

C-Band Wavelength Calibrator Hydrogen Cyanide Gas Cell $H^{13}C^{14}N$

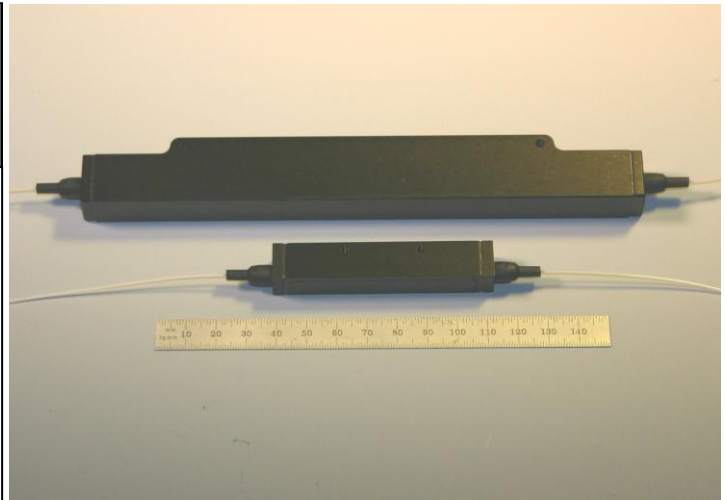
Gas cells are precision filters whose wavelength depends on molecular energy levels. Hydrogen Cyanide gas absorption has been widely researched and identified by national standards bodies as a primary wavelength reference in the C-band from 1525nm to 1565nm.

Our NIST traceable HCN gas cells are offered in two sizes that give the same wavelength spectrum but different absorption depths.

The cells are hard sealed for long life and feature advanced optical design for very low level of interference artifacts.

Cells can be offered at 100 Torr pressure, equivalent to the NIST SRM2519, 25 Torr equivalent to NIST SRM2519A, or a custom pressure. The main affect of pressure is to change the absorption linewidth.

The cells may be ordered with single mode fiber pigtailed with or without connectors, with a built in InGaAs photodetector for direct board mount, or in a rugged instrument package with bulkhead optical connectors. This housing can be loaded with up to three gas cells of any type.



Specifications¹

Gas Lines:

Wavelength Range	nm	1525nm to 1565nm
Wavelength Accuracy	pm	±0.05
Temperature dependence	pm	<0.01/°C
Linewidth (FWHM)	nm	0.068 typical (100Torr)
	nm	0.016 typical (25 Torr)
	nm	0.008 typical (10 Torr)
HCN Pressure (25 °C)	Torr	1 to 600 ±10% (custom)
Carbon Isotope		13 standard (12 optional)
Absorption line depth (R9) ² C-size	dB	3.2 typical (100 Torr)
	dB	3.1 typical (25 Torr)
	dB	2.5 typical (10 Torr)
Absorption line depth (R9) ² M-size (miniaturized)	dB	1.2 typical (100 Torr)
	dB	1.1 typical (25 Torr)
	dB	0.9 typical (10 Torr)
Interference artifacts	dB	<0.1 P-P
Operating temperature	°C	+5 to +70
Storage temperature	°C	-40 to +80
Shock	g	>100
Cell Lifetime	years	>10

- Specifications subject to change without notice
- For instruments that have resolution better than the line width. When probed with lower resolution devices contrast is reduced

Features

- The “Ultimate” in stability and accuracy
- Reliable hard sealed tube, >10 year life
- AR coated optics and wedged windows for low level of spectral artifacts
- Rugged miniaturized package
- Custom pressure and connectors
- Low cost
- Full C-band coverage

Applications

- Embedded calibrator for tunable laser or OSA
- Wavelength locker
- Laboratory Calibration source
- Sensing Systems

Ordering Information (example)

HCN - 13 - C - 100 - None

Isotope:
Standard: 13
Optional: 12

Pressure:
Torr

Type:
Cell with pigtailed: C (C-size)
M (M-size)
Photodiode output: CP or MP

Connector(s):
FCPC
FCAPC
SCPC
SCAPC
None

Wavelength λ References Inc

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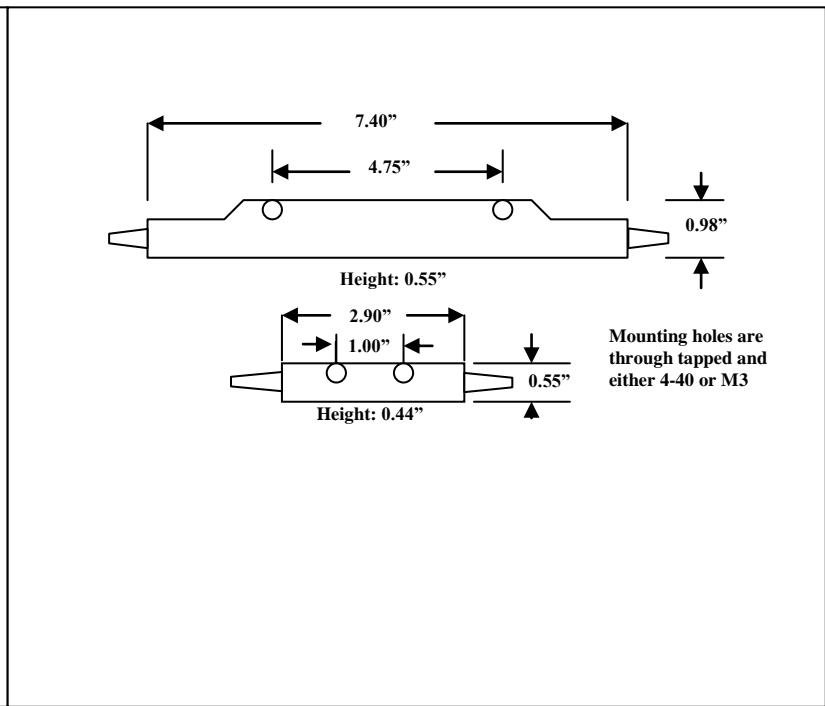
Tel: 541-738-0528 Office, 741-740-1030 Mobile

