

C-band Calibrators: Acetylene Cells: C2H2-M

Acetylene gas absorption has been widely researched and identified by national standards bodies as a primary wavelength reference in the band 1510nm-1540nm. Move your calibration system to a physical constant. Gas cells are inherently NIST traceable, have unparalleled accuracy, and extremely low drift. Standard pressures offered are 20 Torr where the linewidth is about 5pm, 50 Torr matching NIST SRM2517A, 200 Torr matching the NIST SRM2517, and 400 Torr. The line depth given will only be seen if the instrument (filter resolution or laser linewidth) can resolve the absorption linewidth. We allow the acetylene pressure to be tailored to your application

The cell is offered in several configurations

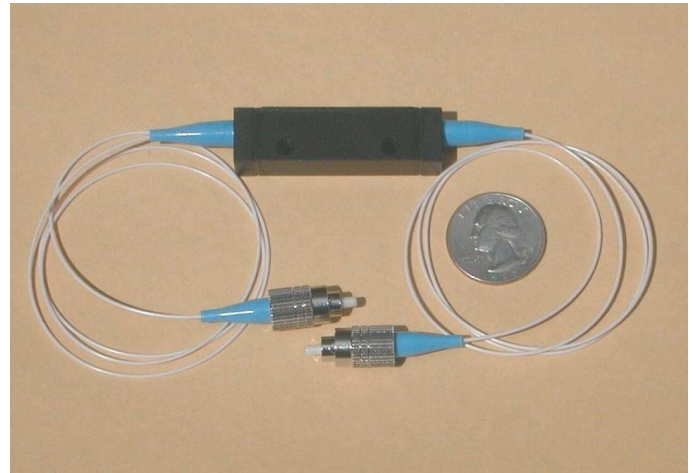
1. With fiber input and output for applications needing optical output such as a OSA calibrator.
2. Absorption tube (glass only) , 5mm by 30mm
3. With a built in InGaAs photodiode for direct board mount

Note: We can also package in a metal instrument housing which is useful for lab applications and provides bulkhead connectors for convenience and ruggedness. It can also be filled with HCN gas instead of acetylene which allows full C-band coverage at reduced line depth ie approximately 1dB instead of 7dB

Specifications¹

Gas Lines:		
Wavelength range	nm	1510 to 1540
Wavelength Accuracy	pm	±0.3 (1σ, 200 Torr, 400 Torr) ±0.01 (1σ 20 Torr)
Temperature dependence	pm	<0.01/°C
Atmospheric pressure or humidity dependence		not detectable
Linewidth ² (-3dB)	nm	0.025 typical (200Torr)
Acetylene Pressure (25 °C)	Torr	10 to 600 ±10%
Carbon Isotope		12 standard (13 optional)
Absorption line depth (R9)	dB	7 typical (200 Torr, 400 Torr) 5 typical (20 Torr)
Cell Transmission	%	>50%
Cell Lifetime	years	>20
Operating temperature	°C	-20 to +80
Storage temperature	°C	-40 to +100
Photodiode:		
Net responsivity	A/W	>0.5
Capacitance (0V)	pf	50 typical
Shunt resistance	MΩ	>5

1. Specifications subject to change without notice
2. For 200 Torr, 0.05nm for 400 Torr. Minimum linewidth at pressures <20Torr is 0.005nm. Match pressure to application for best performance



Features

- Hermetic seal, >20 year life
- Wedged windows and coated optics for minimum interference artifacts
- Rugged miniaturized package
- Custom pressure and options
- Low cost

Applications

- Sensor system calibrator
- Wavelength calibrator for tunable laser
- Wavelength calibrator for OSA or tunable filter
- Wavelength locker

Ordering Information (example)

C2H2	-12	- M	- PD	- 200	- None
				<u>Pressure:</u> Torr	<u>Connector(s):</u> FCPC FCAPC SCPC SCAPC None
		<u>Size:</u> Mini: M			
			<u>Output:</u> Photodiode Output: PD Fiber Output: F Tube only: T		
<u>Isotope:</u> Carbon Isotope: 12, 13					

Wavelength λ References

Wavelength References
14711 S Buckner Creek Rd
Mulino, OR 97042 USA
Tel: (503) 632-5240 632-5215(fax)
Email: sales@wavelengthreferences.com

