

**Test report:****50 GHz C-band Tunable Dispersion Compensator Prototype  
ETDC-50-AL1****SN: LF002630****1. Technical specifications**

Specifications below apply over dispersion settings within  $\pm 800$  ps/nm, and channels within 192 – 196 THz.

FSR	50 GHz
Number of etalons (A / B)	1 / 1
Number of etalon passes (A / B)	2 / 2
Channel bandwidth	25 GHz
Channel centre frequencies	50 GHz ITU grid over C-band (192.000 – 196.000 THz)
Dispersion tuning range	$> \pm 800$ ps/nm
Insertion loss at channel centre	$< 4.4$ dB
Insertion loss ripple over channel bandwidth	$< 0.3$ dB
Group delay ripple over channel bandwidth	$< \pm 4.0$ ps
Dispersion slope across 192 – 196 THz	$-0.3$ to $-3.0$ ps/nm <sup>2</sup>
Dispersion deviation from linearity within 192 – 196 THz	$< \pm 5$ ps/nm
PMD	T.B.D.
PDL	T.B.D.
Ambient operating temperature	Room temperature only

*Misra Rouhani July 18/2002*

## 2. Operating instructions

Operation of the Tunable Dispersion Compensator (TDC) requires two thermoelectric cooler controllers.

The TDC contains etalon filters arranged in two groups, called "A" and "B", which are separately temperature controlled. Dispersion is tuned by adjusting the temperatures of A and B.

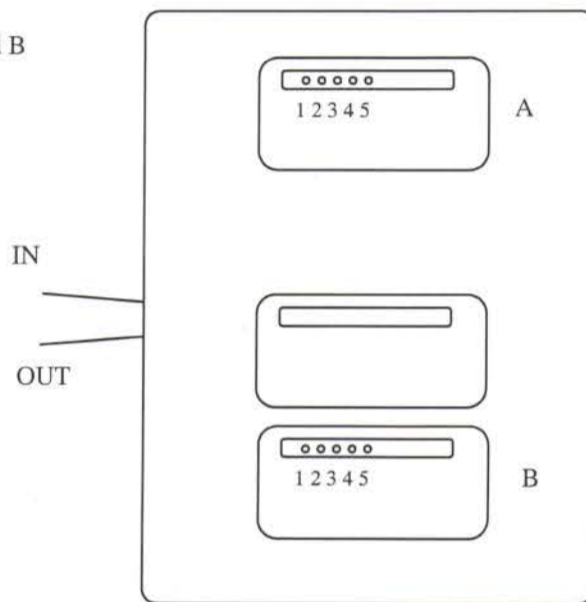
- Temperature sensors: Platinum RTD, 1.0000 k $\Omega$  at 0°C,  $\alpha=0.00385 \Omega/\Omega/^\circ\text{C}$ . Resistance vs. temperature characteristics are given in the Appendix.
- TEC current limits:  $\pm 1.0 \text{ A}$
- Temperature settings for the TDC are shown below in the Test Results section.
- Operating temperature range: The evaluation TDC should be operated in a room temperature environment (15 – 30 °C)
- The TDC was tested with a PID controller (Wavelength Electronics LFI-3751) using the control loop parameters shown below:

P	90 A/V (with 1 mA sensor current)
I	1.0 s
D	0 s

### Electrical Connections

Electrical pin connections are the same for A and B

Pin	Connection
1	RTD
2	RTD
3	No connection
4	TEC -
5	TEC +
6	No connection
7	No connection
8	No connection
9	No connection
10	No connection



### Optical connections

Input: FC/PC connector  
Output: FC/PC connector

### 3. Test results

Measured dispersion values at each temperature test point are shown in the table below:

