

### Hydrogen Cyanide Fiber coupled gas cell for Remote Optical Gas Sensor and Calibration C-Band

Gas cells are precision filters whose absorption wavelengths depend on specific molecular energy level transitions.  $H^{13}C^{14}N$  molecular absorption lines have been identified by national standards bodies as a primary wavelength reference in the C-band (1530nm-1565nm).

Our NIST-traceable  $H^{13}C^{14}N$  gas cells are offered in two standard pressures: 100 Torr and 25 Torr (equiv. to SRMs 2519 and 2519a, respectively). Cells are available in two standard sizes –5.5cm path length (*shown here*) and 16.5cm. Generally, path length will affect measured absorption depth and pressure will affect the linewidth.

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

Cells may be ordered fully fiber-coupled (single-mode fiber, with or without connectors), or with a built-in InGaAs photo-detector on one end for direct board mount.

Additional housing sizes and gases available.

### Specifications<sup>1</sup>

#### Gas Lines:

Wavelength Range	nm	1525 to 1565
Wavelength Accuracy <sup>2</sup>	pm	< ± 0.2pm (expanded uncertainty)
Absorption line depth <sup>3</sup> (R8 line)	dB	3.2 (16.5cm; typ.) 1.1 (5.5cm; typ.)
Linewidth (R8 line; FWHM, log scale)	pm	68 (100 Torr; typ.) 16 (25 Torr; typ.)
Temperature Dependence	pm	<0.01/°C
Custom Pressures (25 °C)	Torr	10 to 740 ± 10%
Carbon Isotope		13 standard (12 optional)

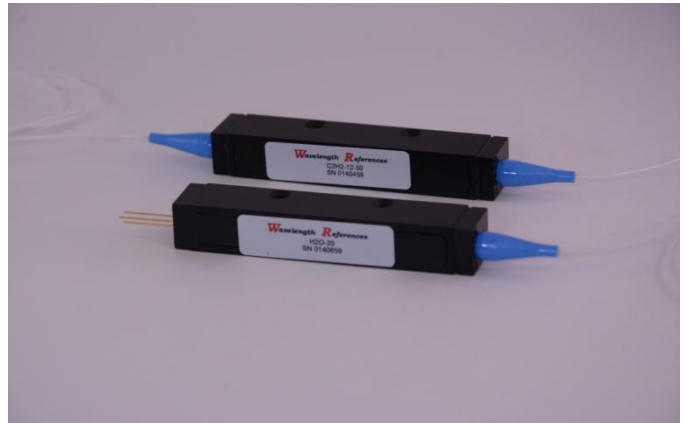
#### Gas Cell:

Cell Transmission	%	>50; fiber to fiber
Spectral ripple (P-P)	dB	<0.1 P-P in any 2nm span
Cell Lifetime	years	>10
Operating temperature	°C	+5 to +70
Storage temperature	°C	-40 to +80
Shock	g	>100, 3 axes
Connector Type		FCAPC, SCAPC, FCPC, SCPC, none, PD(photodetector)

#### Photodetector:

Net Responsivity	A/W	>0.5
Capacitance (0V)	pF	4 typical
Shunt Resistance	MΩ	>5

- 25 °C; Specifications subject to change without notice
- Expanded uncertainty on least accurate line (P7) for 25 Torr. See table next page.
- For instruments with resolution better than the linewidth. Using lower resolution instruments could understate absorption.