R Branch	Wavelength (nm)	P Branch	Wavelength (nm)
25	1513.2010	1	1525.7602
24	1513.5841	2	1526.3142
23	1513.9735	3	1526.8746(1)
22	1514.3692	4	1527.4415(1)
21	1514.7712	5	1528.0147(1)
20	1515.1794	6	1528.5942(1)
19	1515.5939	7	1529.1802
18	1516.0148	8	1529.7726
17	1516.4419(1)	9	1530.3714
16	1516.8754	10	1530.9766(1)
15	1517.3151	11	1531.5882
14	1517.7612	12	1532.2063
13	1518.2136	13	1532.8307(1)
12	1518.6723	14	1533.4617(1)
11	1519.1373(1)	15	1534.0991
10	1519.6087	16	1534.7429
9	1520.0864	17	1535.3932
8	1520.5704	18	1536.0498
7	1521.0608(1)	19	1536.7130
6	1521.5574	20	1537.3826
5	1522.0605	21	1538.0587
4	1522.5699	22	1538.7413
3	1523.0857	23	1539.4304(1)
2	1523.6077	24	1540.1259(1)
1	1524.1362(1)	25	1540.8280(1)

200 Torr Acetylene Lines

Dimensions

M package:

Length: 50mm
 Width: 13.9mm
 Height: 11.1mm

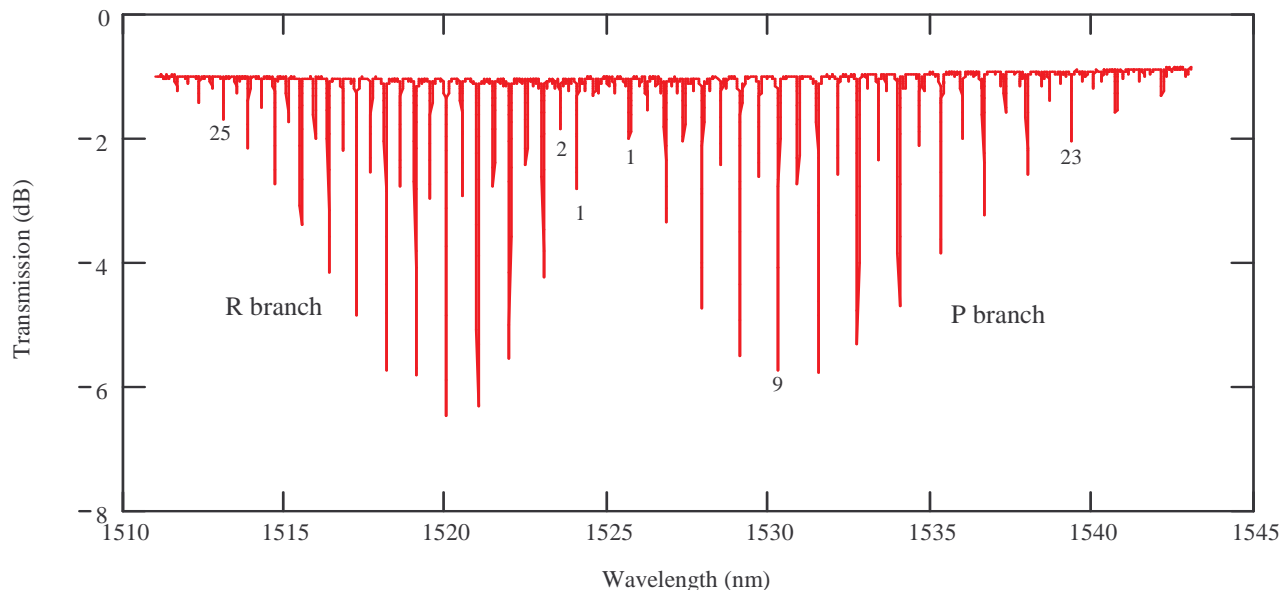
Tube

Length: 30 mm
 Diameter: 5 mm OD
 Tipoff length: <5 mm

Ordering Information for Instrument housing:

The cells may be ordered enclosed in a metal instrument housing for protection against fiber breakage and for convenience in laboratory applications. Up to two cells of any type (ie hydrogen cyanide, carbon monoxide, etc) can be ordered in a given housing. The housing used is 28 cm wide by 6.5 cm high by 32 cm deep. To order this option append "with instrument housing" to part number.

Acetylene absorption vacuum center wavelengths of the $\nu_1+\nu_3$ band of $^{12}\text{C}_2\text{H}_2$. Wavelengths are adjusted for the pressure shift of 200 Torr. The US National Institute of Standards and Technology (NIST) has measured these lines on a similar cell of their own design. Not all lines were directly measured for pressure shift. Lines not directly measured were fit to the pattern of pressure shift values as a function of line number from the very accurate low pressure values. The additional errors associated with this procedure are estimated to be <0.1pm. The lines directly measured are indicated by (1) after the wavelength. These lines are known with an expanded uncertainty of 0.1pm coverage factor 2. The coverage factor 2 means the 1σ uncertainty is 0.05pm. The uncertainty in the other lines is estimated to be <0.3pm 1σ .



Plot of transmission of M style 200 Torr acetylene cell taken on OSA with 10 pm resolution