

PRODUCT INFORMATION PACKAGE

Cascade Devices

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For more information regarding modification of the design of the housing or variation of the combination of active components please ask at

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Please visit also our website www.oeca.de to learn more about OECA and its products.

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Cascade-Devices Duplex-, Triplex- Module, Wavelength Combiner

The construction of the modules allows the assembly of several emitting-/receiving-devices and fibers as a cascade in one common housing. Different combinations of these components are possible and makes cascade-devices with up to 5 optical in- or/and outputs feasible. In- and outputs can be realized as pigtail as well as receptacle.

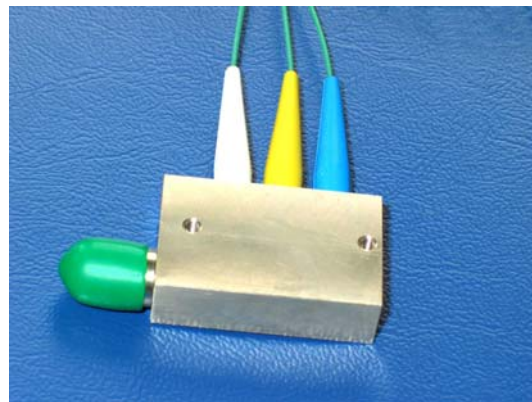
Because of use of dielectric mirrors as beamsplitter, the maximum of coupling efficiency and the lowest crosstalk will be achieved if the difference between the wavelengths which have to be distinguished is $\geq 100\text{nm}$. Otherwise higher losses ($\geq 50\%$) and a higher crosstalk are to be expected.

The active components as Laserdiode, LED's, VCSELs and photodiodes are isolated from the housing.

These devices are designed to work in bidirectional modus.

Applications

- WDM-systems, - bandwidth of the systems will be multiplied
- Alternative to fiber couplers, especially to expensive polarization maintaining couplers
- Sensorapplications, - special possibilities by combination of several wavelengths



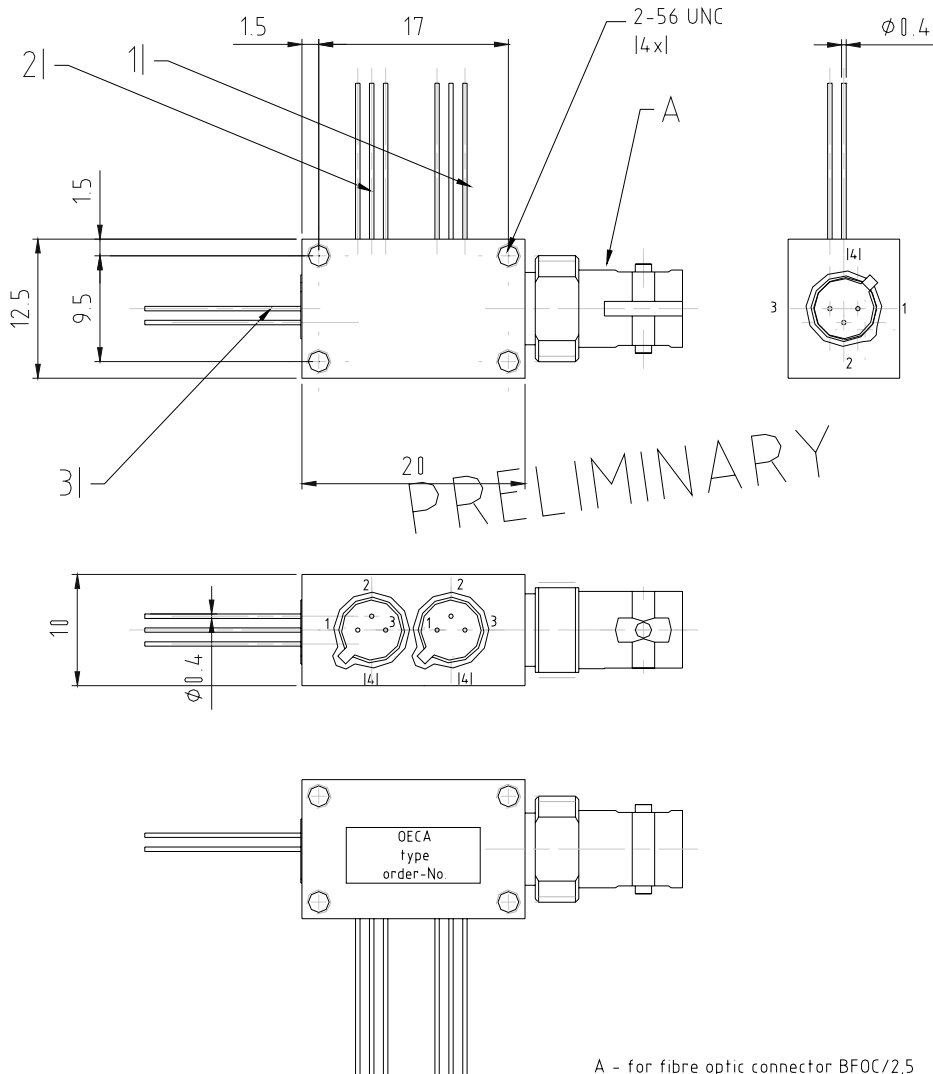
Crosstalk	$\Delta\lambda > 100\text{nm}$	>40dB
	$\Delta\lambda < 100\text{nm}$	>20dB
Emitting devices	Laserdiode, LED's; VCSEL's, Wavelength 635nm-1650nm	
Receiving devices	APD, PIN-diodes, PINTIA	
Optical fibers	multimode, singlemode, polarisation maintaining	
Electro optical parameter	defined by individual parameters of used active components	

