Production and Quality Control
Datasheet TeraBeam / TeraScan

1.0 General

Order Number	VB.21.02659
Institute / Company	Oklahoma State University
Production Date	08.02.2022

2.0 Components Components

System	TeraScan 1550	SN 01107
Laser Head #1	DFB pro BFY THz #LD-1550-0040-DFB-8, 1550 nm	SN 33639
Laser Head #2	DFB pro BFY THz #LD-1550-0040-DFB-8, 1545 nm	SN 33632
Laser Head #3	DFB pro BFY THz #LD-1550-0040-DFB-8, 1530 nm	SN 33633
Control Electronics	DLC smart	SN 015163 Firmware 3.1.1
Emitter	PCA-FD-1550-100-TX-1	SN TC211009
Receiver	PCA-FD-1550-130-RX-1	SN RC191001
Accessories	Schottky receiver Schottky-FD-RX-1 Optomechanics THz Optics / Tr 2M	SN 43-41

3.0 Acceptance Criteria

		Specification	**Test Result**
Difference Frequency Tuning		2700 GHz	0 .. 3250 GHz
Dynamic Range of Terahertz Power	100 GHz	90 dB	104 dB
@ 300 ms integration time	500 GHz	70 dB	83 dB

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4.0 Lasers

Frequency Range: 0– 1390 GHz

Settings	THz frequency at startup: 700 GHz		
Laser Connections		DLC smart	fiber port
	Laser SN 33639:	L 1 (Channel 1)	I1
	Laser SN 33632:	L 2 (Channel 2)	I2
Optical Power	Fiber port	O1	O2
	Laser SN 33639:	16.6 mW	16.4 mW
	Laser SN 33632:	16.4 mW	16.6 mW
	Total optical power:	33.0 mW	33.0 mW

Frequency Range: 1130 – 2500 GHz

Settings	THz frequency at startup: 1800 GHz		
Laser Connections		DLC smart	fiber port
	Laser SN 33633:	L 1 (Channel 1)	I1
	Laser SN 33632:	L 2 (Channel 2)	I2
Optical Power	Fiber port	O1	O2
	Laser SN 33633:	16.6 mW	16.4 mW
	Laser SN 33632:	16.4 mW	16.6 mW
	Total optical power:	33.0 mW	33.0 mW

Frequency Range: 1850 – 3250 GHz

Settings	THz frequency at startup: 2600 GHz		
Laser Connections		DLC smart	fiber port
	Laser SN 33633:	L 1 (Channel 1)	I1
	Laser SN 33639:	L 2 (Channel 2)	I2
Optical Power	Fiber port	O1	O2
	Laser SN 33633:	16.6 mW	16.4 mW
	Laser SN 33639:	16.4 mW	16.6 mW
	Total optical power:	33.0 mW	33.0 mW

CAUTION!	**Carefully clean the fiber facets before connecting fibers. An inspection under an optical microscope is recommended.**

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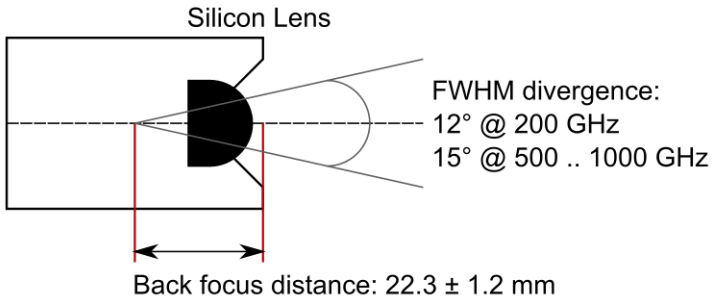
5.0 Photoconductive Antennas

TX Module	Emitter PCA-FD-1550-100-TX-1 InGaAs photodiode with bow-tie antenna Typical terahertz power: 100 µW @ 100 GHz, 10 µW @ 500 GHz Bandwidth: ~ 3 THz	SN TC211009
RX Module	Receiver PCA-FD-1550-130-RX-1 InGaAs photomixer with bow-tie antenna Bandwidth: ~ 3 THz	SN RC191001
Package	Housing: cylindrical, Ø 25 mm Lens: hyperhemisphere, Ø 10 mm, height 6 mm Electrical connector: BNC Fiber: SM/PM fiber, FC/APC connector Fiber length: 1.0 m (emitter), 1.3 m (receiver)	
Beam Properties	Linear THz polarization	
Operation	Maximum optical power: 35 mW on the chip Maximum bias voltage: • Emitter: -2 .. +0.5 V • Receiver: -0.5 .. +0.5 V (only for testing!)	