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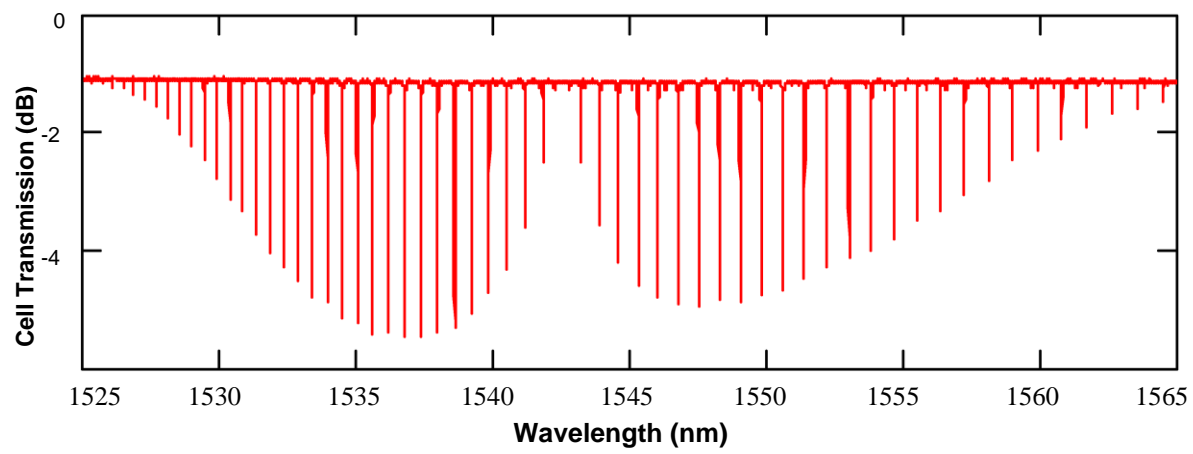
R Branch	Wavelength (nm)	P Branch	Wavelength (nm)
25	1528.0541	1	1543.1148(6)
24	1528.4862(6)	2	1543.8094
23	1528.9271	3	1544.5147
22	1529.3762	4	1545.2314(6)
21	1529.8376(6)	5	1545.9563(6)
20	1530.3061	6	1546.6902
19	1530.7856	7	1547.4354
18	1531.2764(6)	8	1548.1904
17	1531.7738	9	1548.9554(6)
16	1532.2825	10	1549.7302(6)
15	1532.8024(6)	11	1550.5149(6)
14	1533.3291	12	1551.3106
13	1533.8671	13	1552.1157
12	1534.4159(6)	14	1552.9308
11	1534.9723	15	1553.7560
10	1535.5401(6)	16	1554.5892(6)
9	1536.1170(6)	17	1555.4346(6)
8	1536.7034(6)	18	1556.2919
7	1537.2997(6)	19	1557.1573
6	1537.9069	20	1558.0329
5	1538.5224(6)	21	1558.9185
4	1539.1494	22	1559.8143
3	1539.7855	23	1560.7185(6)
2	1540.4314	24	1561.6344(6)
1	1541.0872	25	1562.5625
0	1541.7529		

100 Torr Hydrogen Cyanide Spectrum



Cyanide gas absorption vacuum center wavelengths of the $2\nu_3$ band of $H^{13}C^{14}N$. The total uncertainty of these lines is $\pm 0.0015\text{nm}$ and is dominated by the pressure shift uncertainty. The US National Bureau of Standards and Technology (NIST) has measured 21 of these lines on a similar cell of their own design and certified their center wavelengths with an expanded uncertainty of $\pm 0.0006\text{nm}$ (coverage factor of 2). Coverage factor of 2 means the uncertainty given is twice the standard deviation (1 sigma). These lines are shown with a (6) in the table. The line centers at low pressure ($<10\text{Torr}$) are known to $\pm 0.05\text{pm}$ (1 sigma). For very high accuracy applications involving narrow line widths ($<<0.05\text{nm}$), choose a lower pressure. Our gas cells are fully NIST traceable. Please visit our website and the library of papers for more information or visit the NIST website www.boulder.nist.gov and navigate to the optoelectronics section.

Safety Note: The total quantity of hydrogen cyanide in a standard cell (100Torr) is about 1 milligram, other cell configurations (eg "Mini and/or lower pressure") contain much less. Small amounts of cyanide are a normal result of metabolism and there is no cumulative effect. For example, the blood of a healthy individual contains about 0.4 milligrams per liter and much more than that if smoking. If the total cell contents were somehow ingested the resultant increase in cyanide would hardly be detectable much less harmful. The OSHA limit for worker exposure is 5 milligrams per cubic meter for an 8-hour shift. For these reasons even in the unlikely event of a cell breakage the small quantity of cyanide in a cell poses no health hazard. In addition for the same reasons the devices can be shipped by any customary means without warning labels. Request our detailed safety analysis for further test data and analysis.



Graph of cell transmission vs wavelength for C-size HCN cell. Note lack of residual spectral artifacts.