Agilent 1290 Infinity Diode Array Detector

Features, Technical Details, Specifications and Ordering Details

World's most sensitive and fastest diode-array detector

The 1290 Infinity Diode Array Detector (DAD) features a completely new optical design based on the Agilent Max-Light cartridge cell with optofluidic waveguides. With typical detector noise levels of < ± 0.6 µAU/cm the revolutionary 6 cm flow cell gives up to 10 times higher sensitivity than the 1200 Series DAD and VWD. Any compromising refractive index and thermal effects are almost completely eliminated, resulting in significantly less baseline drift for more reliable and precise peak integration. For ultra high productivity the 1290 Infinity DAD offers multiple wavelength and full spectral detection at sampling rates up to 160 Hz.

Features

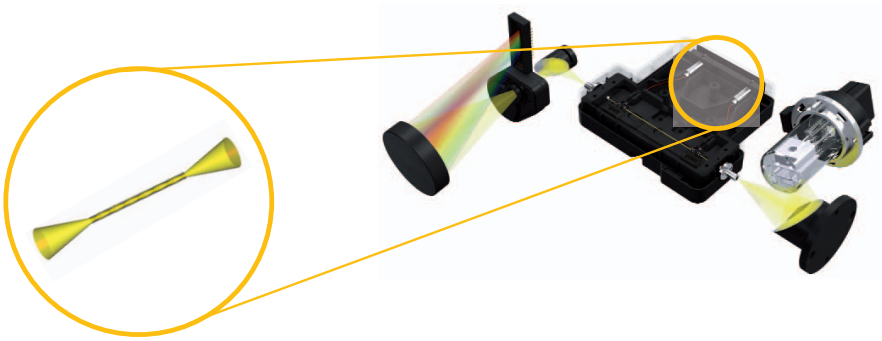
- Ultra sensitivity through revolutionary Agilent Max-Light cartridge cell with 60 mm optical path length (typically noise: < ± 0.6 µAU/cm).
- Universal Agilent Max-Light cartridge standard cell with 10 mm optical path length provides high sensitivity (noise: < ± 3 µAU) and lowest peak dispersion for 2.1, 3 and 4.6 mm ID columns.
- Programmable slit from 1 to 8 nm provides optimum incident light conditions for rapid optimization of sensitivity, linearity and spectral resolution.
- Multiple wavelength and full spectral detection at high sampling rate of 160 Hz, keeping pace with fastest possible analysis speed.
- More reliable and robust peak integration process due through less baseline drift.
- Full spectral detection for compound identification by spectral libraries or verification of the separation quality with peak purity analysis for ultra fast LC. Simultaneous detection of up to 8 signals for increased sensitivity and selectivity.
- Wide linear range (typically up to 2.5 AU) – for reliable, simultaneous quantification of primary compounds, by-products and impurities.
- Radio frequency identification (RFID) technology for flow cells and lamp provide new levels of data security and traceability.
- Electronic temperature control (ETC) provides maximum baseline stability and practical sensitivity under fluctuating ambient temperature and humidity conditions.
- Reference wavelength for elimination of background interference.

Agilent Technologies

Technical Details – Agilent 1290 Infinity Diode Array Detector

Optofluidic waveguides technology

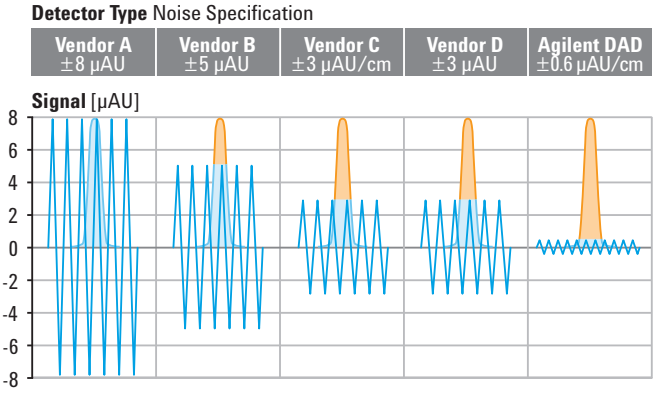
The optical design of the 1290 Infinity DAD is based on the Agilent Max-Light cartridge cell with optofluidic waveguides. This new cell technology increases dramatically the light transmission by utilizing the principle of total internal reflection in a non-coated fused silica fiber, without sacrificing resolution caused by cell dispersions effects.