Test temperatures		Dispersion in ps/nm				
T <sub>A</sub> (°C)	T <sub>B</sub> (°C)	192.000 THz channel	193.000 THz channel	194.000 THz channel	195.000 THz channel	196.000 THz channel
51.59	49.47	-980.4	-979.4	-978.3	-980.7	-979.5
51.59	48.83	-936.4	-938.5	-937.9	-940.1	-938.2
51.93	48.49	-891.6	-891.8	-891.3	-892.0	-888.4
51.92	47.88	-844.6	-846.0	-844.4	-844.4	-840.4
52.21	47.24	-776.9	-776.6	-774.6	-773.1	-766.0
52.55	46.29	-683.2	-680.9	-676.8	-672.5	-663.3
52.85	45.34	-590.6	-585.8	-578.7	-572.8	-562.9
53.16	44.42	-499.2	-491.8	-483.1	-475.6	-465.2
53.80	43.43	-402.5	-393.3	-384.2	-374.6	-362.1
53.80	42.48	-305.4	-293.7	-283.7	-271.5	-258.3
54.12	41.48	-207.8	-194.9	-181.1	-168.6	-154.3
54.12	40.17	-106.4	-92.2	-77.7	-63.2	-47.9
54.46	39.62	-38.1	-21.8	-6.9	8.4	24.3
54.78	38.34	81.8	100.1	117.3	133.9	150.0
55.10	37.42	182.4	201.6	219.0	237.7	256.1
55.41	36.47	280.7	301.7	320.5	340.9	359.8
55.73	35.82	357.7	378.3	398.2	418.9	439.2
56.04	34.89	456.3	478.0	499.5	521.2	541.2
56.36	33.94	556.9	580.6	602.6	626.1	646.4
56.67	32.98	658.7	682.1	706.0	729.8	751.6
56.67	32.02	735.2	761.0	785.0	811.7	832.9
56.99	31.40	810.0	836.1	861.5	888.1	909.7
56.99	31.08	833.0	860.3	885.1	912.6	935.1
57.31	30.44	896.9	927.3	954.5	981.0	1004.2
57.30	30.12	917.1	948.4	974.8	1002.8	1025.9

To obtain other dispersion settings, a linear interpolation of the test temperatures should be used. The temperature settings in the table below are obtained from a linear interpolation of the test temperatures:

D (ps/nm)	192 THz channel		193 THz channel		194 THz channel		195 THz channel		196 THz channel	
	T <sub>A</sub> (°C)	T <sub>B</sub> (°C)	T <sub>A</sub> (°C)	T <sub>B</sub> (°C)	T <sub>A</sub> (°C)	T <sub>B</sub> (°C)	T <sub>A</sub> (°C)	T <sub>B</sub> (°C)	T <sub>A</sub> (°C)	T <sub>B</sub> (°C)
-800	52.11	47.46	52.11	47.46	52.10	47.47	52.10	47.48	52.08	47.53
-700	52.49	46.46	52.48	46.48	52.47	46.52	52.46	46.55	52.43	46.63
-600	52.82	45.44	52.81	45.48	52.78	45.55	52.77	45.60	52.74	45.69
-500	53.16	44.43	53.13	44.50	53.11	44.58	53.08	44.65	53.05	44.75
-400	53.80	43.41	53.76	43.50	53.70	43.59	53.64	43.68	53.56	43.79
-300	53.82	42.42	53.80	42.54	53.80	42.63	53.80	42.74	53.80	42.86
-200	54.12	41.38	54.10	41.53	54.06	41.66	54.02	41.78	53.98	41.92
-100	54.15	40.12	54.12	40.27	54.12	40.45	54.12	40.63	54.12	40.81
0	54.56	39.21	54.52	39.39	54.48	39.55	54.42	39.68	54.35	39.80
100	54.84	38.17	54.78	38.34	54.74	38.52	54.69	38.69	54.65	38.85
200	55.16	37.25	55.09	37.43	55.04	37.59	54.98	37.75	54.93	37.91
300	55.49	36.31	55.40	36.49	55.35	36.66	55.29	36.85	55.23	37.02
400	55.86	35.42	55.80	35.62	55.74	35.80	55.65	35.98	55.57	36.14
500	56.18	34.48	56.11	34.69	56.04	34.89	55.98	35.08	55.91	35.27
600	56.49	33.53	56.42	33.76	56.35	33.96	56.28	34.18	56.22	34.36
700	56.67	32.46	56.67	32.76	56.65	33.04	56.58	33.26	56.52	33.45
800	56.95	31.48	56.84	31.70	56.73	31.90	56.67	32.16	56.67	32.41

