



Datasheet

HCA-S-400M-IN

400 MHz Photoreceiver with InGaAs PIN Photodiode



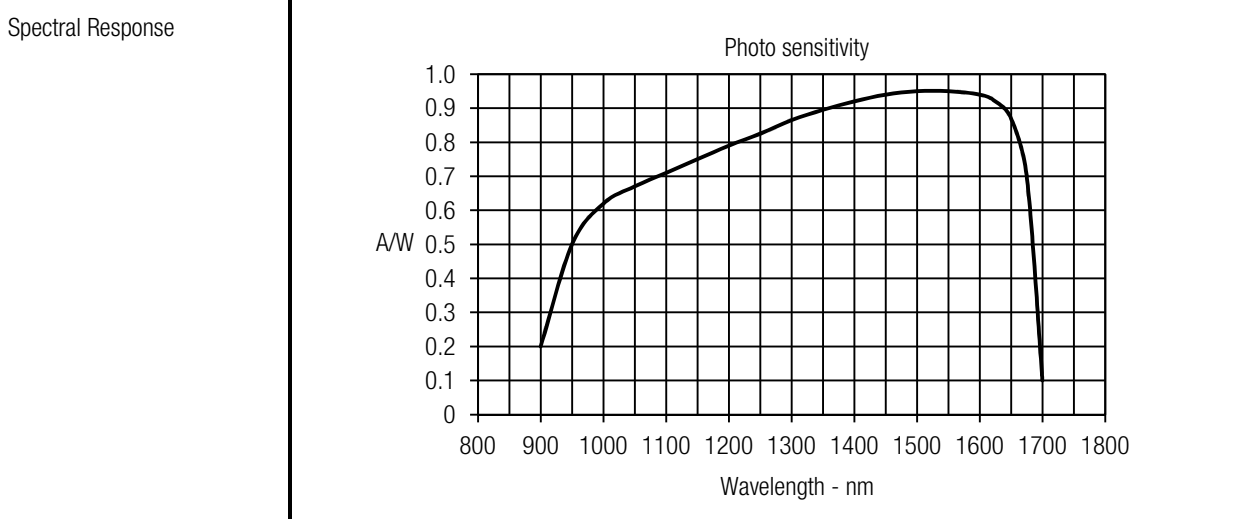
The picture shows the HCA-S-400M-IN-FS with free space input. The photoreceiver will be delivered without post holder and post.

