The SBS-Cell DATASHEET, October 2022



Phase Conjugating Mirror



Stimulated Brillouin Scattering (SBS) is one of the most common nonlinear optical processes for achieving Phase Conjugating Mirror (PCM). Phase conjugating SBS mirrors are simple self-pumped devices that can easily be applied in double-pass amplifier configurations as high-reflecting mirrors. The wavefront inversion with respect to the propagation direction of the light, the phase conjugation, allows for the compensation of phase distortions from, for example, the active material in solid-state lasers in the second pass. As result, almost ideal wavefronts can be obtained at the output of such lasers. The beam quality of such laser systems containing phase conjugating SBS mirrors can be diffraction-limited, although the phase distortions from the highly pumped and thus strongly thermally stressed active material would not allow beam propagation factors better than 10.

Besides phase conjugation mirror the SBS cells can be applicable for another important phenomenon called SBS pulse compression. The SBS pulse compression is based on the ability of an SBS-active material to amplify the leading edge of a backward Stokes pulse in the field of forward-propagating pump beam.

Features

- Compact design
- Custom cell length, mounting and its designs are welcome!
- Non-toxic (fluorinert) SBS active liquids are default
- Available models with build-in frontal focusing lens

Specifications

Typical Specifications	Value		
SBS Cell lengths	200, 250, 300, 400, 500 mm		
Standard window diameters	Ø20 mm, Ø25 mm		
Beam Height	25mm or 50 mm		
Rigid Stainless steel /Standard Glass type	YES / YES		

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Important note

Because the buildup of PCM in SBS materials is based on interference effects in the volume, the coherence demands of the pump light are important feature and shall be considered before ordering any of SBS cell.

Application

- Phase Conjugation Mirror
- Beam cleanup
- Beam combining



- Pulse compression (shortening) reshaping
- Increasing self-phase modulation



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Typical SBS Liquids

"—" means no relevant data

Liquid	Refractive index (n)	Density (g/cm³)	SBS gain coefficient (cm/GW)	Phonon lifetime (ns)	Brillouin linewidth (MHz)	Brillouin shift (MHz)
H ₂ O	1.324	1.0	3.8	1.87	317	5690
CS ₂	1.632	1.26	68	6.4	52.3	5850
GeCl ₄	1.460	1.87	12	2.3	69.2	2100
SnCl ₄	1.360	2.33	11	1.75	182	2210
SiCl ₄	1.410	1.48	10	-	-	2160
TiCl ₄	1.610	1.73	14	1.47	108.3	3000
CCI ₄	1.460	1.60	6.0	0.6	520	4390
Methanol	1.328	0.81	13	1.27	250	4250
Ethanol	1.361	0.79	12	0.9	353	4550
Acetone	1.358	0.79	15.8	2.67	224	4600
Toluene	1.496	0.87	13	1.27	250	5910
n-hexane	1.375	0.66	26	1.43	222	4402
Cyclohexane	1.426	0.78	6.8	0.41	774	5550
FC-40	1.290	1.87	3.8	0.2	1292	<mark>1</mark> 386
FC-43	1.291	1.86	1.3	0.2	-	1073
FC-70	1.303	1.94	0.2	0.031	-	<mark>1</mark> 540
FC-72	1.251	1.68	6 - 6.5	1.2	270	1100
FC-75	1.276	1.77	4.5 – 5	0.9	350	<mark>1</mark> 340
FC-77	1.280	1.78	5.1	0.7	486	1360
FC-84	1.261	1.73	6.0	0.9	371	1221
FC-87	1.238	1.65	6.6	1.1	297	1226
FC-770	1.270	1.79	3.5	0.57	-	1081
FC-3255	1.270	1.77	4.4	0.6	533	1375
FC-3283	1.281	1.83	4.2	0.6	554	<mark>1</mark> 281
HT-55	1.280	1.65	6.2	1.0	318	1112
HT-70	1.280	1.68	5.7	0.9	359	1166
HT-110	1.280	1.72	4.7	0.6	553	1289
HT-135	1.280	1.73	4.4	0.4	718	1294
HT-200	1.281	1.79	3.8	0.2	1724	1446
HT-230	1.283	1.83	4.1	0.1	3159	<mark>1</mark> 515
HT-270	1.283	1.85	2.3	0.1	8401	1697
DET	1.280	1.70	5.7	0.8	405	1143

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Dimensions (for example)

