400 MHz Photoreceiver with InGaAs-PIN Photodiode

The picture shows model HCA-S-400M-IN-FS.
The photoreceiver will be delivered without post holder and post.

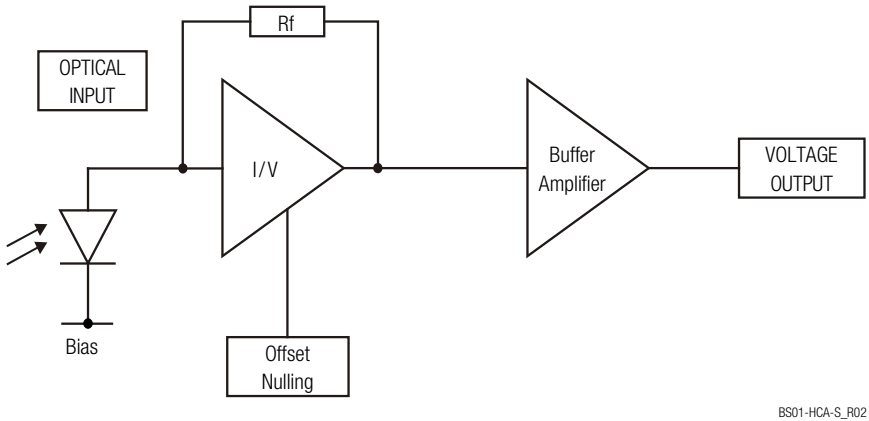
Features

- **InGaAs-PIN photodiode**
- **Bandwidth DC – 400 MHz**
- **Amplifier transimpedance gain 5.0 × 10^3 V/A**
- **Max. conversion gain 4.8 × 10^3 V/W @ 1550 nm**
- **Spectral range 900 – 1700 nm**
- **Free-space input 1.035"-40 threaded, alternatively 25 mm diameter unthreaded**
- **Fiber optic input available as permanently mounted FC-input**
- **UNC 8-32 and M4 tapped holes for mounting on standard posts with metric and imperial thread**

Applications

- **Spectroscopy**
- **Fast pulse and transient measurements**
- **Optical triggering**
- **Optical front-end for oscilloscopes, A/D converters and HF lock-in amplifiers**

Block Diagram



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Available Versions

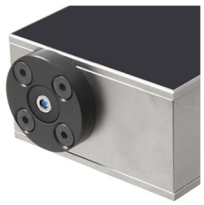
HCA-S-400M-IN-FST

1.035"-40 threaded flange for free space applications. Compatible with many optical standard accessories.

Picture shows 1.035"-40 threaded flange with internally threaded coupler ring (outer diameter 30 mm)

HCA-S-400M-IN-FS

25 mm dia. unthreaded flange for free space applications. Compatible with many optical standard accessories.



Picture shows unthreaded flange with 25 mm diameter

HCA-S-400M-IN-FC

Fix/permanent FC fiber connector for high coupling efficiency and excellent conversion gain accuracy.

Related Models

HCA-S-400M-SI-FST	Si-PIN, ∅ 0.8 mm, 320 – 1000 nm free space input, 1.035"-40 threaded flange
HCA-S-400M-SI-FS	Si-PIN,∅ 0.8 mm, 320 – 1000 nm free space input, 25 mm dia. unthreaded flange
HCA-S-400M-SI-FC	Si-PIN,∅ 0.8 mm, 320 – 1000 nm FC fiber connector (fix/permanent)
HCA-S-400M-SI-SMA	Si-PIN, ∅ 0.8 mm, 320 – 1000 nm SMA fiber connector (fix/permanent)

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Available Accessories

PRA-PAP

Alternative mounting option:
Post adapter plate, easy to mount on FEMTO photoreceiver series OE, FWPR, PWPR, HCA-S and LCA-S.