## Appendix

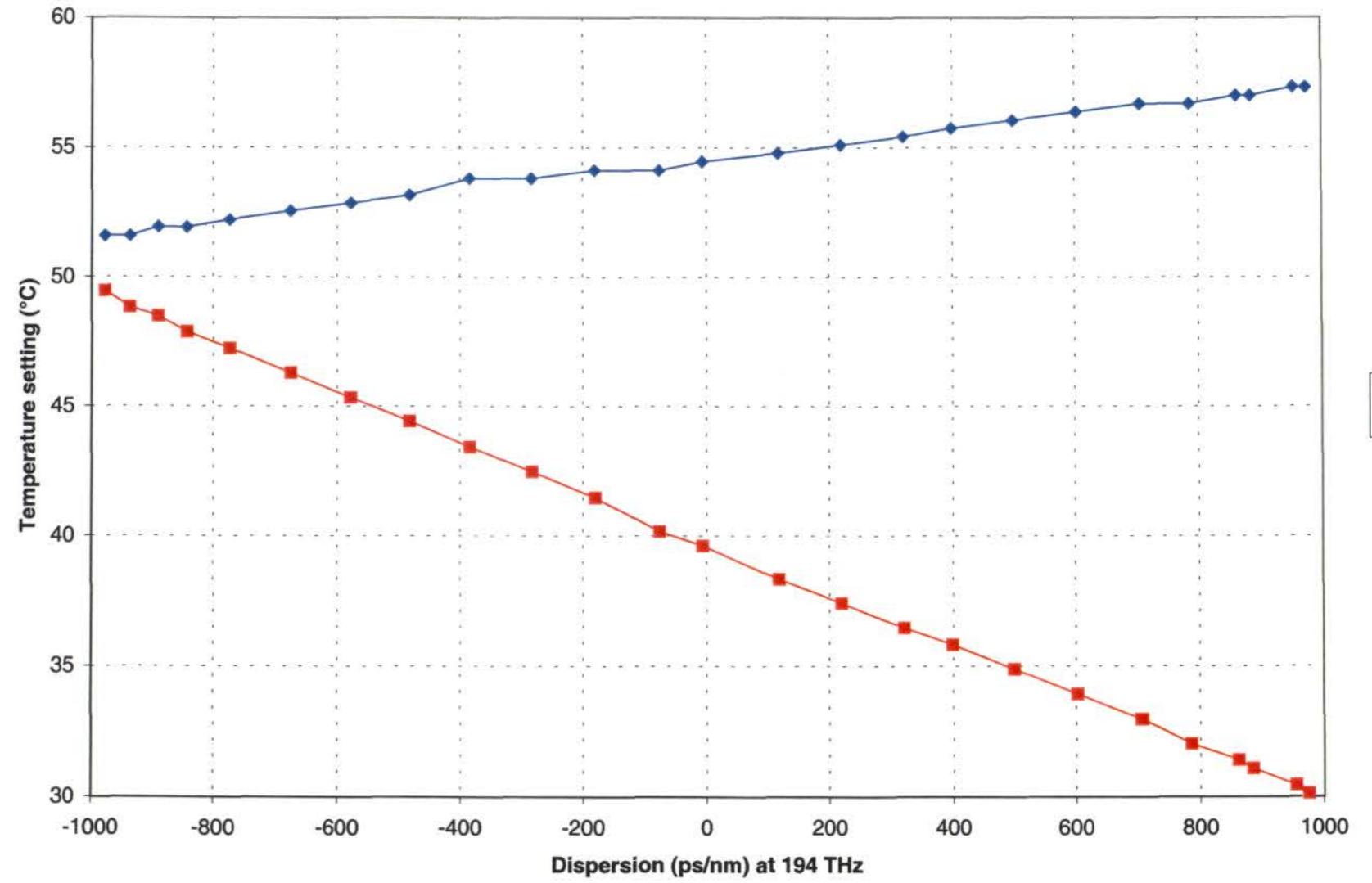
RTD Resistance vs. temperature characteristics.

