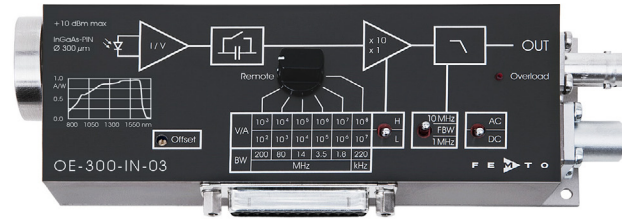


Datasheet

OE-300-IN-03

200 MHz Variable Gain Photoreceiver



The image shows model OE-300-IN-03-FST with 1.035"-40 threaded flange and coupler ring.

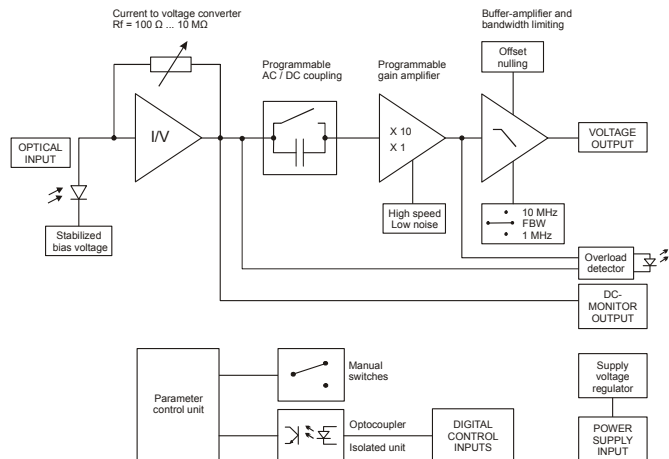
Features

- Adjustable transimpedance gain from 10^2 to 10^8 V/A
- Wide bandwidth up to 200 MHz
- InGaAs-PIN photodiode covering the 800 to 1700 nm wavelength range
- High dynamic input range up to 10 mW optical power
- Very low noise, NEP down to 52 fW/√Hz
- Switchable low pass filters for minimizing wideband noise
- Threaded 1.035"-40 and unthreaded 25 mm dia. free space input available, compatible with many optical standard accessories
- Full manual and remote control capability

Applications

- All-purpose low-noise photoreceiver (O/E converter) for the MHz range
- Time resolved optical pulse and power measurements
- Laser intensity noise measurements (RIN)
- Optical front-end for oscilloscopes, spectrum analyzers, A/D converters and RF lock-in amplifiers

Block Diagram



SOPHISTICATED TOOLS FOR SIGNAL RECOVERY



DE-OE-300-IN-03_R2/MG/JM/250CT2018

Datasheet

OE-300-IN-03

200 MHz Variable Gain Photoreceiver

Available Versions

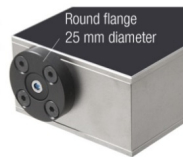
OE-300-IN-03-FST



Internal threaded coupler ring with 30 mm outer diameter (included)

1.035"-40 threaded flange for free space applications compatible with many optical standard accessories.
(Please note: Using the fiber-adapters PRA-FC and PRA-FSMA is not recommended as the small size of the active area can drastically reduce the coupling efficiency.)

OE-300-IN-03-FS



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

Related OE-300 Models

See separate datasheets for following models on www.femto.de:

OE-300-SI-10-FST Si-PIN, 1 x 1 mm, 400 - 1000 nm
1.035"-40 threaded flange

OE-300-SI-10-FS Si-PIN, 1 x 1 mm, 400 - 1000 nm
25 mm dia. unthreaded flange

OE-300-SI-30-FST Si-PIN, \varnothing 3 mm, 320 - 1000 nm
1.035"-40 threaded flange

OE-300-SI-30-FS Si-PIN, \varnothing 3 mm, 320 - 1000 nm
25 mm dia. unthreaded flange

OE-300-IN-01-FC InGaAs-PIN, \varnothing 80 μ m, 900 - 1700 nm
FC fiber receptacle only