PS-15-25-L

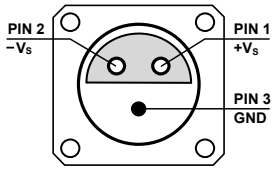
Power supply
Input: 100 – 240 VAC
Output: ±15 VDC

Specifications

	Test conditions	V_S = ±15 V, T_A = 25 °C, output load impedance 50 Ω, warm-up 20 minutes (min. 10 minutes recommended)
Gain	Transimpedance gain	5.0×10^3 V/A (@ output load 50 Ω)
	Gain accuracy	±1 % (electrical)
	Conversion gain	4.8×10^3 V/W typ. (@ 1550 nm, output load 50 Ω)
Frequency Response	Lower cut-off frequency	DC
	Upper cut-off frequency (–3 dB)	400 MHz (±15 %)
	Gain flatness	±1 dB
Time Response	Rise/fall time (10 % – 90 %)	1.0 ns
Input	Noise equivalent power (NEP)	24 pW/√Hz (@ 1550 nm, 100 MHz)
	Optical saturation power	200 µW (for linear amplification, @ 1550 nm)
	Input offset compensation range	±200 µA, adjustable by offset potentiometer
Detector	Detector	InGaAs-PIN photodiode
	Active area (FS/FST version)	∅ 0.3 mm
	Active area (FC version)	integrated ball lens suitable for fibers up to 62.5 µm core diameter
	Spectral range	900 – 1700 nm
	Max. sensitivity	0.95 A/W typ. (@ 1550 nm)
Output	Output voltage range	±1.0 V (@ 50 Ω output load) for linear operation and low harmonic distortion
	Max. output voltage range	±1.5 V (@ 50 Ω output load)
	Output impedance	50 Ω (terminate with 50 Ω load)
	Output noise	3 mV_{RMS} (20 mV_{PP}) typ. (@ 50 Ω load, no signal on detector, measurement bandwidth 1.5 GHz)
Input Flange	Material	1.4305 stainless steel, nickel-plated (FST flange) AlMg4.5Mn, nickel-plated (FS flange)
Coupler Ring (FST version only)	Material	1.4305 stainless steel, glass bead blasted
Power Supply	Supply voltage	±15 V (±14.5 V ... ±16.5 V)
	Supply current	±55 mA (depends on operating conditions, recommended power supply capability min. ±150 mA)

400 MHz Photoreceiver with InGaAs-PIN Photodiode

Specifications (continued)			
Case	Weight	209 g (0.46 lbs) HCA-S-400M-IN-FST incl. coupler ring 196 g (0.43 lbs) HCA-S-400M-IN-FS 188 g (0.41 lbs) HCA-S-400M-IN-FC	
	Material	AlMg4.5Mn, nickel-plated	
Temperature Range	Storage temperature	–30 °C ... +85 °C	
	Operating temperature	0 °C ... +60 °C	
Absolute Maximum Ratings	Optical input power (CW)	10 mW	
	Power supply voltage	±20 V	
Connectors	Input	HCA-S-400M-IN-FST	1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories
		HCA-S-400M-IN-FS	25 mm dia. unthreaded flange for free space applications
		HCA-S-400M-IN-FC	FC fiber optic connector (fix/permanent, FC/PC and FC/APC compatible)
	Output	BNC jack (female)	
	Power supply	LEMO® series 1S, 3-pin fixed socket (mating plug type: FFA.1S.303.CLAC52)	



Pin 1: +15 V
Pin 2: –15 V
Pin 3: GND

Scope of Delivery	HCA-S-400M-IN, internally threaded coupler ring (FST version only), LEMO® 3-pin connector, datasheet, transport package

Ordering Information	HCA-S-400M-IN-FST	1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories.
	HCA-S-400M-IN-FS	25 mm dia. unthreaded flange for free space applications.
	HCA-S-400M-IN-FC	FC fiber optic connector (fix/permanent, FC/PC and FC/APC compatible).