T°C	R Ω	T°C	R Ω	T°C	R Ω
0	1000	37	1143.817	74	1286.052
1	1003.908	38	1147.681	75	1289.874
2	1007.814	39	1151.545	76	1293.695
3	1011.72	40	1155.408	77	1297.515
4	1015.624	41	1159.27	78	1301.334
5	1019.527	42	1163.13	79	1305.152
6	1023.429	43	1166.989	80	1308.968
7	1027.33	44	1170.847	81	1312.783
8	1031.229	45	1174.704	82	1316.597
9	1035.128	46	1178.56	83	1320.411
10	1039.025	47	1182.414	84	1324.222
11	1042.921	48	1186.268	85	1328.033
12	1046.816	49	1190.12	86	1331.843
13	1050.71	50	1193.971	87	1335.651
14	1054.603	51	1197.821	88	1339.458
15	1058.495	52	1201.67	89	1343.264
16	1062.385	53	1205.518	90	1347.069
17	1066.274	54	1209.364	91	1350.873
18	1070.162	55	1213.21	92	1354.676
19	1074.049	56	1217.054	93	1358.477
20	1077.935	57	1220.897	94	1362.277
21	1081.82	58	1224.739	95	1366.077
22	1085.703	59	1228.579	96	1369.875
23	1089.585	60	1232.419	97	1373.671
24	1093.467	61	1236.257	98	1377.467
25	1097.347	62	1240.095	99	1381.262
26	1101.225	63	1243.931	100	1385.055
27	1105.103	64	1247.766		
28	1108.98	65	1251.6		
29	1112.855	66	1255.432		
30	1116.729	67	1259.264		
31	1120.602	68	1263.094		
32	1124.474	69	1266.923		
33	1128.345	70	1270.751		
34	1132.215	71	1274.578		
35	1136.083	72	1278.404		
36	1139.95	73	1282.228		