OE-300-S customized versions available on request

SOPHISTICATED TOOLS FOR SIGNAL RECOVERY



Datasheet

OE-300-IN-03

200 MHz Variable Gain Photoreceiver

Available Accessories

PRA-PAP



post adapter plate, easy to mount on FEMTO photoreceiver series OE, FWPR, HCA-S and LCA-S

(picture shows model OE-300-SI-10)



PS-15



power supply, input: 100 - 240 VAC, output: ± 15 VDC, +400/-250 mA

LUCI-10



compact digital I/O interface for USB remote control, supports opto-isolation of amplifier signal path from PC USB port, 16 digital outputs, 3 opto-isolated digital inputs, bus-powered operation

Specifications

Test conditions

$V_s = \pm 15$ V, $T_A = 25$ °C, system impedance = 50 Ω

Gain

Transimpedance gain
Gain accuracy

$1 \times 10^2 \dots 1 \times 10^8$ V/A
 ± 1 %

Frequency Response

Lower cut-off frequency
Upper cut-off frequency

DC/100 Hz, switchable
up to 200 MHz (see table below),
switchable to 1 MHz or 10 MHz

Input

Noise equivalent power (NEP)
Max. CW saturation power

see table below
see table below

Detector

Detector
Active area

InGaAs-PIN photodiode
300 μ m dia.

Spectral response
Sensitivity R
Dark current

800 - 1700 nm
0.95 A/W typ. @ 1550 nm
0.1 nA typ.

SOPHISTICATED TOOLS FOR SIGNAL RECOVERY

F E M T O

Datasheet

OE-300-IN-03

200 MHz Variable Gain Photoreceiver

Specifications (continued)

Performance Depending
on Gain Setting

Gain setting (low noise) (V/A)	10 ²	10 ³	10 ⁴	10 ⁵	10 ⁶	10 ⁷
Upper cut-off frequency (-3 dB)	200 MHz	80 MHz	14 MHz	3.5 MHz	1.8 MHz	220 kHz
NEP (1/√Hz, @ 1550 nm)	192 pW	23 pW	1.9 pW	410 fW	152 fW	55 fW
Measured at	20 MHz	8 MHz	1.4 MHz	350 kHz	180 kHz	22 kHz
Integrated input noise (RMS)*	4.8 μW	370 nW	23 nW	3.4 nW	0.82 nW	64 pW
CW sat. power (@ 1550 nm)	10 mW	1.0 mW	100 μW	10 μW	1.0 μW	100 nW

Gain setting (high speed) (V/A)	10 ³	10 ⁴	10 ⁵	10 ⁶	10 ⁷	10 ⁸
Upper cut-off frequency (-3 dB)	175 MHz	80 MHz	14 MHz	3.5 MHz	1.8 MHz	220 kHz
NEP (1/√Hz, @ 1550 nm)	137 pW	6.8 pW	1.4 pW	360 fW	127 fW	52 fW
Measured at	18 MHz	8 MHz	1.4 MHz	350 kHz	175 kHz	22 kHz
Integrated input noise (RMS)*	2.9 μW	270 nW	20 nW	3.3 nW	0.82 nW	64 pW
CW sat. power (@ 1550 nm)	1.0 mW	100 μW	10 μW	1.0 μW	100 nW	10 nW

* The integrated input noise is measured with a shaded input in the full bandwidth ("FBW") setting (referred to 1550 nm). The measurement bandwidth is 3 x the upper cut-off frequency at the specific gain setting; filter slope is a 1st order roll-off.

The input referred peak-peak noise can be calculated from the RMS noise as follows:

$$P_{\text{input noise peak-to-peak}} = P_{\text{input noise RMS}} \times 6$$

The output noise is given by:

$$U_{\text{output noise RMS}} = P_{\text{input noise RMS}} \times \text{gain} \times R$$

$$U_{\text{output noise peak-to-peak}} = U_{\text{output noise RMS}} \times 6 = P_{\text{input noise RMS}} \times \text{gain} \times R \times 6$$

The integrated noise will be reduced considerably by setting the low pass filter to "1 MHz" or "10 MHz" instead of "FBW". This is especially useful for continuous wave (CW) measurements.