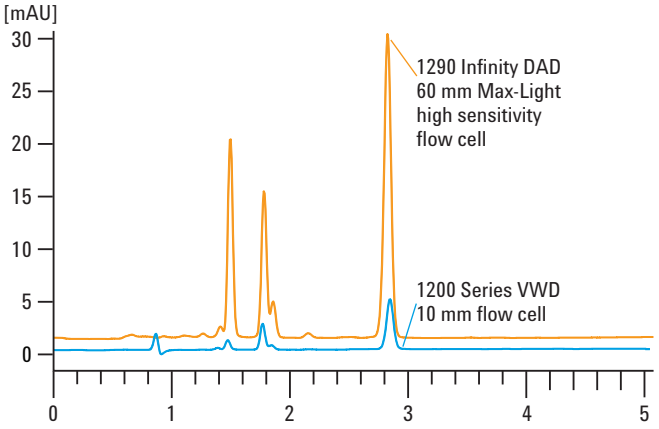
Optofluidic waveguides – Agilent Max-Light cartridge cells utilize total internal reflection in non-coated fused silica fiber. The cartridge design facilitate easy exchange of flow cells.

Ultra UV sensitivity

The 1290 Infinity DAD with the revolutionary Max-Light cartridge cell with 60 mm path length is by far the most sensitive UV-detector in world. With typical detector noise levels of less than ± 0.6 ÌAU/cm the flow cell gives you up to 10 times higher sensitivity than the 1200 Series DAD or VWD.



Comparison of DAD noise specifications from different vendors

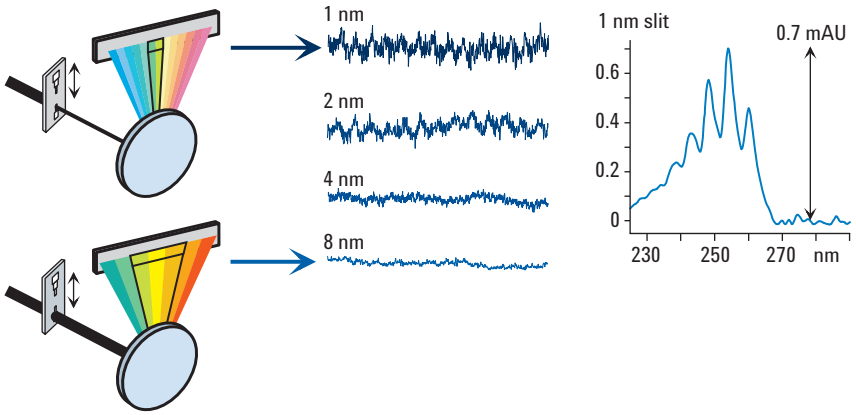


	1290 Infinity DAD 60 mm cell	1200 Series DAD 10 mm cell	1100 Series VWD 10 mm cell
Height [mAU]	28.88	4.938	4.800
Noise [µAU]	9.806	19.08	18.94
Signal/noise	2944	259	253

Comparison of signal to noise ratios for anthracene with different UV-detectors.
The 1290 Infinity DAD delivers 11 times higher sensitivity than the 1200 Series DAD and VWD.

Programmable slit for rapid optimization of sensitivity, linearity and spectral resolution

The optical design of the 1290 Infinity DAD is based on the Agilent Max-Light cartridge cell with optofluidic waveguides. This new cell technology increases dramatically the light transmission by utilizing the principle of total internal reflection in a non-coated fused silica fiber, without sacrificing resolution caused by cell dispersions effects.