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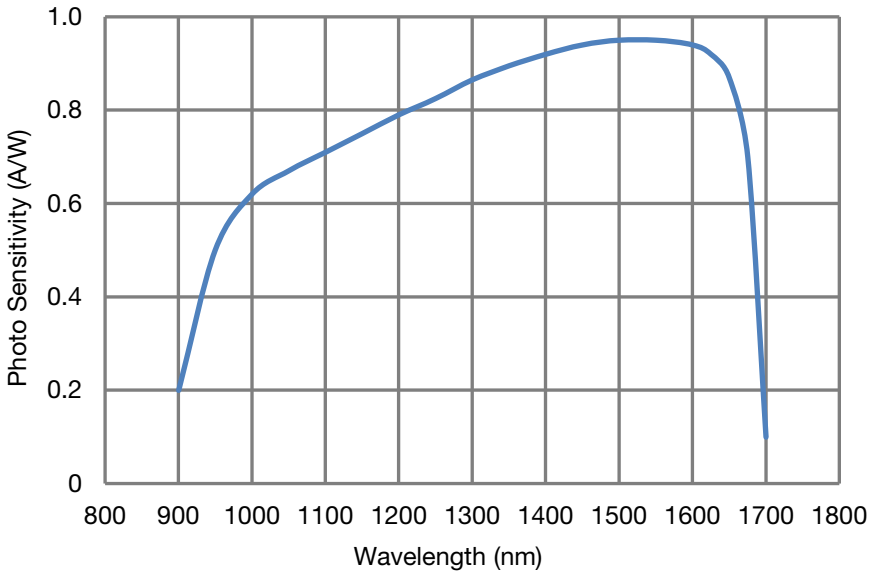
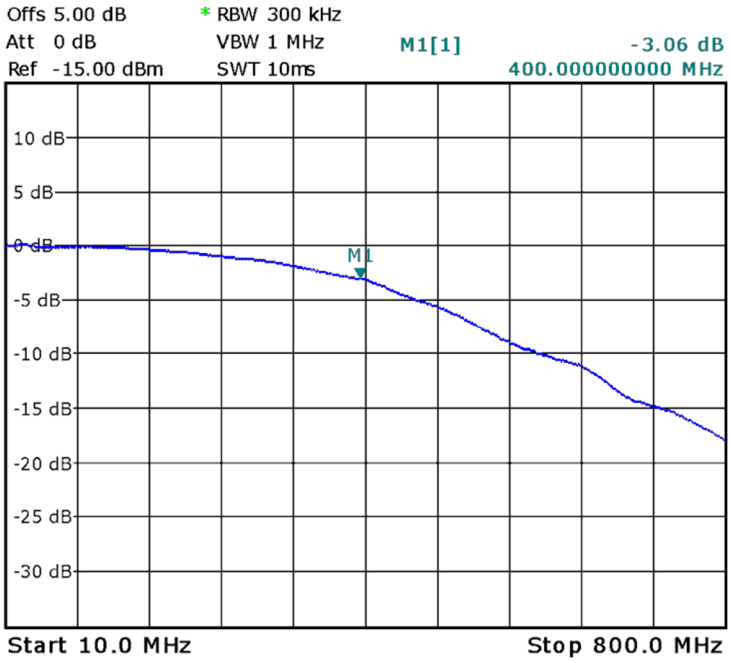
Spectral Responsivity