A complete passive device, consisting of only coupled fibers, as a wavelength combiner / splitter is one of the possible variations of the described cascade concept (see foto above).

In another application the photodiode is used as a monitordiode or additional reference diode.

For detailed information please contact OECA to find out what parameter can be achieved using the special configuration you may need. Let us find out together whether we can meet your targets by modifying the above described concept. We are convinced that we can find the right solution to your problem.

Drawing (Example)



CDM-2Tx-Rx:

- 1 - 1300nm Rx
- 2 - 850nm Tx
- 3 - 780nm Tx

CDM-Tx-2Rx:

- 1 - 1300nm Tx
- 2 - 850nm Rx
- 3 - 780nm Rx

Pinout according to specification

A - for fibre optic connector BFOC/2,5
terminated for MM fibre 62.5/125
option: fiber optic connector SC-PC
acc. to IEC 61754-4

Accessories: dust cover
4x screw 2-56 UNC

tolerances acc. to DIN ISO2768

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Type	Description	Remarks
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Multi mode devices

LED Cascade	Duplex	...OECA-ST400 ...OECA-FC400 ...OECA-SC400 ...OECA-P400	Combination of emitting (Tx) and receiving (Rx) devices same / different wavelength fixation with glue	All kinds of active components, Laser only with lens cap
		CDM-2Tx CDM-3Tx CDM-2Rx CDM-3Rx	Combination of two or three dev. of same kind (Tx or Rx) same / different wavelength fixation with glue, housing like Duplex ST400 etc	
Laser Cascade	Duplex	DLQ5 -...	Combination of emitting (Tx) and receiving (Rx) devices same / different wavelength fixation with glue, housing like Duplex ST400 etc	"Laser" or "LED" stands for different coupling technologies and differences in the design of the housings
		CDM-2Tx CDM-3Tx CDM-2Rx CDM-3Rx	Combination of two or three dev. of same kind (Tx or Rx) same / different wavelength fixation with glue	

Type	Description	Remarks
Triplex	CDM- Tx-2Rx CDM- 2Tx-Rx	Combination of Tx and 2 Rx or 2Tx and Rx same / different wavelength fixation with glue, housing like Duplex ST400 etc
Quadruplex	CDM-2Tx-Rx	Combination of 2 Tx and 2 Rx same / different wavelength fixation with glue