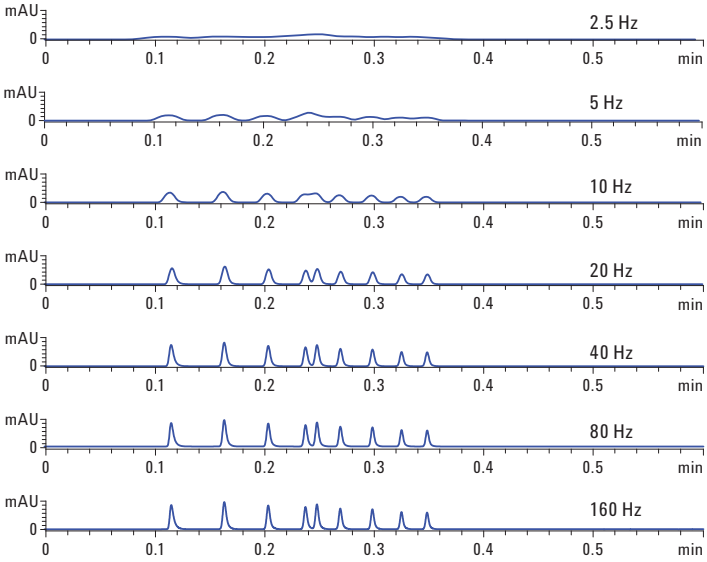


Highest data rates for ultra-fast LC

Ultrafast LC analyses with small peak widths require fast data rates to maintain chromatographic resolution. The 1290 Infinity diode array detector offers both multiple wavelength and full spectral detection at highest sampling rates of 160 Hz, keeping pace with the analysis speed of ultrafast LC.

Data rate (Hz)	Resolution peak 5	Peak width last peak (min)	Peak height (mAU) of peak 3
160	1.89	0.00307	1171.2
80	1.83	0.00323	1131.1
40	1.57	0.00381	1006.4
20	1.06	0.00565	738.6
10	0.56	0.0102	431.2
5	–	0.0203	217.1
2.5	–	–	–

Influence of data rate on resolution, peak width and peak height.



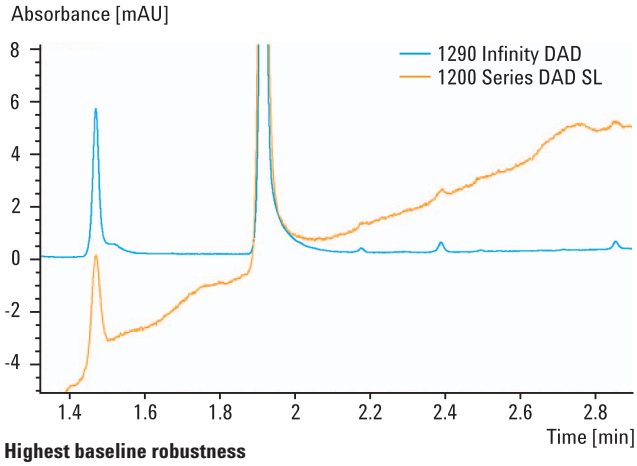
Influence of data on resoluition and peak width.

Chromatographic method

Column:	Agilent ZORBAX RRHD Eclipse Plus C18, 50 mm × 2.1 mm, 1.8 µm
Sample:	Set of 9 compounds, 100 ng/uL each, dissolved in water/ACN (65/35) 1. Acetanilide, 2. Acetophenone, 3. Propiophenone, 4. Butyrophenone (200 ng/mL), 5. Benzophenone, 6. Valerophenone, 7. Hexanophenone, 8. Heptanophenone, 9. Octanophenone
Injection volume:	1µL with Automatic Delay Volume Reduction (ADVR)
Column temperature:	60 °C
Mobile phases:	Water(A) and Acetonitrile (B)
Gradient:	At 0 min 35% B, at 0.3 min 95% B
Flow:	1.5 mL/min
Stop time:	0.6 min
DAD:	2.5 up to 160 Hz, 245/10 nm, Ref 360/80

Highest baseline robustness

The optofluidic waveguides in the Max-Light cartridge cells eliminates almost any compromising refractive index and thermal effects, resulting in significantly less baseline drift for more reliable and precise peak integration.