DB-Sens-HCA-S-400M-IN_R01

Typical Performance Characteristics

Frequency response

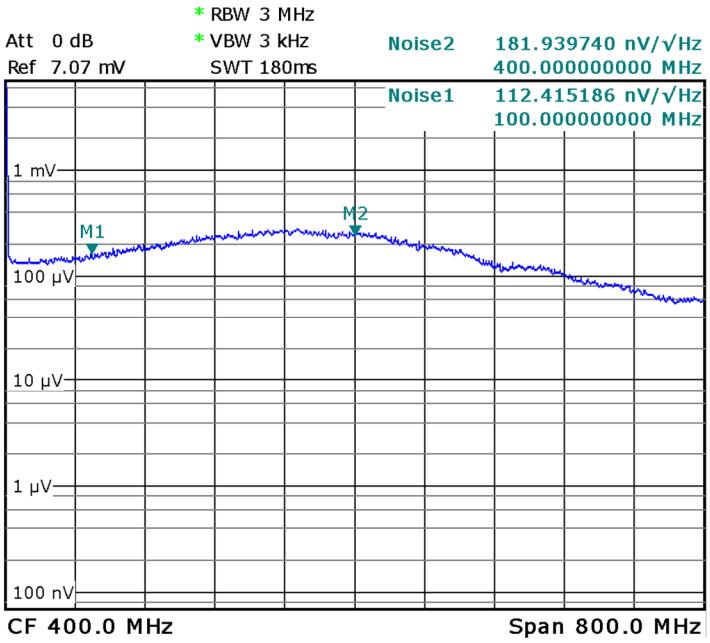


PD-HCA-S-400M-IN-bw_R01

400 MHz Photoreceiver with InGaAs-PIN Photodiode

Typical Performance Characteristics (continued)

Noise spectrum

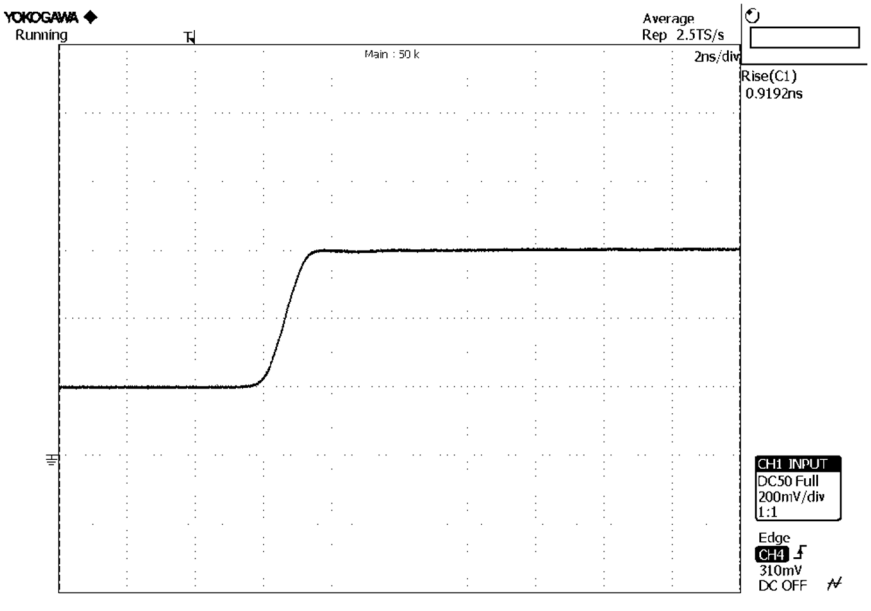


PD-HCA-S-400M-IN-noise_R01

Note: spectral noise data is measured at the amplifier output with no signal on the photodiode. To determine the spectral input noise divide the measured output noise by the amplifier conversion gain.
Conversion gain (V/W) = amplifier gain (V/A) × photo sensitivity (A/W).

Marker	frequency	output noise	resulting input noise (NEP)
1	100 MHz	112 nV/√Hz	24 pW/√Hz (@ 1550 nm)

Pulse response to square wave input signal
(with 16 times averaging)