Features	<ul style="list-style-type: none"> • InGaAs PIN detector • Spectral range 900 ... 1700 nm • Bandwidth DC ... 400 MHz • Amplifier transimpedance (gain) 5.0×10^3 V/A • Max. conversion gain 4.8×10^3 V/W @ 1550 nm 																														
Applications	<ul style="list-style-type: none"> • Spectroscopy • Fast pulse and transient measurements • Optical triggering • Optical front-end for oscilloscopes and A/D converters 																														
Specifications	<table border="0"> <tr> <td>Test conditions</td> <td colspan="2">$V_s = \pm 15$ V, $T_A = 25$ °C, system impedance = 50 Ω</td> </tr> <tr> <td rowspan="2">Gain</td> <td>Transimpedance</td> <td>5.0×10^3 V/A (@ 50 Ω load)</td> </tr> <tr> <td>Max. conversion gain</td> <td>4.8×10^3 V/W (@ 1550 nm)</td> </tr> <tr> <td rowspan="3">Frequency Response</td> <td>Lower cut-off frequency</td> <td>DC</td> </tr> <tr> <td>Upper cut-off frequency (-3 dB)</td> <td>400 MHz (± 15 %)</td> </tr> <tr> <td>Rise/fall time (10 % - 90 %)</td> <td>1.0 ns</td> </tr> <tr> <td rowspan="3">Detector</td> <td>Detector material</td> <td>InGaAs PIN photodiode</td> </tr> <tr> <td>Active area</td> <td>\varnothing 300 μm (free space "-FS" version only)</td> </tr> <tr> <td>Spectral response</td> <td>900 ... 1700 nm</td> </tr> <tr> <td rowspan="3">Input</td> <td>Input offset compensation range</td> <td>± 200 μA adjustable by offset potentiometer</td> </tr> <tr> <td>Optical saturation power</td> <td>200 μW (for linear amplification, @ 1550 nm)</td> </tr> <tr> <td>NEP</td> <td>24 $\text{pW}/\sqrt{\text{Hz}}$ (@ 1550 nm, 100 MHz)</td> </tr> </table>		Test conditions	$V_s = \pm 15$ V, $T_A = 25$ °C, system impedance = 50 Ω		Gain	Transimpedance	5.0×10^3 V/A (@ 50 Ω load)	Max. conversion gain	4.8×10^3 V/W (@ 1550 nm)	Frequency Response	Lower cut-off frequency	DC	Upper cut-off frequency (-3 dB)	400 MHz (± 15 %)	Rise/fall time (10 % - 90 %)	1.0 ns	Detector	Detector material	InGaAs PIN photodiode	Active area	\varnothing 300 μ m (free space "-FS" version only)	Spectral response	900 ... 1700 nm	Input	Input offset compensation range	± 200 μ A adjustable by offset potentiometer	Optical saturation power	200 μ W (for linear amplification, @ 1550 nm)	NEP	24 $\text{pW}/\sqrt{\text{Hz}}$ (@ 1550 nm, 100 MHz)
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Specifications (continued)		
Output	Output voltage range	$\pm 1.0\text{ V}$ (@ 50 Ω load) for linear amplification and low harmonic distortion
	Max. output voltage range	$\pm 1.5\text{ V}$ (@ 50 Ω load)
	Output impedance	50 Ω (designed for 50 Ω load)
	Output noise	typ. 20 mV _{pp} or 3 mV _{RMS} (@ 50 Ω load, no signal on detector)
Power Supply	Supply voltage	$\pm 15\text{ V}$
	Supply current	$\pm 55\text{ mA typ.}$ (depends on operating conditions, recommended power supply capability min. $\pm 150\text{ mA}$)
Case	Weight	210 g (0.5 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage temperature	-40 ... +100 °C
	Operating temperature	0 ... +60 °C

Absolute Maximum Ratings	Optical input power	10 mW
	Power supply voltage	$\pm 22\text{ V}$



Connectors	Input	HCA-S-400M-IN-FS 25 mm round flange for free space applications HCA-S-400M-IN-FC FC fiber optic receptacle
	Output	BNC jack (female)
	Power supply	Lemo® series 1S, 3-pin fixed socket (Mating plug type: FFA.1S.303.CLAC52) Pin 1: +15V Pin 2: -15V Pin 3: GND

400 MHz Photoreceiver with InGaAs PIN Photodiode

Typical Performance
Characteristics

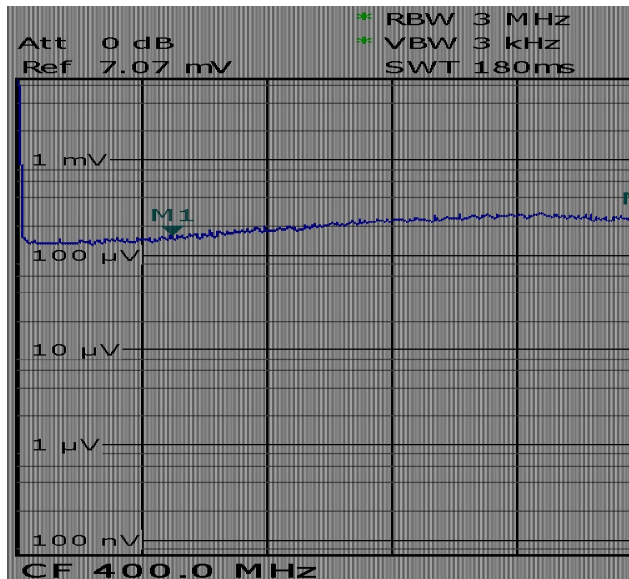
Frequency response

Offs 5.00 dB * RBW 300 kHz
Att 0 dB VBW 1 MHz M1[1] -3.06 dB
Ref -15.00 dBm SWT 10ms 400.00000000 MHz



Start 10.0 MHz Stop 800.0 MHz

Noise spectrum



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.