Output

Output voltage range ±1 V (@ 50 Ω load), for linear amplification
 Output impedance 50 Ω (designed for 50 Ω load)
 Slew rate 1000 V/μs
 Max. output current ±40 mA
 Output offset compensation adjustable by offset potentiometer and external control voltage, output offset compensation range min. ±100 mV

Ext. Offset Control

Control voltage range ±10 V
 Offset control input impedance 15 kΩ

Indicator LED

Function overload

Digital Control

Control input voltage range LOW bit: -0.8 ... +1.2 V, HIGH bit: +2.3 ... +12 V
 Control input current 0 mA @ 0 V, 1.5 mA @ +5 V, 4.5 mA @ +12 V
 Overload output non active: <0.4 V @ 0 ... -1 mA
 active: typ. 5 ... 5.1 V @ 0 ... 2 mA

Power Supply

Supply voltage ±15 V
 Supply current +110/-90 mA (depends on operating conditions, recommended power supply capability min ±200 mA)
 Stabilized power supply output ±12 V, max. 20 mA, +5 V, max. 150 mA

Case

Weight 320 g (0.74 lb.)
 Material AlMg4.5Mn, nickel-plated

Input Flange

Material 1.4305 stainless steel, glass bead blasted
 (1.035"-40 threaded flange)
 AlMg4.5Mn, nickel-plated
 (25 mm dia. unthreaded flange)

Coupler Ring

Material 1.4305 stainless steel, glass bead blasted

SOPHISTICATED TOOLS FOR SIGNAL RECOVERY



Datasheet

OE-300-IN-03

200 MHz Variable Gain Photoreceiver

Specifications (continued)

DC Monitor Output

Monitor output gain	Mode	Monitor gain
	Low noise	Gain setting divided by -1
	High speed	Gain setting divided by -10
Monitor output polarity	inverting	
Monitor output voltage range	±1 V (@ ≥1 MΩ load)	
Monitor output bandwidth	DC ... 1 kHz	
Monitor output impedance	1 kΩ (designed for ≥1 MΩ load)	

Temperature Range

Storage temperature	-40 ... +80 °C
Operating temperature	0 ... +60 °C

Absolute Maximum Ratings

Max. CW power (averaged)	12 mW
Digital control input voltage	-5 V/+16 V relative to digital ground DGND (pin 9)
Analog control input voltage	±15 V relative to analog ground AGND (pin 3)
Power supply voltage	±20 V

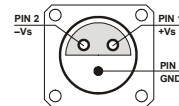
Connectors

Input	OE-300-IN-03-FST	1.035" -40 threaded flange for free space applications and for use with various types of optical standard accessories
	OE-300-IN-03-FS	25 mm unthreaded round flange for free space applications For optical FC input model see OE-300-IN-01-FC

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



Control port

Sub-D 25-pin, female, qual. class 2
Pin 1: +12 V (stabilized power supply output)
Pin 2: -12 V (stabilized power supply output)
Pin 3: AGND (analog ground for pins 1 - 8)
Pin 4: +5 V (stabilized power supply output)
Pin 5: digital output: overload (referred to pin 3)
Pin 6: DC Monitor output
Pin 7: NC (= not connected)
Pin 8: output offset control voltage input
Pin 9: DGND (ground for digital control pins 10 - 16)
Pin 10: digital control input: gain, LSB
Pin 11: digital control input: gain
Pin 12: digital control input: gain, MSB
Pin 13: digital control input: AC/DC
Pin 14: digital control input: high speed / low noise
Pin 15: upper cut-off frequency limit 10 MHz
Pin 16: upper cut-off frequency limit 1 MHz
Pin 17 - 25: NC (= not connected)