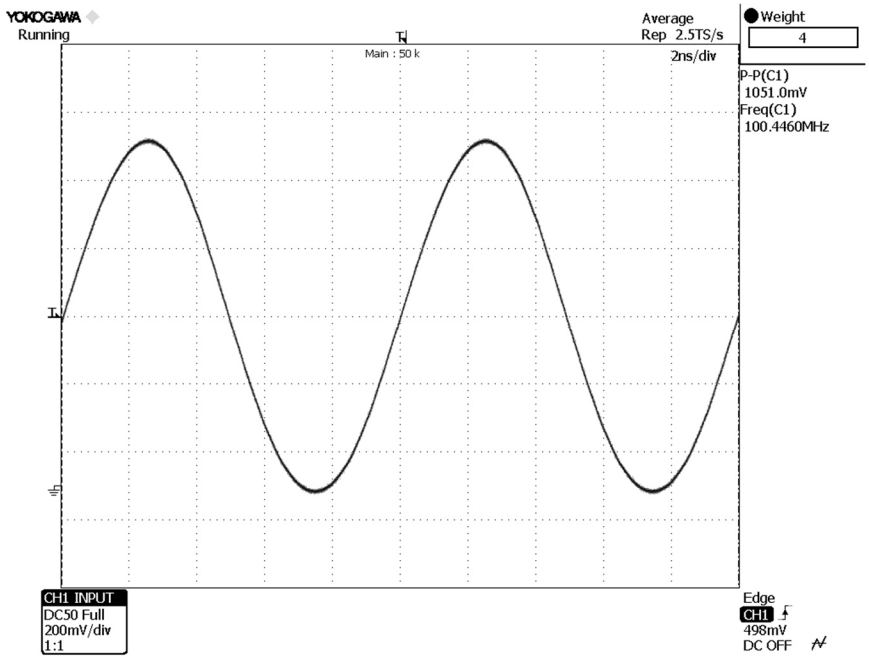


PD-HCA-S-400M-IN-pulse-2ns_R01

400 MHz Photoreceiver with InGaAs-PIN Photodiode

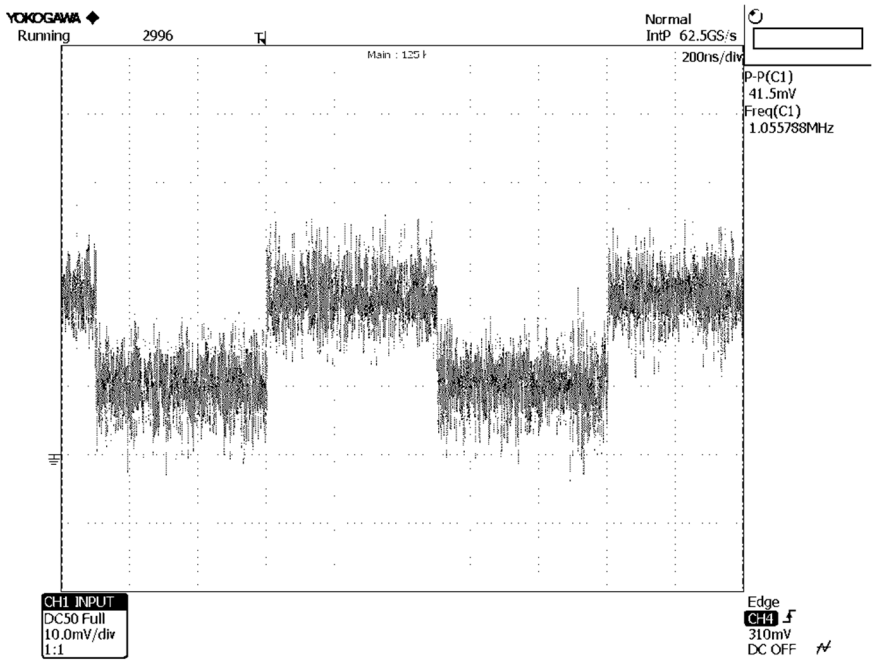
Typical Performance Characteristics (continued)

Large signal response
output signal for 100 MHz, 210 µW modulated optical input signal (with 4 times averaging)



PD-HCA-S-400M-IN-large-sinus_R01

Small signal response
output signal for 3 µW modulated optical input signal, 1 MHz square wave, without averaging