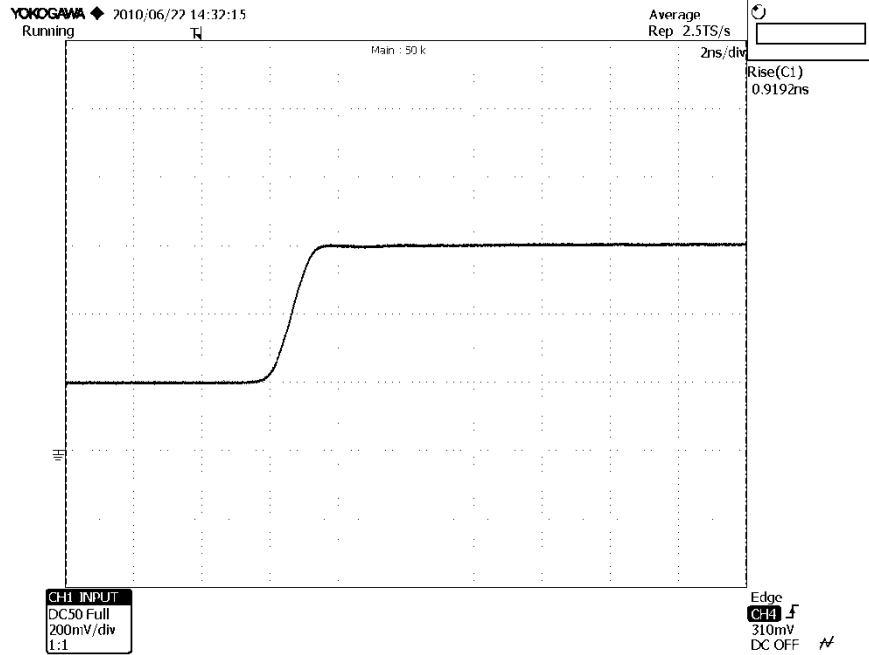
Conversion gain (V/W) = amplifier gain (5,000 V/A) x photo sensitivity (A/W).

Marker	Frequency	Output noise	Resulting input noise (NEP)
1	100 MHz	112 nV/ $\sqrt{\text{Hz}}$	24 pW/ $\sqrt{\text{Hz}}$ (@ 1550 nm)
2	400 MHz	182 nV/ $\sqrt{\text{Hz}}$	38 pW/ $\sqrt{\text{Hz}}$ (@ 1550 nm)

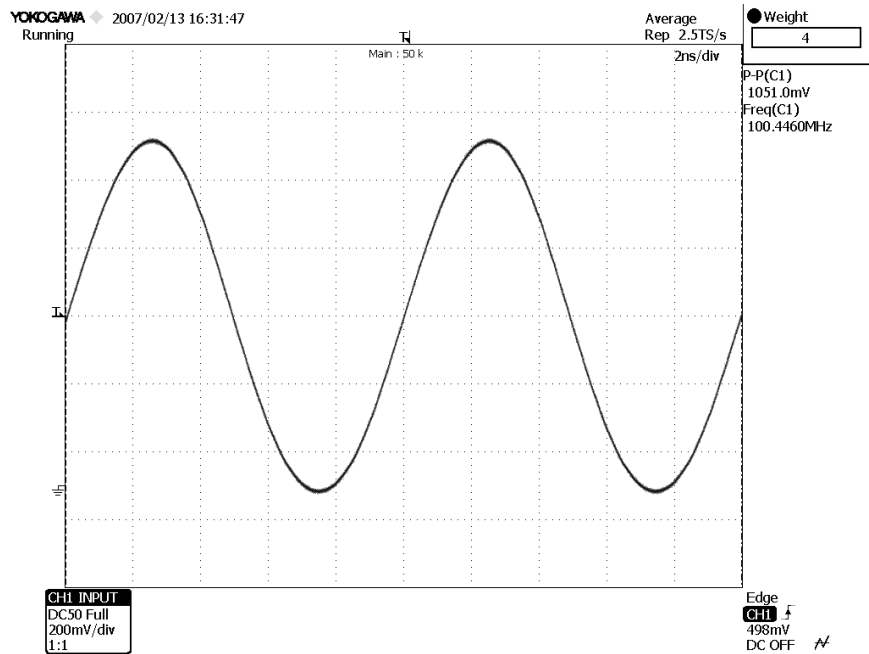
400 MHz Photoreceiver with InGaAs PIN Photodiode