Single mode devices

Laser Cascade	Duplex	DLQ6 -...	Combination of emitting (Tx) and receiving (Rx) devices same / different wavelength Tx welded, Rx glued	Same size as "Infineon" device
	MiniDuplex		both Tx and Rx welded	
		CDS-2Tx CDS-3Tx CDS-2Rx CDS-3Rx	Combination of two or three dev. of same kind (Tx or Rx) same / different wavelength all components welded	
	Triplexer	CDS- Tx-2Rx CDS- 2Tx-Rx	Combination of Tx and 2 Rx or 2Tx and Rx same / different wavelength Tx welded, Rx glued, housing based on DLQ6...	"FSAN"

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1A1942/1A3582H OECA-ST400

860nm LED / 1300 nm PD

Description

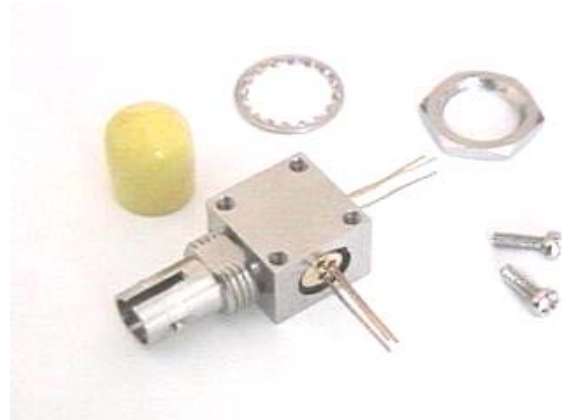
The device consists of a 860 nm LED and a 1300nm PIN-Photodiode and can be used as a duplex data transmission device for multimode fibers. Both single components are assembled in a ST - receptacle for a 62.5/ 125µm multimode fiber together with a dielectrical beamsplitter. The components are electrical isolated from the case to avoid ESD damage.

Applications

full-duplex data communication for datacom systems, WDM systems, and sensor techniques

Features

- Optical power in GI62.5/125µm fiber min. 30 µW
- Responsivity min. 0.5 A/W
- Optical crosstalk suppression ≥40dB
- Laser class 1M



This picture gives only an impression how the real device will look like. For details and pin out please refer to the drawing.

Absolute Maximum Ratings

(TC = 25°C ± 2°C)

Parameter	Symbol	min.	max.	Unit
Reverse voltage LED	V_R		1.5	V
Electrical power dissipation LED	P_{tot}		160	mW
Continous forward current (f < 10kHz) LED	I_F		80	mA
Peak forward current (50 % Duty cycle, f > 10MHz) LED	I_{FRM}		130	mA
Reverse voltage PD	V_R		20	V
Operating temperature	TOP = Tc	-40	+85	°C
Storage temperature	Tstg	-55	+85	°C
Soldering temperature / - time	Tsold / tsold		260/10	°C / s

Optical and Electrical Characteristics

(TC = 25°C ± 2°C)

Parameter LED 1A1942	Symbol	Condition	min.	typ.	max.	Unit
Fiber coupled power	Pfiber	fiber 62.5/125µm, NA = 0.275, I _F = 60 mA	30			µW
Peak wavelength	λ_P	I _F = 60 mA		860		nm
Spectral width (FWHM)	$\Delta\lambda$	I _F = 60 mA		50		nm
Forward voltage	V_F	I _F = 60 mA		1.7	1.9	V
Band width	f _C	I _F = 60 mA		70		MHz
Rise - / fall time	tr,tf	I _F = 60 mA		5	7	ns
Reverse current	I _R	$V_R = 1V$			20	µA
Capacitance	C	$V_R = 0V, f = 1MHz$		250		pF