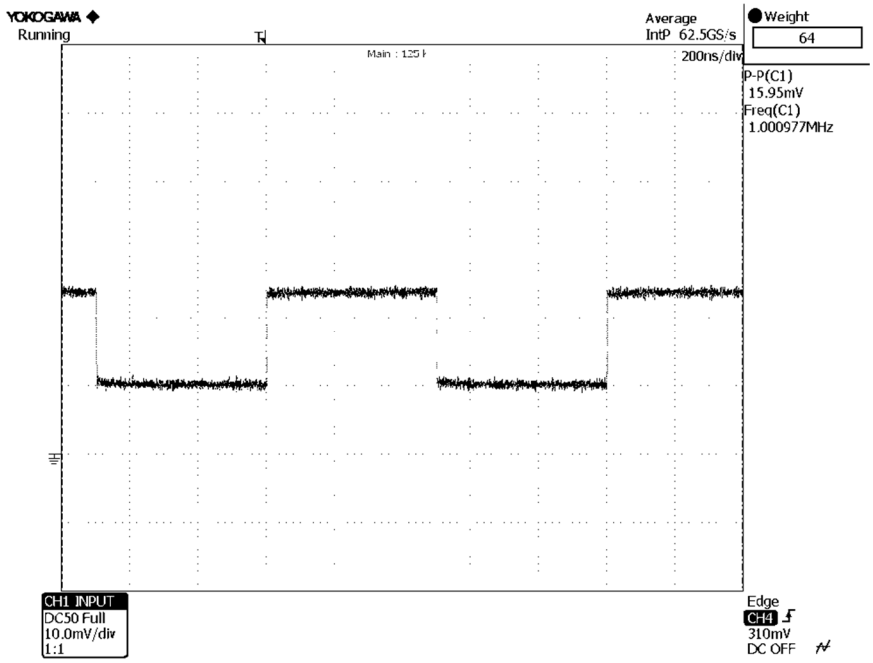


PD-HCA-S-400M-IN-noise-square_R01

400 MHz Photoreceiver with InGaAs-PIN Photodiode

Typical Performance Characteristics (continued)

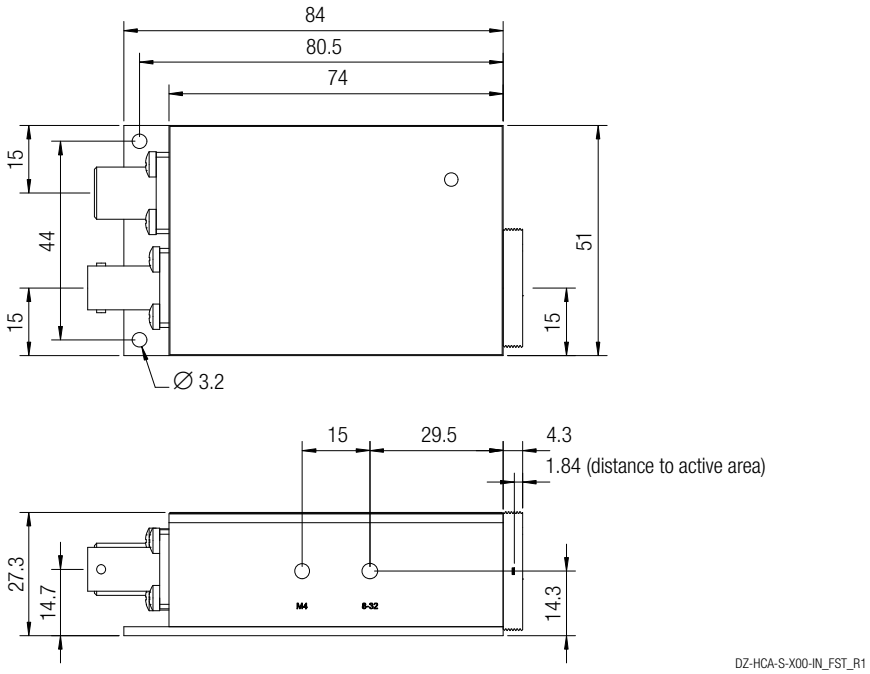
Small signal response
output signal for3 µW modulated optical input signal, 1 MHz square wave, with 64 times averaging