Typical Performance
Characteristics
(continued)

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



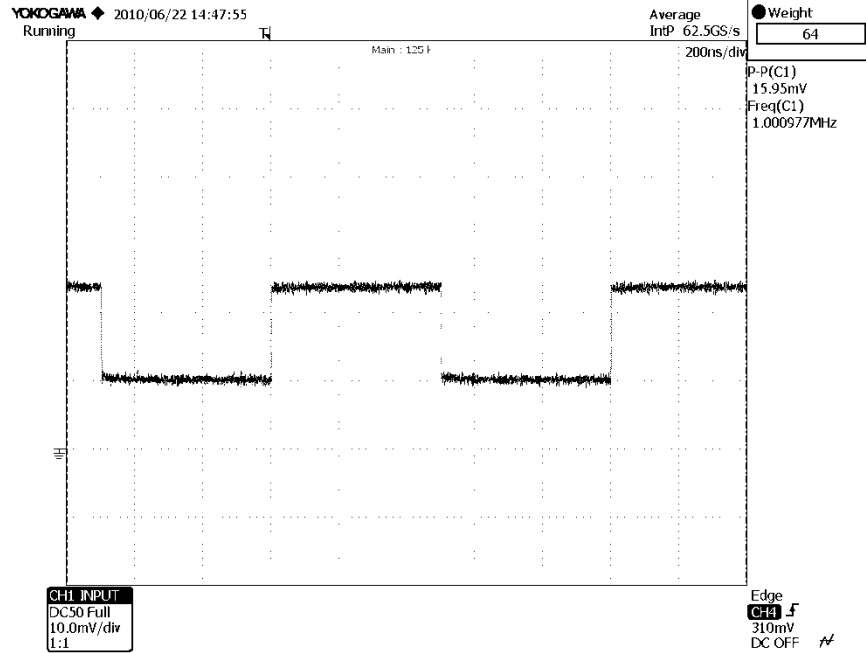
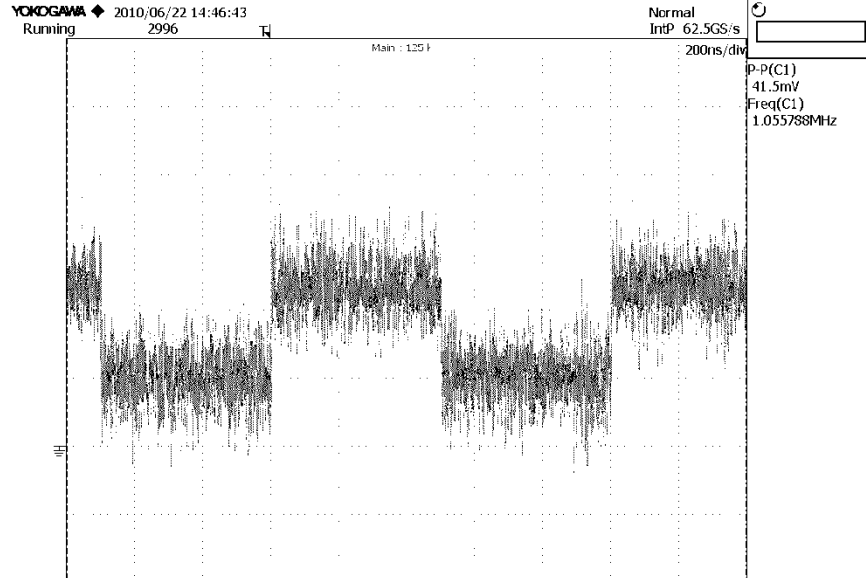
Large signal response
output signal for 100 MHz, 210 μ W modulated optical input signal
(with 4 times averaging)