SOPHISTICATED TOOLS FOR SIGNAL RECOVERY

F E M T O

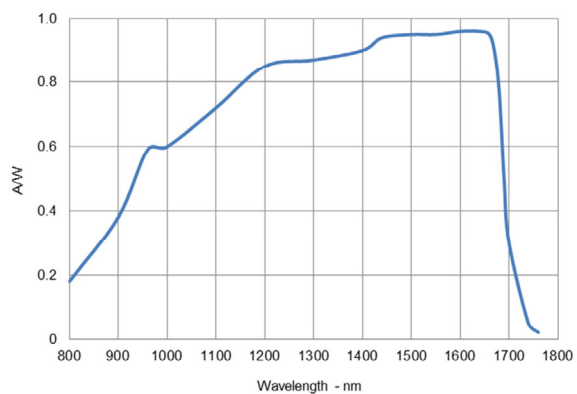
Datasheet

OE-300-IN-03

200 MHz Variable Gain Photoreceiver

Scope of Delivery	OE-300-IN-03, threaded coupler ring ("FST" version only), Lemo® 3-pin connector, datasheet, transport package				
Remote Control Operation	General	Remote control input bits are opto-isolated and connected by a logical OR function to the local switch settings. For remote control set the corresponding local switches to "Remote", "DC", "L" (low noise mode) and "FBW", and select the desired setting via a bit code at the corresponding digital inputs. Mixed operation, e.g. local AC/DC setting and remote controlled gain setting, is also possible.			
	Gain setting	Low noise Gain (V/A) Pin 14=LOW	High speed Gain (V/A) Pin 14=HIGH	Pin 12 MSB	Pin 11 Pin 10 LSB
		10 ²	10 ³	LOW	LOW LOW
		10 ³	10 ⁴	LOW	LOW HIGH
		10 ⁴	10 ⁵	LOW	HIGH LOW
	10 ⁵	10 ⁶	LOW	HIGH HIGH	
	10 ⁶	10 ⁷	HIGH	LOW LOW	
	10 ⁷	10 ⁸	HIGH	LOW HIGH	
	AC/DC setting	Coupling	Pin 13		
		DC	LOW		
		AC	HIGH		
	Low pass filter setting	Upper cut-off freq. limit	Pin 15	Pin 16	
		full bandwidth	LOW	LOW	
		10 MHz	HIGH	LOW	
		1 MHz	LOW	HIGH	
	High speed / low noise setting	Mode	Pin 14		
		low noise mode	LOW		
		high speed mode	HIGH		