PD-HCA-S-400M-IN-noise-square_average_R01

Dimensions

HCA-S-400M-IN-FST (1.035"-40 threaded free space input)



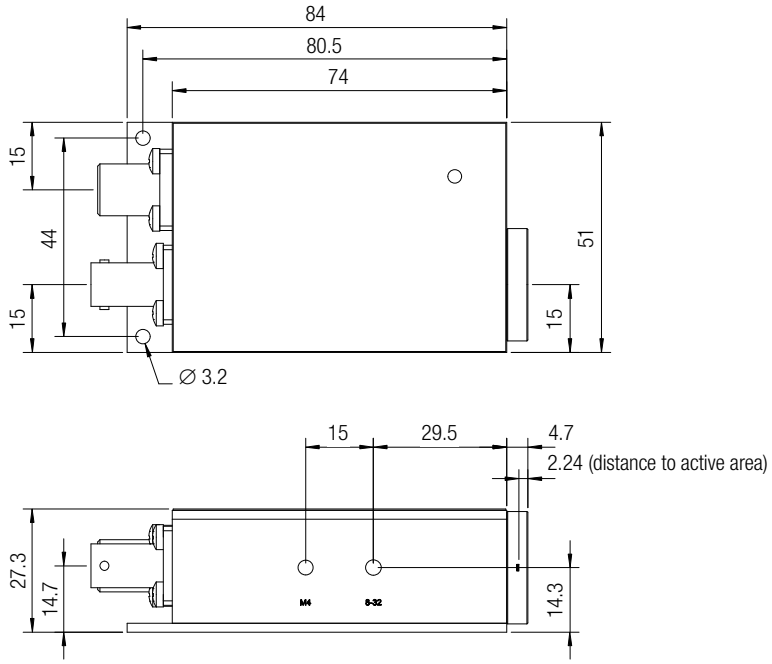
DZ-HCA-S-X00-IN_FST_R1

all dimensions in mm unless otherwise noted

400 MHz Photoreceiver with InGaAs-PIN Photodiode

Dimensions (continued)

HCA-S-400M-IN-FS (25 mm dia. unthreaded free space input)



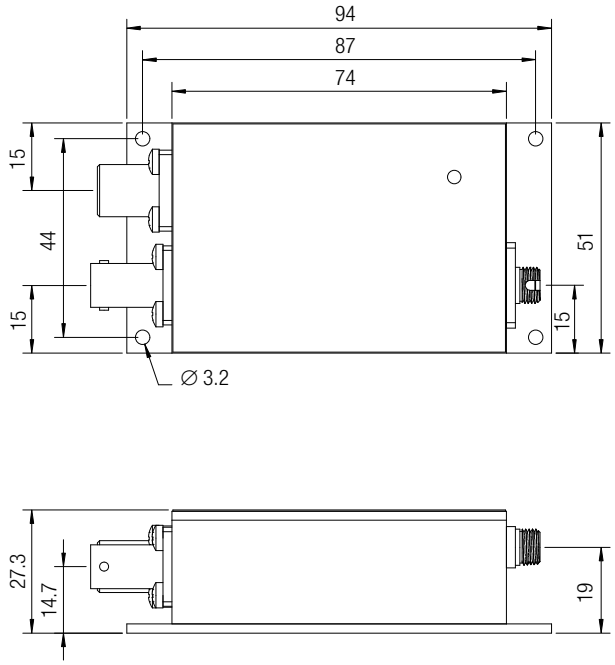
DZ-HCA-S-X00-IN_FS_R1

all dimensions in mm unless otherwise noted

400 MHz Photoreceiver with InGaAs-PIN Photodiode

Dimensions (continued)

HCA-S-400M-IN-FC (FC fiber optic connector)



DZ-HCA-S-XX-XX_FC_R1

all dimensions in mm unless otherwise noted

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