CAUTION!	**Photoconductive antennas are electrostatic-discharge sensitive devices! We recommend to always wear a high-impedance grounding strap for handling.**
CAUTION!	**Carefully clean the fiber facets before connecting fibers. An inspection under an optical microscope is recommended.**

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Emitter Operation

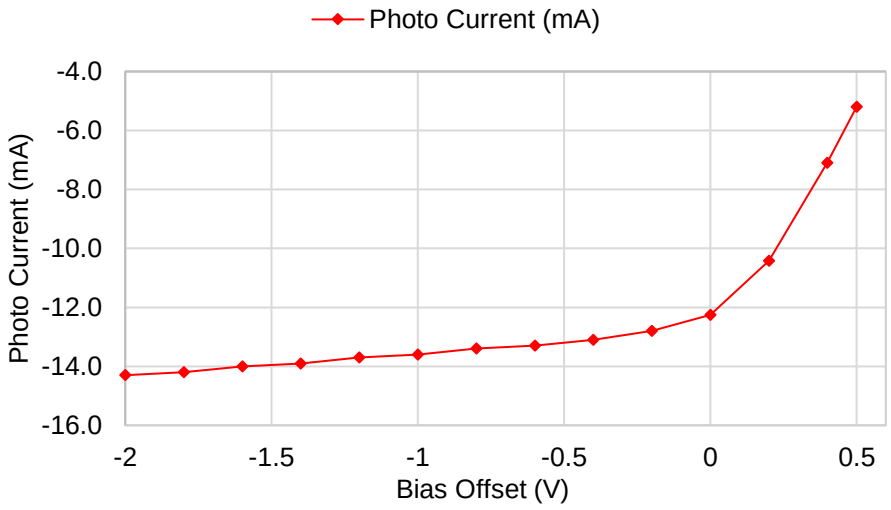
Optical power: 33 mW @ fiber port O1

Max. DC bias: -2 V DC

Emitter Characteristics

DC photocurrent: -14.3 mA @ -2.0 V

Emitter DC Photocurrent



Receiver Operation

Optical power: 33 mW @ fiber port O2

Max. DC bias: -0.5 V DC (only for testing)

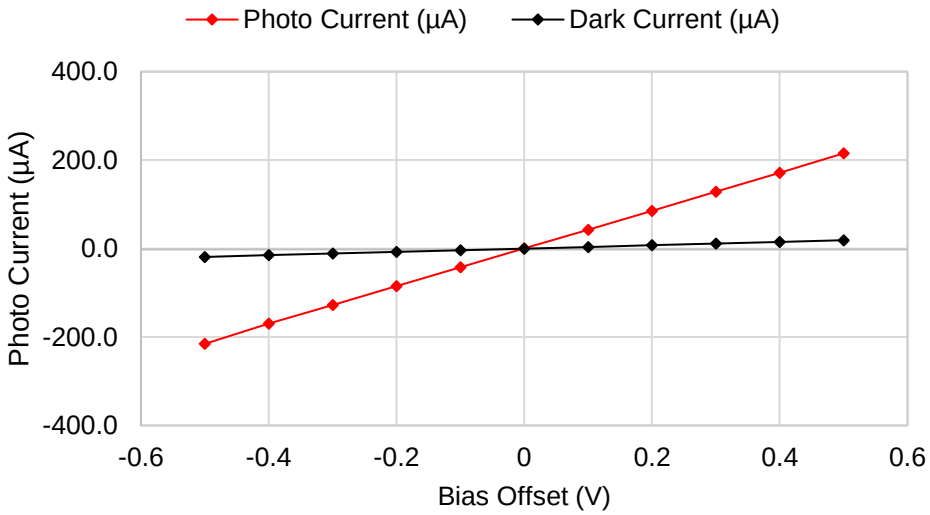
Receiver Characteristics

DC photocurrent: -0.216 mA @ -0.5 V

Noise:

- 119 pA @ 3 ms lock-in integration time
- 9.6 pA @ 300 ms lock-in integration time

Receiver DC Photocurrent



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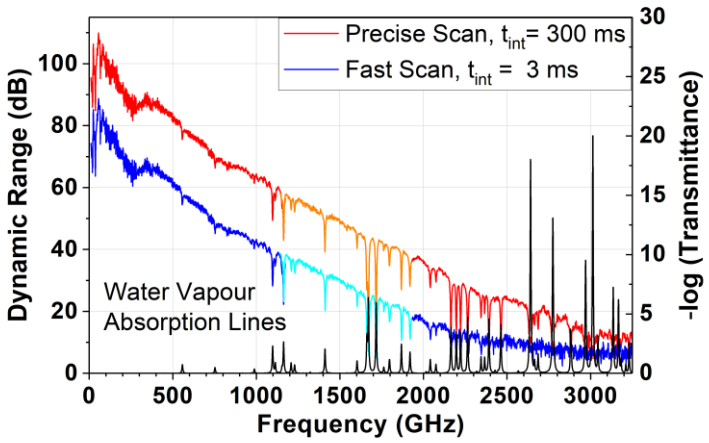
Lock-in Detection Settings	Emitter bias: -0.4 V DC ± 0.9 V AC (offset ± modulation amplitude)
	Modulation frequency: 39.7 kHz
	Lock-in phase: 95.3 deg
	Integration time: 3 ms / 300 ms