Power measured at the exit of 100m of fiber

Duplex

PRELIMINARY

1A1942/1A3582H OECA-ST400
0198.04.02-OECA- 2004-21-20

Engineering Sample

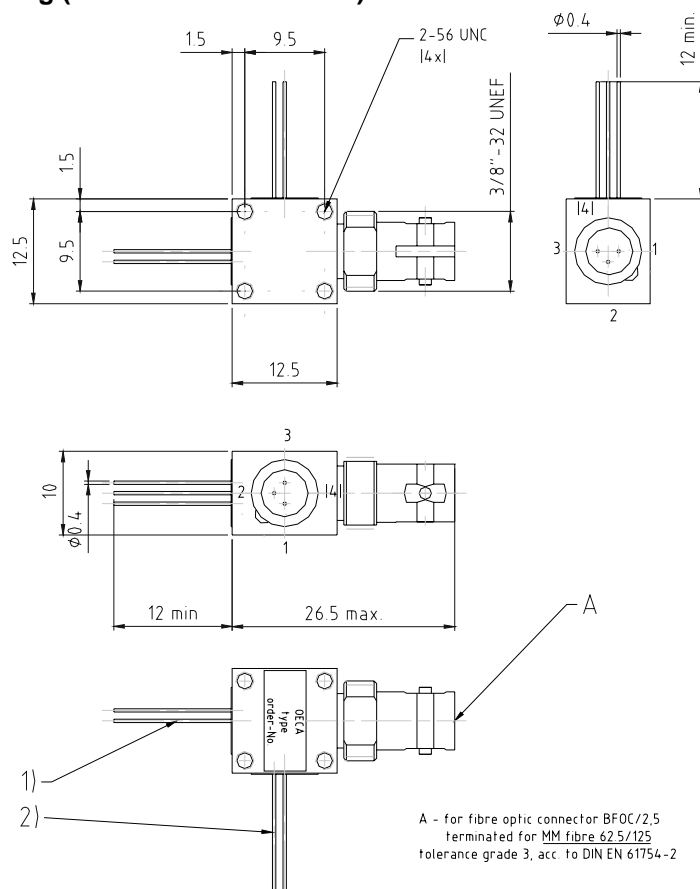
Optical and Electrical Characteristics

(T = 25°C ± 2°C)

Parameter PD 1A3582	Symbol	Condition	min.	typ.	Max.	Unit
Bandwidth	f_C	$V_R=5V, R_L=50\Omega$	2.5			GHz
Responsivity	R	$\lambda =1300nm, V_R=5V$ GI 62.5/125 μm ; NA=0.275	0.5	0.6		A/W
Dark current	I_d	$V_R=5V$			3	nA
Capacitance	C	$f = 1MHz, V_R=5V$		0.8	1.2	pF
Crosstalk current	I_{Cr}	$V_R=5V; I_F(LED)=60mA$ ^{note1}		75		nA

note 1: Internal crosstalk with ceramic ferrule inserted but no power from the fiber. Total current=dark current+crosstalk current.

Drawing (All Dimensions in mm)



Pinout according to specification
tolerances acc. to DIN ISO2768

Accessories: dust cover
nut 3/8"-32UNEF
washer 3/8"
4x screw 2-56 UNC

Pin Out

Pin	LED: 1A1942 diode 1	Pin	PD: 1A3582 diode 2
1	-	1	anode
2	cathode	2	cathode
3	case TO 46	3	case TO46
4	anode	4	-

LED cathode and anode as well as PD cathode and anode are electrical isolated from TO46 case

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2/2

1A4392/1A2032H OECA-ST400

1320 nm LED / 850 nm PD

Description

The device consists of a 1320 nm LED and a 850nm PIN-Photodiode and can be used as a duplex datatransmission device for multimode fibers. Both single components are assembled in a ST - receptacle for a 62.5/ 125µm multimode fiber together with a dielectrical beamsplitter. The components are electrical isolated from the case to avoid ESD damage.

Applications

full-duplex data communication for datacom systems, WDM systems, and sensor techniques

Features

- Optical power in GI62.5/125µm fiber min. 30 µW
- Responsivity min. 0.35 A/W
- Optical crosstalk suppression ≥40dB
- Laser class 1



This picture gives only an impression how the real device will look like. For details and pin out please refer to the drawing.

