Chromatic Dispersion Emulator

CDE

Applications

- Testing Coherent Transceivers
- Testing Long-Distance IMDD-Type Signals

Features

- Low Insertion Loss
- Cost-Effective
- Wide Spectral Coverage
- Compatible with high-speed data transmission
- Massive Dispersion Levels
- Configurable Dispersion Settings
- Ultra-Compact

The CDE is an ultra-compact chromatic dispersion emulator that uses indie's fiber Bragg grating (FBG) technology to emulate the chromatic dispersion of hundreds or thousands of kilometers of fiber within the volume of a single half 1U 19-inch rack module. The modules have an ultra-low insertion loss and can be cascaded several times to emulate hundreds of thousands of picoseconds per nanometer of dispersion with no external power required.

indie developed the CDE as a space-saving and cost-effective solution for researchers who need to emulate the chromatic dispersion of hundreds or even thousands of kilometers of fiber. The ultra-low insertion loss also reduces the number of amplifiers required for long-haul emulation, trimming expenses while saving laboratory space.

Features Details

- **Low Insertion Loss:** The CDE significantly reduces the accumulated insertion loss caused by hundreds or thousands of kilometers of transport fiber, thus reducing the number of amplifiers needed when emulating very long fiber links.
- **Cost-effective:** The CDE eliminates the cost of purchasing and storing large fiber spools and reduces the number of amplifiers needed for long-haul transmission emulation.
- **Wide Spectral coverage:** The CDE supports bandwidths as high as 350 GHz and can be manufactured anywhere within the C-band or L-band (O-band available upon request).
- **Compatible with high-speed data transmission**: The CDE's wide spectral coverage enables dispersion emulation for high-baud-rates.
- **Massive Dispersion Levels:** Dispersion emulation as high as 45,000 ps/nm per module—equivalent to approximately 2,650 km of fiber. For even greater dispersion, multiple modules can be cascaded.
- **Configurable Dispersion Settings**: Each module supports testing at multiple dispersion levels (typically three).
- **Ultra-compact:** The CDE is available as either half 1U 19-inch rack-mountable or benchtop modules.

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Single-channel Wide-bandwidth Chromatic Dispersion Emulator

350 GHz Operation Bandwidth (1), any Wavelength in the C-Band or L-Band (2)

Parameters	Multiple Outputs Configuration			Single Output	
	A	A+B	A+B+C	Configuration	Units
Dispersion Emulation Level	5000	10 000	15 000	10 000	ps/nm
Dispersion Accuracy	≤ 2	≤ 2	≤ 2	≤ 2	%
Insertion Loss	≤ 4	≤ 7	≤ 10	≤ 7	dB

(1) Operation bandwidth refers to the spectral range over which optical parameters are guarantied. Measured bandwidth may be higher.
(2) Contact indie for O-band.

Multi-channel Chromatic Dispersion Emulators

Multi-channel configurations can be designed in both C-band and L-band. Contact indie for O-band.

50 GHz Operation Bandwidth, 100 GHz Channel Spacing

Parameters	Multiple Outputs Configurations									
	A	A+B	A+B+C	A	A+B	A+B+C	A	A+B	A+B+C	Units
Dispersion Emulation Level	3 333	6 666	10 000	10 000	20 000	30 000	15 000	30 000	45 000	ps/nm
Dispersion Accuracy	≤ 3	≤ 3	≤ 3	≤ 3	≤ 2	≤ 2	≤ 3	≤ 2	≤ 2	%
Insertion Loss	≤ 5	≤ 9	≤ 12	≤ 12	≤ 24	≤ 36	≤ 16	≤ 32	≤ 48	dB

70 GHz Operation Bandwidth, 200 GHz Channel Spacing

Parameters	Multiple Outputs Configuration			
	A	A+B	A+B+C	Units
Dispersion Emulation Level	4 500	9 000	15 000	ps/nm
Dispersion Accuracy	≤ 3	≤ 3	≤ 3	%
Insertion Loss	≤ 7	≤ 12	≤ 20	dB

(1) Choice of odd or even channels on 100 GHz ITU grid

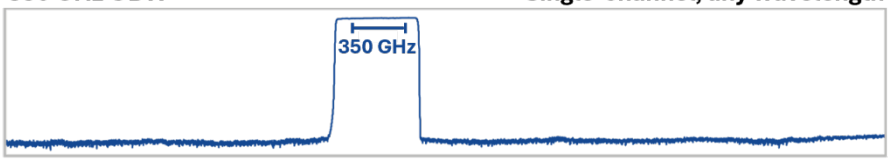
150 GHz Operation Bandwidth, 1200 GHz Channel Spacing

Parameters	Multiple Outputs Configuration			
	A	A+B	A+B+C	Units
Dispersion Emulation Level	5000	10 000	15 000	ps/nm
Dispersion Accuracy	≤ 3	≤ 2	≤ 2	%
Insertion Loss	≤ 11	≤ 22	≤ 33	dB

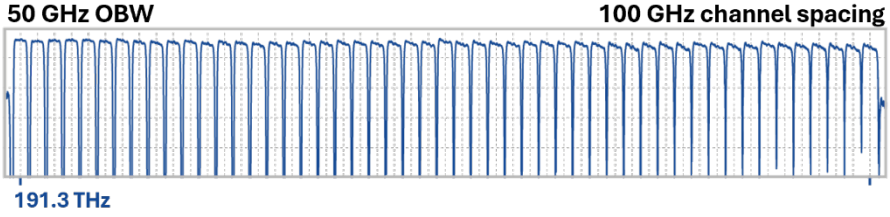
(1) Specification for C-band
(2) Contact indie for specific center channel positioning