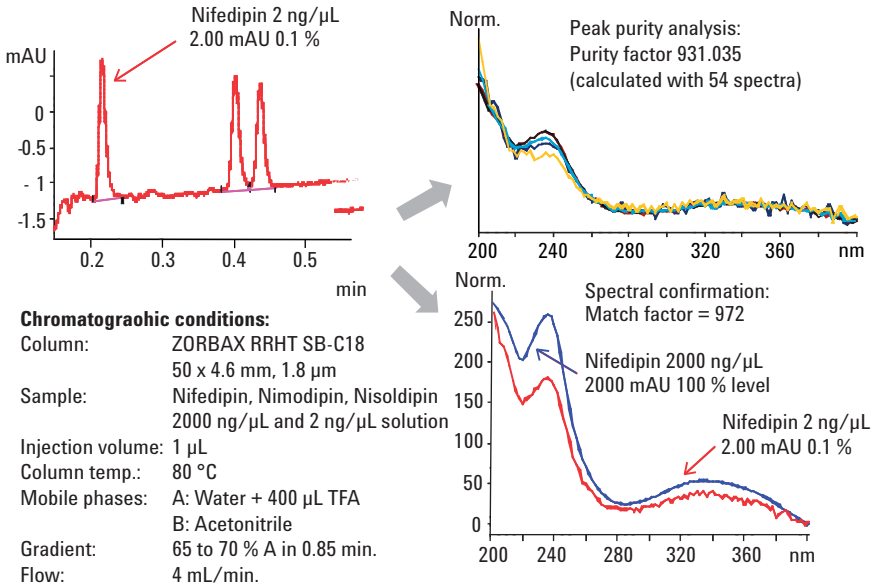
Highest baseline robustness

Column:	ZORBAX RRHT SB-C18, 2.1 x 50 mm, 1.8 µm	Elution:	5-95 %B over 3 min
		Flow:	0.5 mL/min
Mobile phase:	A: Water	Temperature:	80 °C
	B: Acetonitrile	Detection:	254/4 (360/80) nm, 40 Hz

Highest baseline robustness through significantly reduced refractive index effects.

Spectral confirmation and purity analysis

The spectral analysis of 54 spectra within the first peak confirms the purity at trace levels (<0.1 %) and under ultra-fast conditions. A library search identifies the peak as nifedipin with a match factor of 972. This positive spectral confirmation significantly enhances confidence in qualitative results.

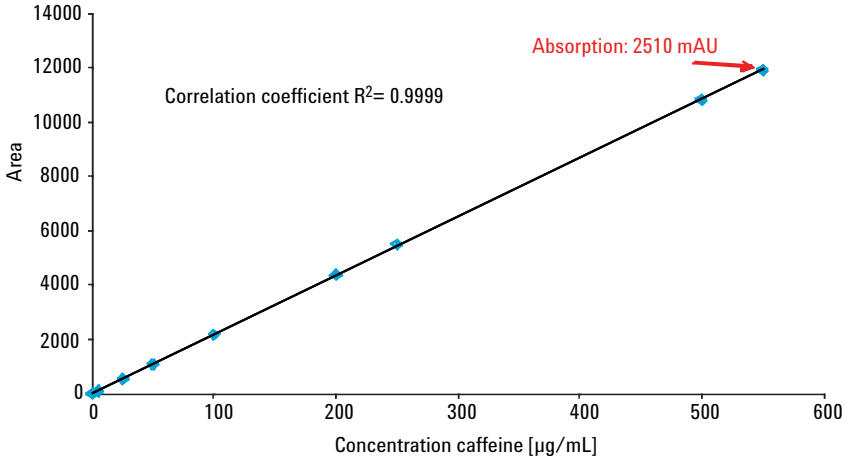


Chromatograohic conditions:

Column:	ZORBAX RRHT SB-C18 50 x 4.6 mm, 1.8 µm
Sample:	Nifedipin, Nimodipin, Nisoldipin 2000 ng/µL and 2 ng/µL solution
Injection volume:	1 µL
Column temp.:	80 °C
Mobile phases:	A: Water + 400 µL TFA B: Acetonitrile
Gradient:	65 to 70 % A in 0.85 min.
Flow:	4 mL/min.
DAD:	80 Hz, 245/4 nm, Ref. 450/80, slit 8 nm, all spectra

Wide linear range

With a typical linear range of up to 2.5 AU the 1290 Infinity DAD allows the reliable, simultaneous quantification of primary compounds, by-products and impurities.