Absolute Maximum Ratings

(TC = 25°C ± 2°C)

Parameter	Symbol	min.	max.	Unit
Reverse voltage LED	V_R		0.5	V
Electrical power dissipation LED	P_{tot}		160	mW
Continous forward current (f < 10kHz) LED	I_F		80	mA
Peak forward current (50 % Duty cycle, f > 10MHz) LED	I_{FRM}		130	mA
Reverse voltage PD	V_R		50	V
Operating temperature	TOP = Tc	-40	+85	°C
Storage temperature	Tstg	-55	+85	°C
Soldering temperature / - time	Tsold / tsold		260/10	°C / s

Optical and Electrical Characteristics LED 1A4392

(TC = 25°C ± 2°C)

Parameter 1A4392	Symbol	Condition	min.	typ.	max.	Unit
Fiber coupled power	Pfiber	fiber 62.5/125µm, NA = 0.275 $I_F = 60$ mA	30			µW
Peak wavelength	λ_P	$I_F = 60$ mA		1320		nm
Spectral width (FWHM)	$\Delta\lambda$	$I_F = 60$ mA		135		nm
Forward voltage	V_F	$I_F = 60$ mA		1.3	1.65	V
Band width	f_C	$I_F = 60$ mA		125		MHz
Rise - / fall time	tr,tf	$I_F = 60$ mA		2.5		ns
Reverse current	I_R	$V_R = 0.5$ V			100	µA
Capacitance	C	$V_R = 0$ V, f=1MHz		200		pF

Power measured at the exit of 100m of fiber

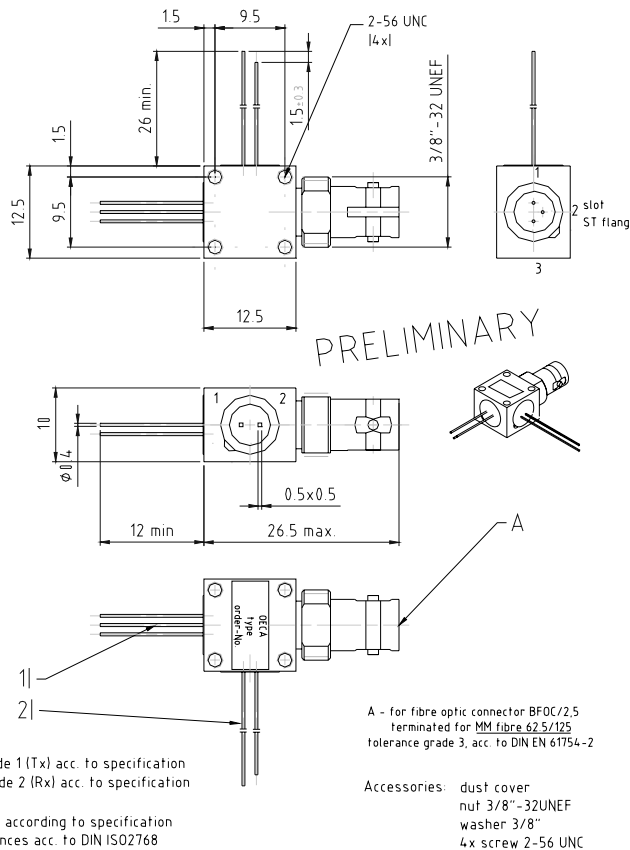
Optical and Electrical Characteristics

(T = 25°C ± 2°C)

Parameter PD 1A2032	Symbol	Condition	min.	typ.	max.	Unit
Wavelength of max. responsivity	λ_{Rmax}			850		nm
Spectral range of sensitivity	λ	R=10% of R_{max}		400...1100		nm
Dark current	I_d	$V_R=5V$		1	10	nA
Responsivity	R_λ	$\lambda=850nm, V_R=5V$ GI 62.5/125 μm ; NA=0.275	0.35			A/W
Rise -, Fall time of photo current	t_r, t_f	$V_R=20V, R_L=50\Omega$		5		ns
Crosstalk current	I_{Cr}	$V_R=5V$; $I_F(LED)=60mA$ note1		15		nA

note 1: Internal crosstalk with ceramic ferrule inserted but no power from the fiber. Total current=dark current+crosstalk current.