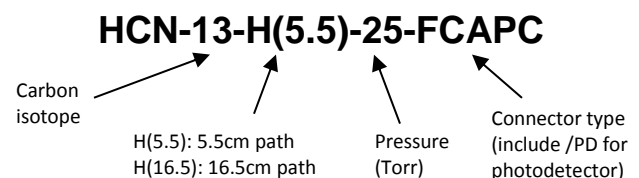
### Features

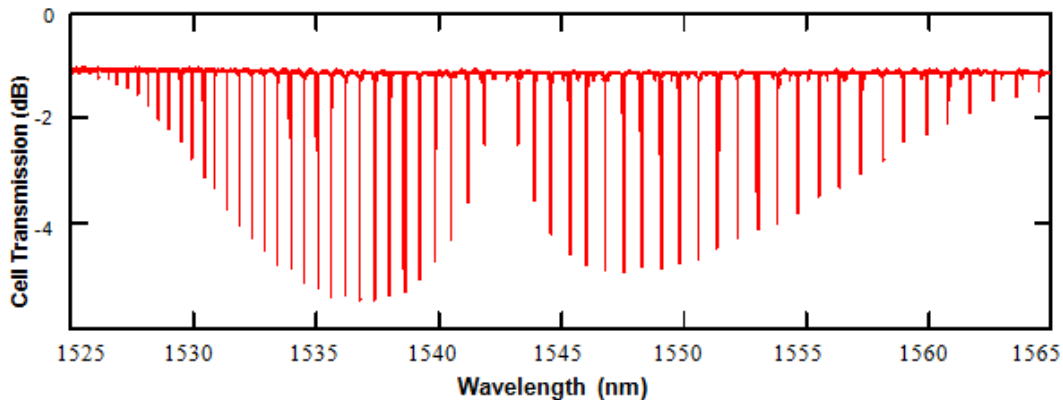
- Hermetic seal, >10 year life
- Wedged windows and coated optics for minimum interference artifacts
- Rugged miniaturized package (5.5cm path length)
- Custom pressures and options available
- Low cost
- Full C band coverage

### Applications

- Remote optical gas sensing systems
- Bump testing gas detectors
- Tunable laser calibration
- OSA or tunable filter calibration
- Wavelength/frequency locking

### Ordering Information (example)





Graph of cell transmission vs. wavelength for 16.5cm H<sup>13</sup>C<sup>14</sup>N cell.

R Branch	Wavelength (nm)	P Branch	Wavelength (nm)
26	1527.63342(12)	1	1543.11423(5)
25	1528.05474(15)	2	1543.80967(18)
24	1528.48574(9)	3	1544.51503(8)
23	1528.92643(6)	4	1545.23033(7)
22	1529.37681(7)	5	1545.95549(7)
21	1529.83688(6)	6	1546.69055(8)
20	1530.30666(8)	7	1547.43558(24)
19	1530.78615(8)	8	1548.19057(7)
18	1531.27537(7)	9	1548.95555(4)
17	1531.77430(8)	10	1549.73051(4)
16	1532.28298(8)	11	1550.51546(5)
15	1532.80139(7)	12	1551.31045(9)
14	1533.32954(8)	13	1552.11546(10)
13	1533.86745(7)	14	1552.93051(9)
12	1534.41514(6)	15	1553.75562(12)
11	1534.97258(6)	16	1554.59079(10)
10	1535.53981(5)	17	1555.43605(11)
9	1536.11683(4)	18	1556.29141(15)
8	1536.70364(5)	19	1557.15686(15)
7	1537.30029(6)	20	1558.03240(15)
6	1537.90675(13)	21	1558.91808(14)
5	1538.52305(7)	22	1559.81389(14)
4	1539.14921(12)	23	1560.71983(10)
3	1539.78523(9)	24	1561.63593(9)
2	1540.43120(10)	25	1562.56218(13)
1	1541.08703(10)	26	1563.49859(16)
0	1541.75280(6)	27	1564.44519(21)

### 25 Torr H<sup>13</sup>C<sup>14</sup>N Center Wavelengths

Values as stated by NIST. Expanded (2 sigma) uncertainties are stated in parenthesis and apply to least significant digits.

## NIST Traceability

The resulting absorption spectra exhibited by Wavelength References H<sup>13</sup>C<sup>14</sup>N Cells are determined by fundamental molecular energy level transitions that have been well characterized by standards bodies such as NIST. As such, the presence of H<sup>13</sup>C<sup>14</sup>N at a specified pressure guarantees repeatable absorption spectra characteristics. Our pressure uncertainty of +/- 10% falls within NIST's stated uncertainty of +/- 20%. We can therefore state with assurance that our cells are NIST-traceable.

## Material Handling

Safety is always an appropriate concern. Occupational Safety & Health Administration (OSHA) lists a Permissible Exposure Limit (PEL) for H<sup>13</sup>C<sup>14</sup>N of 11mg/m<sup>3</sup> over an 8-hour period (time-weighted average). Our 16.5cm 100 Torr cells contain approximately 1 mg of H<sup>13</sup>C<sup>14</sup>N, while the 5.5cm path 25 Torr cells contain <40 µg – far below any quantity deemed hazardous by OSHA. Therefore, no special provisions are necessary for the handling of these cells, and they may be shipped by any customary means.