Beam Divergence control (BDC) module

TRL 7

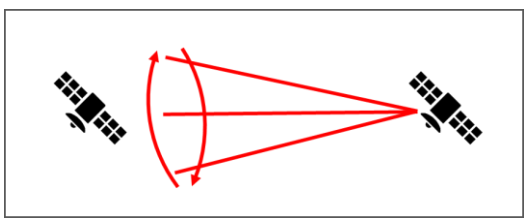
The Beam Divergence Control (BDC) module is an optical device designed for laser communication terminals. By optimally varying the beam divergence angle through the movement of the built-in lens, it enhances the efficiency of the PAT (Pointing, Acquisition, Tracking) process in free space optical (FSO) communication. This product was developed as a prototype in collaboration with the National Institute of Information and Communications Technology (NICT), and our company has successfully achieved miniaturization and space compatibility.

Features

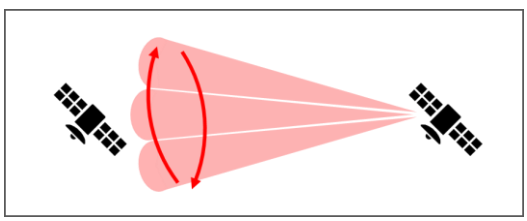
1. The beam divergence angle is controlled in real-time to achieve the optimal angle based on the communication distance and error, thereby contributing to the high efficiency of the PAT process.
2. By utilizing photographic zoom lens technology, we have developed a high-precision lens drive system that operates effectively in a space environment.
3. Designed for integration into LCT, our system achieves low SWaP (Size, Weight, and Power Consumption).

Utilization in the PAT Process

Currently, standardization of FSO communication is underway. The U.S. SDA standard has adopted a beaconless PAT process that utilizes the transmitting beam instead of a beacon beam. By employing the BDC, it becomes possible to adjust the beam divergence angle to the optimal level based on the uncertainty of the receiving satellite's position, thereby enhancing the efficiency of the PAT process.



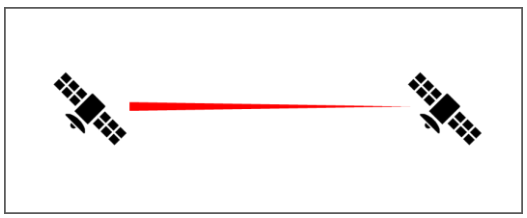
Using Collimated Beam (Without BDC)
This is a representative method of the PAT process for inter-satellite optical communication. It establishes links between satellites using highly directional communication beam without the use of beacon beam.



Using Divergent Beam (With BDC)
By using the BDC, the PAT process can be performed at the optimal beam divergence angle, which is expected to enhance the efficiency of the PAT process.

Utilization During Transmitting

During transmitting, the beam divergence angle can be adjusted to the optimal level with minimal data loss, according to the distance and antenna aperture of the receiving satellite.