Drawing (All Dimensions in mm)



1) diode 1 (Tx) acc. to specification
2) diode 2 (Rx) acc. to specification

Pinout according to specification
tolerances acc. to DIN ISO2768

Pin Out

Pin	LED: 1A4392 diode 1	Pin	PD: 1A2032 diode 2
1	anode	1	anode
2	case	2	Cathode (short pin)
3	cathode	3	

LED cathode and anode as well as PD cathode and anode are electrical isolated from case.

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1A4522/S59712 OECA-ST400

Description

This device consists of a 850 nm VCSEL and a Si PIN photodiode for 850 nm. Both components are coupled to a ST-Port for GI62.5/125µm multimode gradient index fiber (MM-fiber) using a dielectrical beamsplitter. The active components are electrical isolated from the metal parts of the housing.

Applications

- Full-duplex data communication
- Sensor technologies

Features

- Optical power in GI62.5/125µm MM-fiber 0.1mW typ.
- Responsivity 0.35 A/W typ.
- Optical crosstalk < -10 dB min.
- Laser class 1M



This picture gives only an impression how the real device will look like. For details and pin out please refer to the drawing.

Absolute Maximum Ratings

Parameter	Symbol	min.	max.	Unit
Reverse voltage VCSEL	V_R		5	V
Forward current VCSEL	I_F		15	mA
Reverse voltage PIN	V_{RPIN}		20	V
Operating temperature	$T_{OP} = T_c$	0	+70	°C
Storage temperature	T_{stg}	-40	+85	°C
Soldering temperature/-time	T_{sold} / t_{sold}		260/5	°C / s

Optical and Electrical Characteristics

(TC = 25°C ± 2°C)

Parameter VCSEL 1A4522	Symbol	Condition	min.	typ.	max.	Unit
Fiber optical power	P_f	GI62.5/125µm fiber NA=0.275 $I_F=7$ mA		0.1		mW
Threshold current	I_{th}		1		4.5	mA
Forward voltage	V_F	$I_F=7$ mA	1.6		2.2	V
Peak wavelength	λ_p	$I_F=7$ mA	830	850	860	nm
Spectral width	$\Delta\lambda$	$I_F=7$ mA			0.85	nm

Optical and Electrical Characteristics

(TC = 25°C ± 2°C)

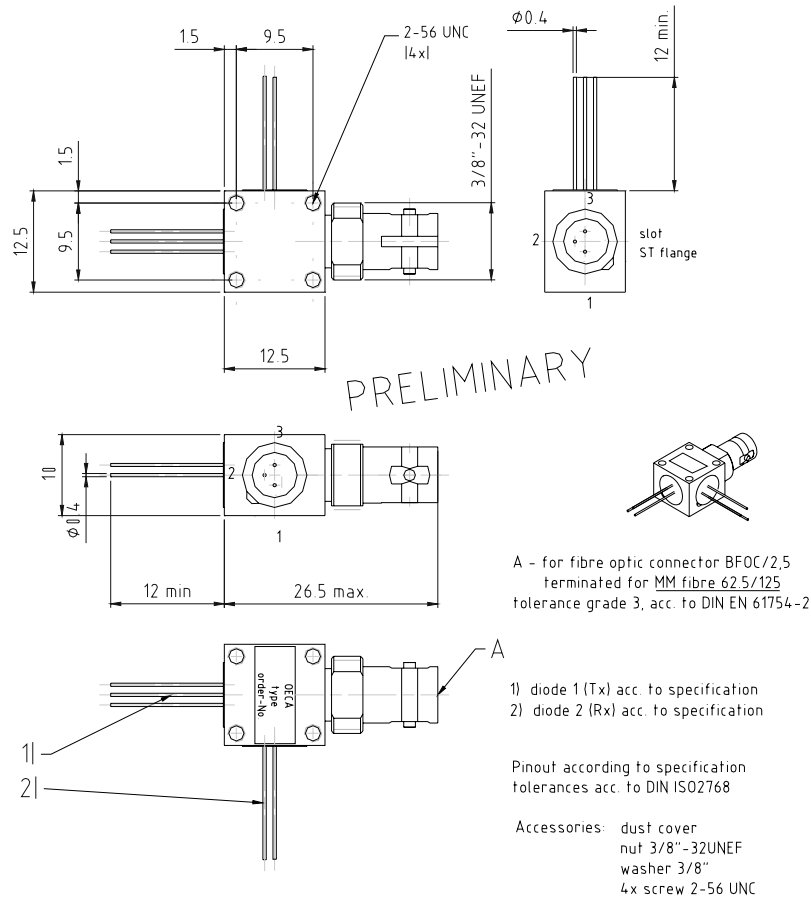
Parameter PD S59712	Symbol	Condition	min.	typ.	max.	Unit
Responsivity	R	$\lambda = 850$ nm, $V_R=10$ V GI62.5/125µm fiber NA=0.275		0.35		A/W
Bandwidth	f_c	$V_R=10$ V		0.1		GHz
Capacitance	C	$f = 1$ MHz		3		pF
Dark current	I_d	$V_R=10$ V		0.07		nA