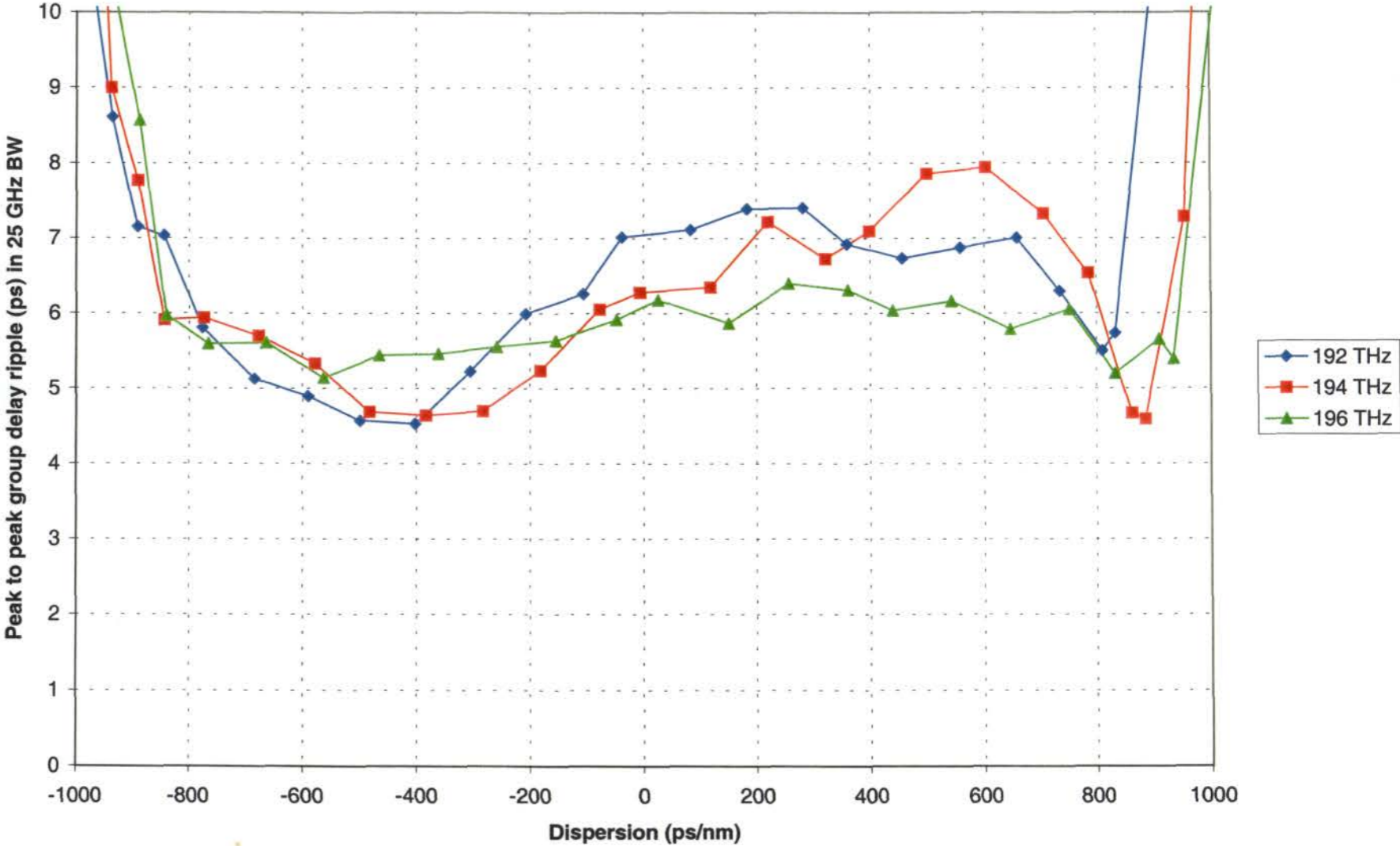
JDS Uniphase

ETDC-50-AL1 Tunable dispersion compensator prototype test report

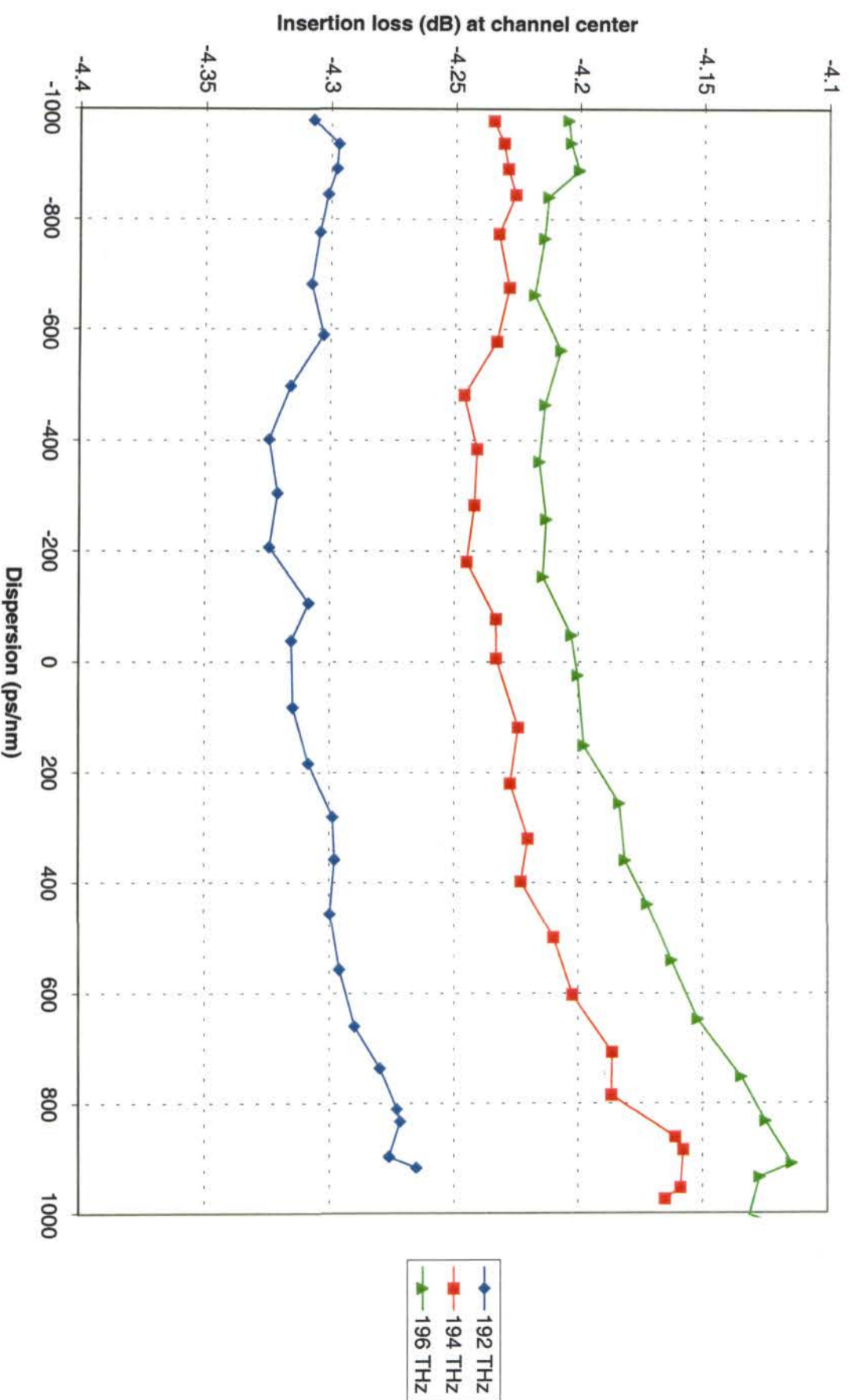
ETDC-50-AL1 Tunable dispersion compensator prototype