Spectral Responsivity



SOPHISTICATED TOOLS FOR SIGNAL RECOVERY



Datasheet

OE-300-IN-03

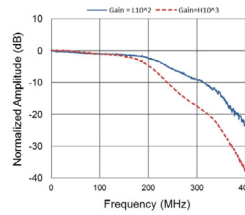
200 MHz Variable Gain Photoreceiver

Typical Performance
Characteristic

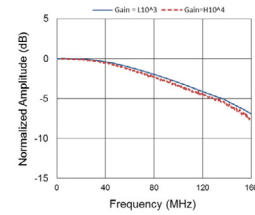
Frequency response

$$V_{\text{Supply}} = \pm 15 V_{\text{DC}}; R_{\text{Load}} = 50 \Omega$$

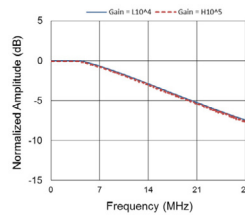
Gain setting: $L10^2, H10^3$



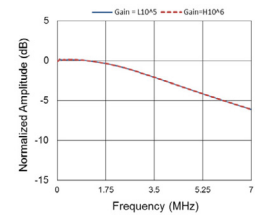
Gain setting: $L10^3, H10^4$



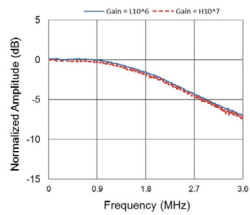
Gain setting: $L10^4, H10^5$



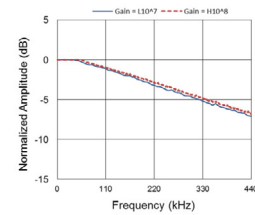
Gain setting: $L10^5, H10^6$



Gain setting: $L10^6, H10^7$



Gain setting: $L10^7, H10^8$



SOPHISTICATED TOOLS FOR SIGNAL RECOVERY



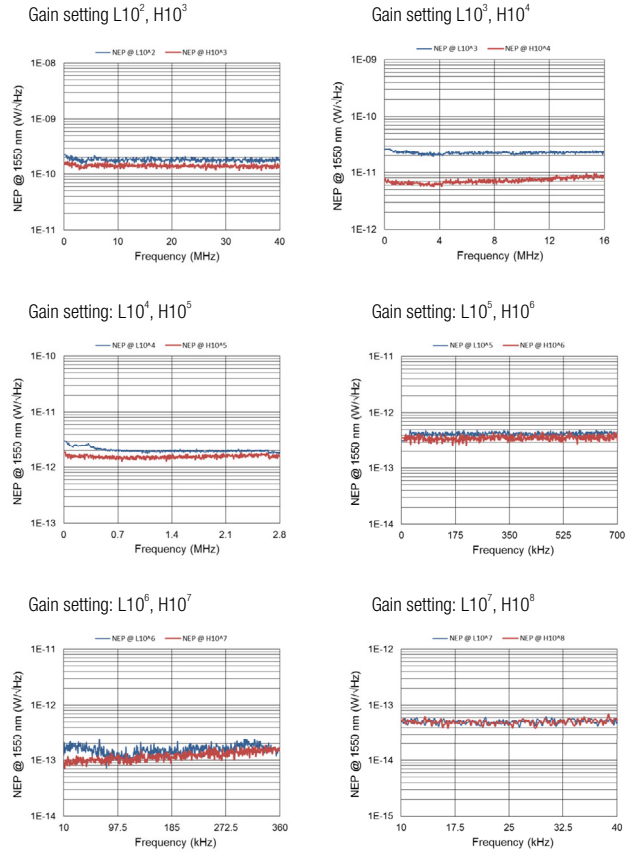
Datasheet

OE-300-IN-03

200 MHz Variable Gain Photoreceiver

Typical Performance
Characteristic (continued)

Input noise equivalent power (NEP)



SOPHISTICATED TOOLS FOR SIGNAL RECOVERY



Datasheet

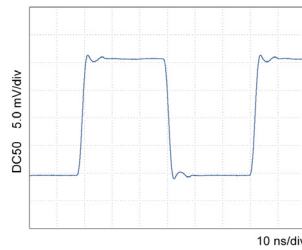
OE-300-IN-03

200 MHz Variable Gain Photoreceiver

Typical Performance
Characteristic (continued)