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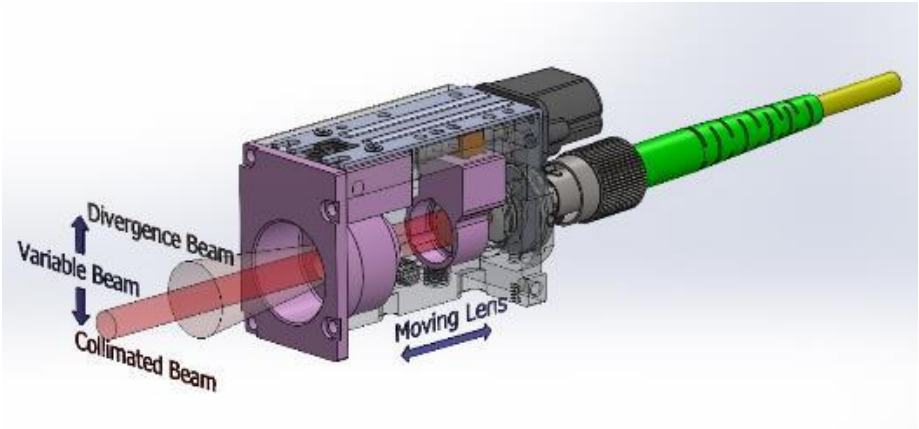
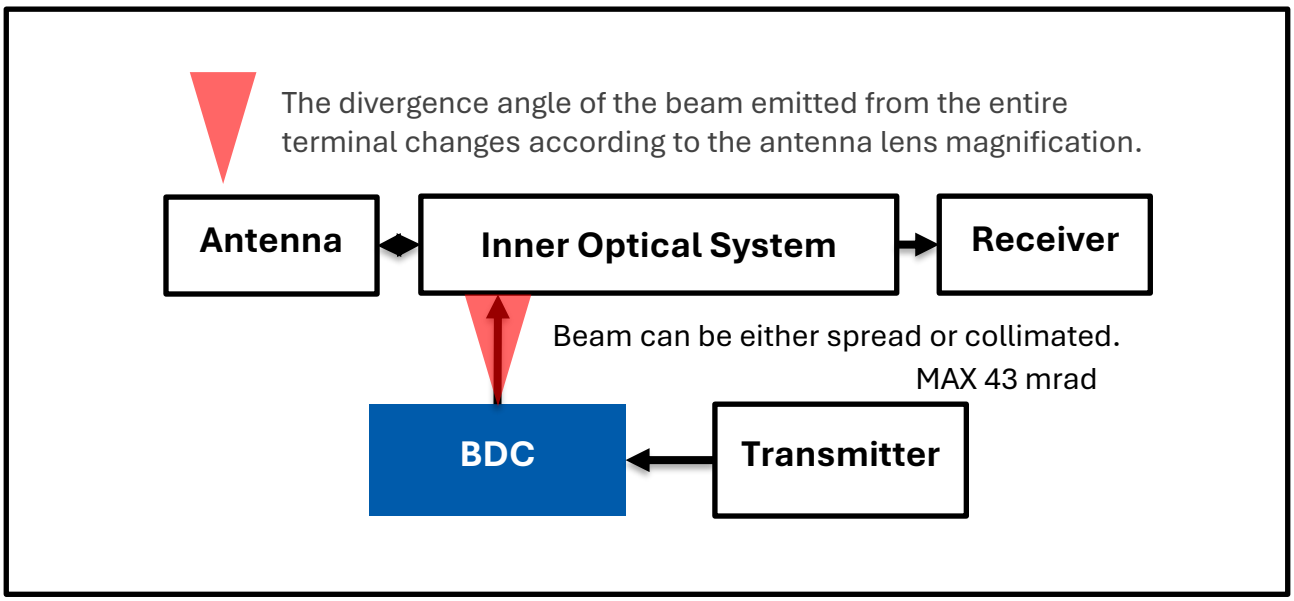
Functions

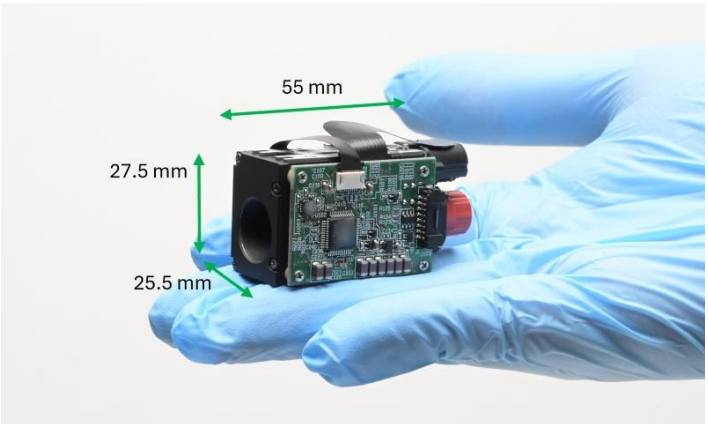
With our developed actuators and control system, the beam divergence angle can be continuously adjusted from collimated beam to a maximum of 43 mrad.



BDC within an LCT



Specifications



	Item	Spec.
1	**Connector**	FC/APC
2	**Wavelength**	C-band
3	**Laser Output**	≦5W
4	**Beam Diameter ($1/e^2$)**	ϕ2
5	**Maximum Angle ($1/e^2$)**	43mrad
6	**Size**	W25.5×H27.5×D55 mm
7	**Weight**	52 g (Approx.)

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