ETDC-50-AL1 Tunable dispersion compensator prototype

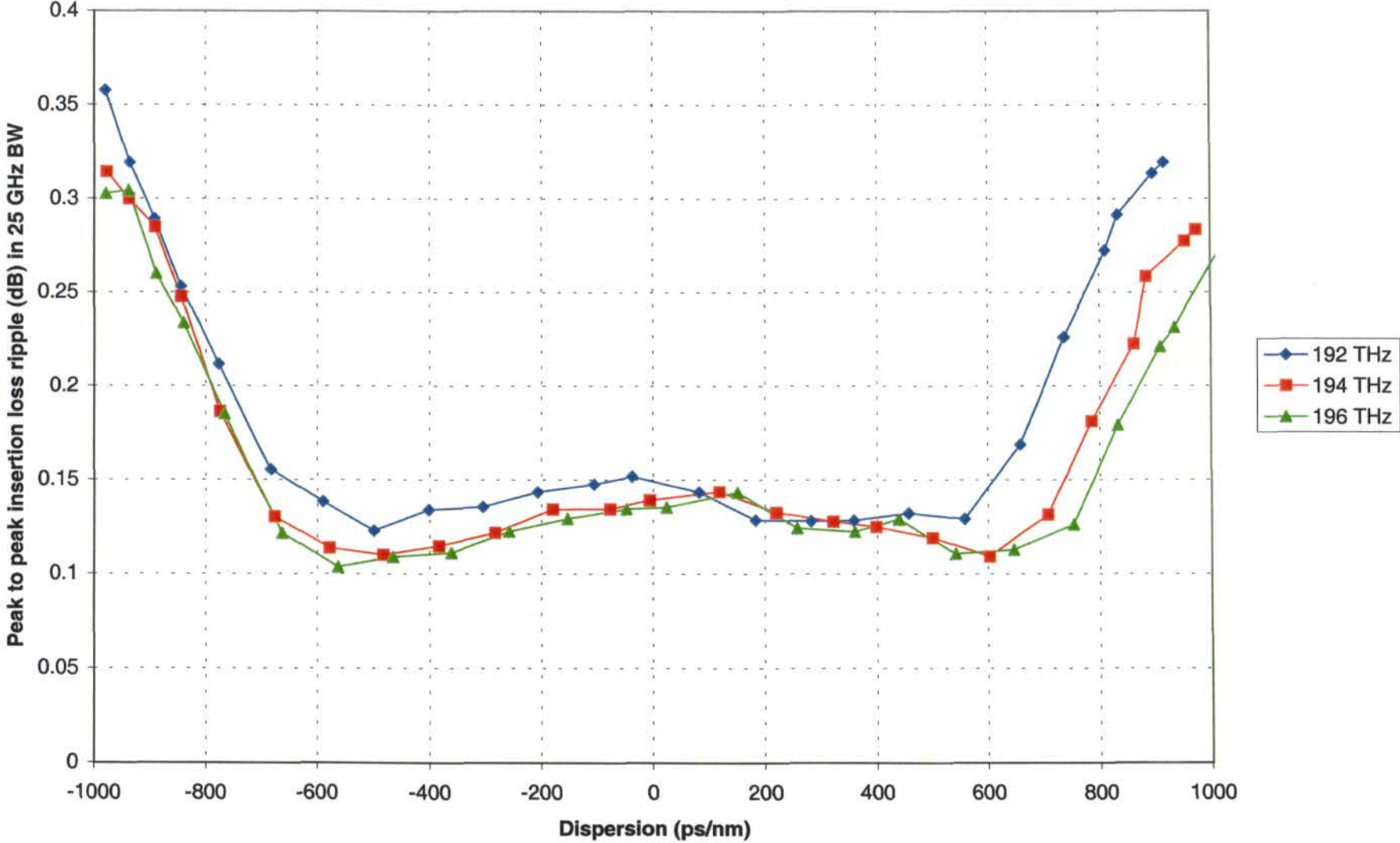


### ETDC-50-AL1 Tunable dispersion compensator prototype

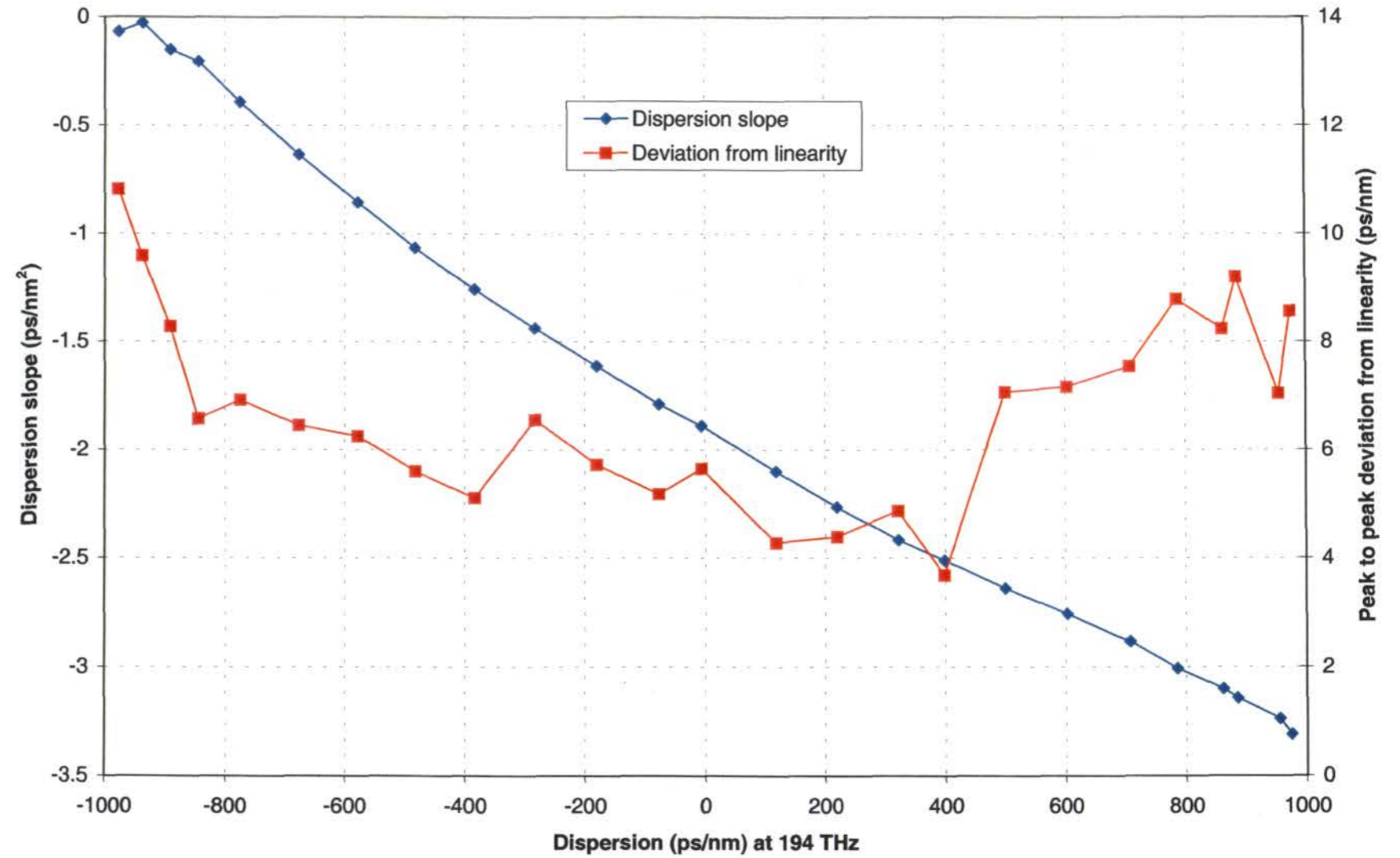




ETDC-50-AL1 Tunable dispersion compensator prototype



ETDC-50-AL1 Tunable dispersion compensator prototype



ETDC-50-AL1 Tunable dispersion compensator prototype