Detector linearity of up to 2.5 AU demonstrated by linearity plot of different caffeine concentrations.

Specifications – Agilent 1290 Infinity Diode Array Detector

Specifications: Agilent 1290 Infinity Diode-Array Detector (G4212A)	
Detector type	1024-element diode array
Light source	Deuterium
Number of signals	8
Maximum sampling rate	160 Hz (both spectra and signals)
Short-term noise	< ± 3 x 10^{-6} AU at 230/4 nm, slit width 4 nm, TC 2 sec, ASTM with 10 mm Max-Light cartridge cell Typically < ± 0.6 × 10^{-6} AU/cm at 230/4 nm, slit width 4 nm, TC 2 sec, ASTM with 60 mm Max-Light cartridge cell
Drift	< 0.5 x 10^{-3} AU/hr at 230 nm
Linearity	> 2.0 AU (5 %) at 265 nm Typically 2.5 AU (5 %)
Wavelength range	190-640 nm
Wavelength accuracy	± 1 nm, self-calibration with deuterium lines
Slit width	Programmable: 1, 2, 4, 8 nm
Diode width	~ 0.5 nm
Wavelength bunching	Programmable, 2 - 400 nm, in steps of 1 nm
Flow cells	• Max-Light Cartridge Cell (Standard) 10 mm, σ_V = 1.0 µL, with RFID tags • Max-Light Cartridge Cell (High Sensitivity) 60 mm, σ_V = 4 µL, with RFID tags • Max-Light Cartridge Ultra Low Dispersion (ULD) Cell 10 mm, σ_V = 0.6 µL, with RFID tags • Max-Light Cartridge High Dynamic Range (HDR) Cell 3.7 mm, σ_V = 0.8 µL, with RFID tags Maximum Operating Pressure (MPO)[1]: 70 bar Maximum Incidental Pressure (MIP)[2]: 150 bar [1] Maximum operating pressure (MOP): Maximum pressure at which a system can operate continuously under normal conditions. [2] Maximum incidental pressure (MIP): The maximum pressure which the system can experience during a short time.
Spectral tools	Data analysis software for spectra evaluation, including spectral libraries and peak purity functions.
Analog output	Recorder/integrator: 100 mV or 1 V, output range 0.001 – 2 AU, one output
Communications	LAN, controller-area network (CAN), RS-232C, APG Remote: ready start, stop and shut-down signals.
GLP features	RFID for electronics records of flow cell and UV lamp conditions (path length, volume, product number, serial number, test passed, usage) Early maintenance feedback (EMF) for continuous tracking of instrument usage in terms of lamp burn time with user settable limits and feedback messages. Electronic records of maintenance and errors. Verification of wavelength accuracy with deuterium lines.
Safety and maintenance	Extensive diagnostics, error detection and display through Agilent Instant Pilot and Agilent Lab Advisor software. Leak detection, safe leak handling, leak output signal for shutdown of pumping system. Low voltages in major maintenance areas.
Others	Electronic temperature control (ETC) for the complete optical unit.

Orderig Details – Agilent 1290 Infinity Diode Array Detector

Description	Product Number
1290 Infinity Diode Array Detector Includes Max-Light Standard Cartridge Cell with 10 mm path length.	G4212A
Change to Max-Light High Sensitivity Cartridge Cell with, 60 mm path length.	#030
Add G4212-60007 Max-Light High-Sensitivity Flow Cell with 60 mm path length.	#031
Add G4212-60011 Max-Light Cartridge Test Cell	#040
Max-Light Standard Cartridge Cell 10 mm path length	G4212-60008
Max-Light High Sensitivity Cartridge Cell 60 mm path length	G4212-60007
Max-Light Cartridge Test Cell	G4212-60011

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