400 MHz Photoreceiver with InGaAs PIN Photodiode

Typical Performance
Characteristics
(continued)

Small signal response
output signal for 3 μ W modulated optical input signal, 1 MHz square wave
(without (top) and with 64 times averaging (bottom))



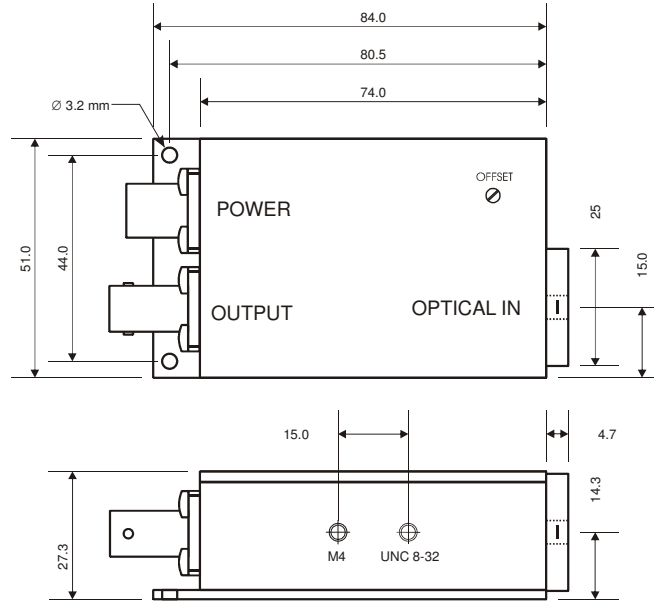
Available Models

HCA-S-400M-IN-FS	free space input
HCA-S-400M-IN-FC	FC fiber optic receptacle
HCA-S	customized versions available on request

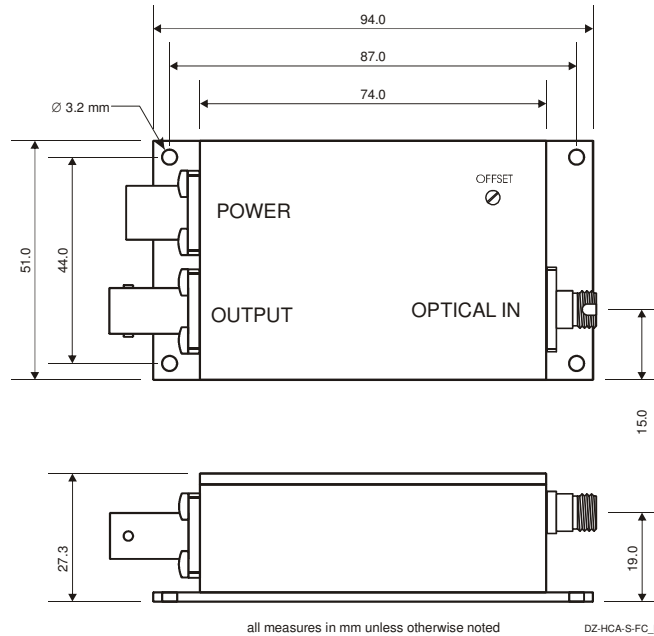
400 MHz Photoreceiver with InGaAs PIN Photodiode

Dimensions

HCA-S-400M-IN-FS



HCA-S-400M-IN-FC



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