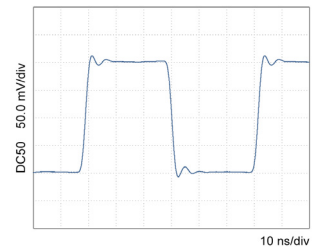
Signal pulse response

Gain setting L10²



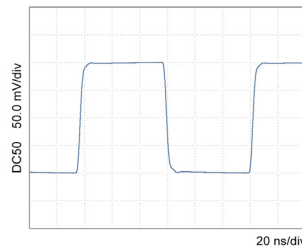
Rise: 1.92 ns Fall: 1.93 ns

Gain setting H10³



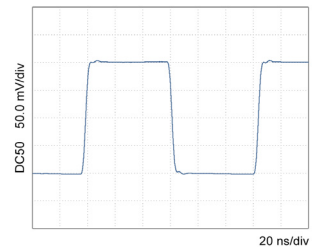
Rise: 2.28 ns Fall: 2.30 ns

Gain setting L10³



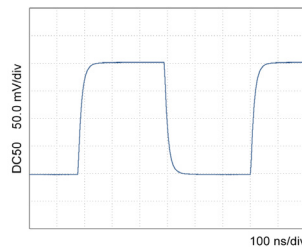
Rise: 3.45 ns Fall: 3.49 ns

Gain setting H10⁴



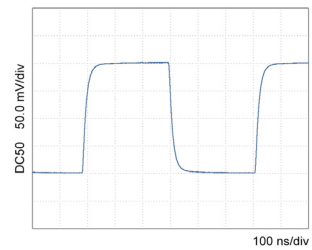
Rise: 3.59 ns Fall: 3.61 ns

Gain setting L10⁴



Rise: 25.98 ns Fall: 26.90 ns

Gain setting H10⁵



Rise: 27.24 ns Fall: 27.11 ns

SOPHISTICATED TOOLS FOR SIGNAL RECOVERY

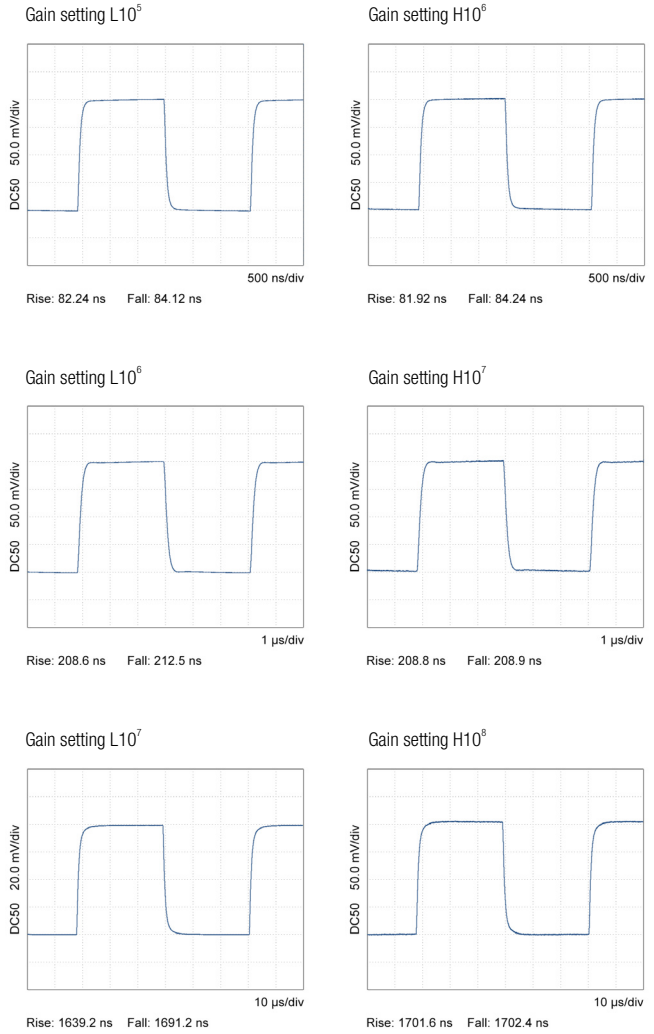


Datasheet

OE-300-IN-03

200 MHz Variable Gain Photoreceiver

Typical Performance
Characteristic (continued)



SOPHISTICATED TOOLS FOR SIGNAL RECOVERY



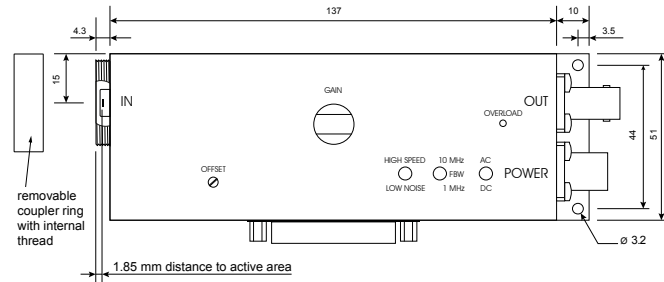
Datasheet

OE-300-IN-03

200 MHz Variable Gain Photoreceiver

Dimensions

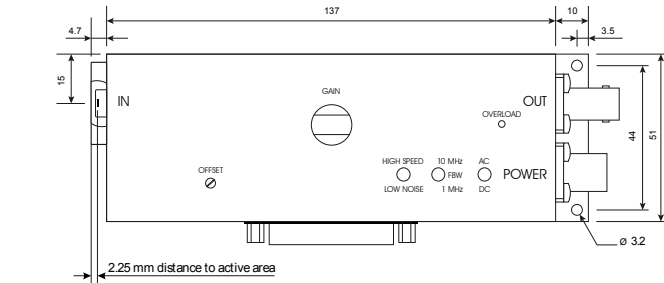
Threaded free space input OE-300-IN-03-FST:



All measurements in mm unless otherwise noted.

DZ-OE-300-IN-03-FST_R1

Free space input OE-300-IN-03-FS:



All measurements in mm unless otherwise noted.

DZ-OE-300-IN-03-FS_R1

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