Examples of spectral coverage for various CDE configurations

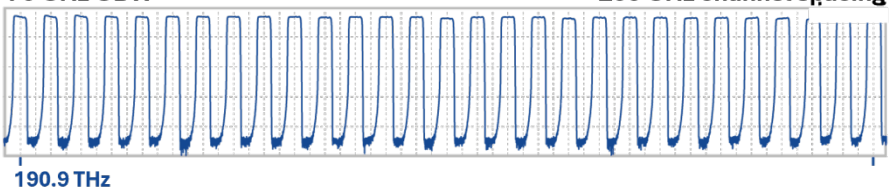
350 GHz OBW **Single-channel, any wavelength**



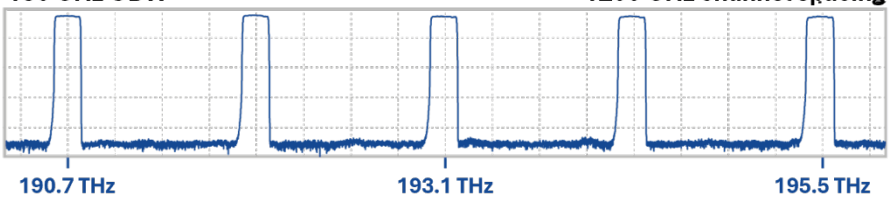
50 GHz OBW **100 GHz channel spacing**



70 GHz OBW **200 GHz channel spacing**



150 GHz OBW **1200 GHz channel spacing**



OBW = Operation bandwidth of each channel over which optical parameters are guarantied.

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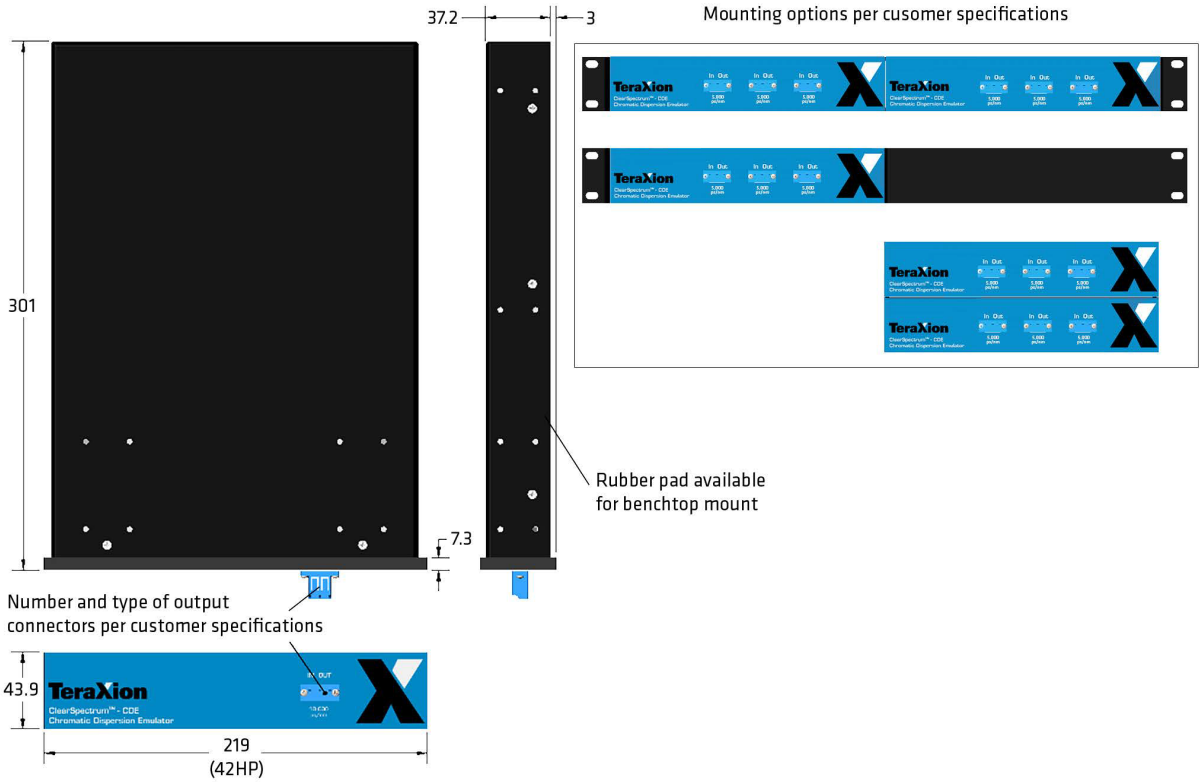
Module Dimension



Environmental and Mechanical Specifications

Parameters	Values	Units
Operating Temperature	10 to 40	°C
Storage Temperature	-40 to 85	°C
Output Connectors (1)	LC-UPC	
Module Dimension	1U for half 19-inch rack	
Mounting Options for Single Unit (2)	Benchtop or rack-mount brackets	
Mounting Options for Multiple Units (2)	Benchtop stacking brackets or side-by-side 1U rackmount brackets	
RoHS Compliance	Yes	

(1) Other connectors available on request
(2) Mechanical drawing available on request