NOTE!	**Set the DC bias offset before adding the AC modulation amplitude.**

Terahertz Characteristics	Frequency	100 GHz	500 GHz	1000 GHz
	Receiver photocurrent	1464 nA	124 nA	14 nA
	Dynamic range @ 300 ms	104 dB	83 dB	63 dB

Spectrum of Terahertz Power



Spectrum acquired with customer optomechanics THz Optics / Tr 2M (2 mirrors, focal length = 3”)

6.0 Additional Components

Transimpedance Amplifier	PDA-S, gain switch setting: 3
Optical Isolators	Integrated isolator (> 30 dB)
	Additional fiber-inline isolator (50 dB)
Fiber Array	2x2 fiber array, split ratio: 50:50 (#OK-001485)

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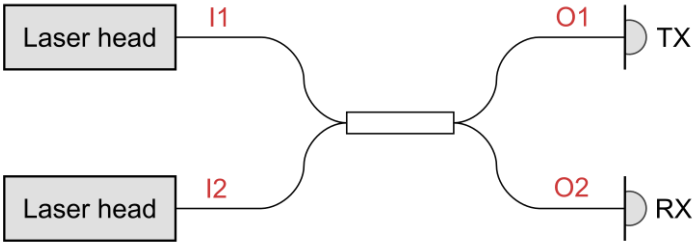
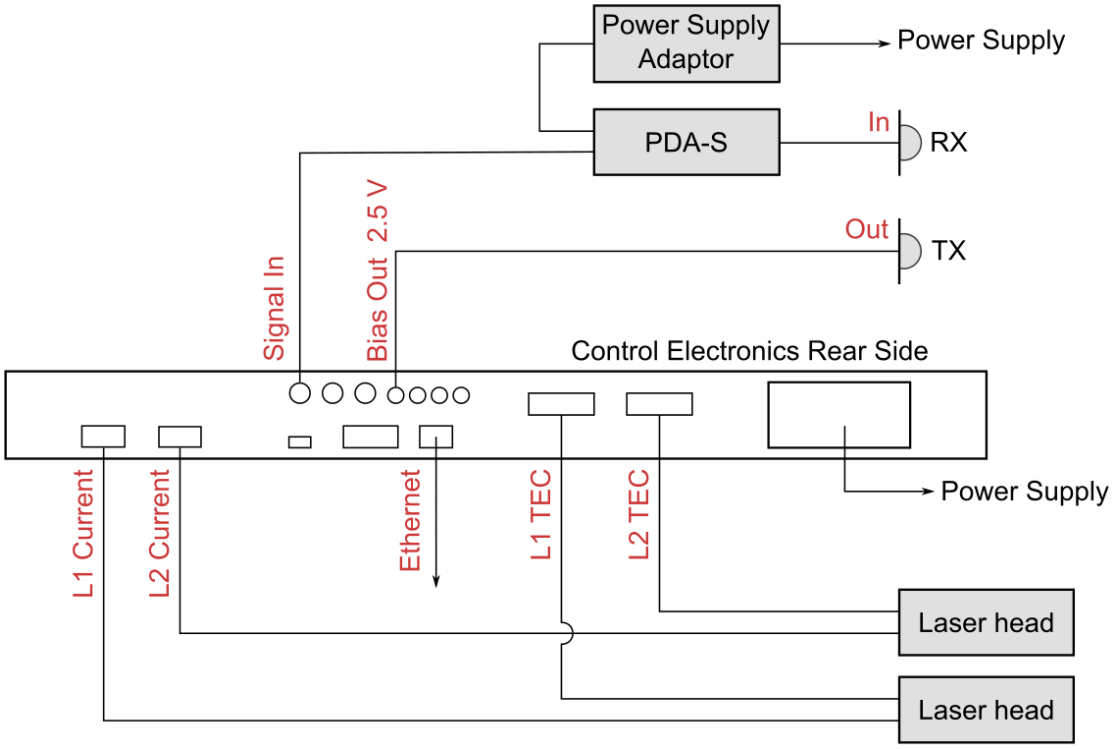
7.0 Instructions and Comments

Sketch of Optical Connections



Sketch of Electrical Connections



8.0 Quality Control

Production	**Cansu Arpacioglu**	**Date**	**08.02.2022**
Final Check		**Date**	**08.02.2022**

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