Duplex

PRELIMINARY

1A4522/S59712 OECA-ST400
0293.04.07.OECA-2004-07-16
ENGINEERING SAMPLE

Drawing (All dimensions in mm.)



Pin Out

Pin	Device 1 1A4522	Pin	Device 2 S59712
1	anode (+)	1	cathode (-)
2	case ^{note1}	2	case
3	cathode (-)	3	anode(+)

Note1 : Chip is isolated from the case.

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1A1942/1A203P2H OECA-ST400

860nm LED / 850 nm PD

Description

The device consists of a 860 nm LED and a Silicon PIN-Photodiode and can be used as a duplex data transmission device for multimode fibers. Both single components are assembled in a ST - receptacle for a 62.5/ 125µm multimode fiber together with a dielectrical beamsplitter. The components are electrical isolated from the case to avoid ESD damage.

Applications

full-duplex data communication for datacom systems, WDM systems, and sensor techniques

Features

- Optical power in GI62.5/125µm fiber min. 30 µW
- Responsivity min. 0.35 A/W
- Optical crosstalk suppression <-10dB min
- Laser class 1M



This picture gives only an impression how the real device will look like. For details and pin out please refer to the drawing.

Absolute Maximum Ratings

(TC = 25°C ± 2°C)

Parameter	Symbol	min.	max.	Unit
Reverse voltage LED	V_R		1.5	V
Electrical power dissipation LED	P_{tot}		160	mW
Continous forward current (f < 10kHz) LED	I_F		80	mA
Peak forward current (50 % Duty cycle, f > 10MHz) LED	I_{FRM}		130	mA
Reverse voltage PD	V_R		20	V
Operating temperature	TOP = Tc	-40	+85	°C
Storage temperature	Tstg	-55	+85	°C
Soldering temperature / - time	Tsold / tsold		260/10	°C / s

Optical and Electrical Characteristics

(TC = 25°C ± 2°C)

Parameter LED 1A1942	Symbol	Condition	min.	typ.	max.	Unit
Fiber coupled power	Pfiber	GI 62.5/125µm, NA = 0.275, I _F = 60 mA	30			µW
Peak wavelength	λ_P	I _F = 60 mA		860		nm
Spectral width (FWHM)	$\Delta\lambda$	I _F = 60 mA		50		nm
Forward voltage	V_F	I _F = 60 mA		1.7	1.9	V
Band width	f _C	I _F = 60 mA		70		MHz
Rise - / fall time	tr,tf	I _F = 60 mA		5	7	ns
Reverse current	I _R	$V_R = 1V$			20	µA
Capacitance	C	$V_R = 0V, f = 1MHz$		250		pF

Power measured at the exit of 100m of fiber

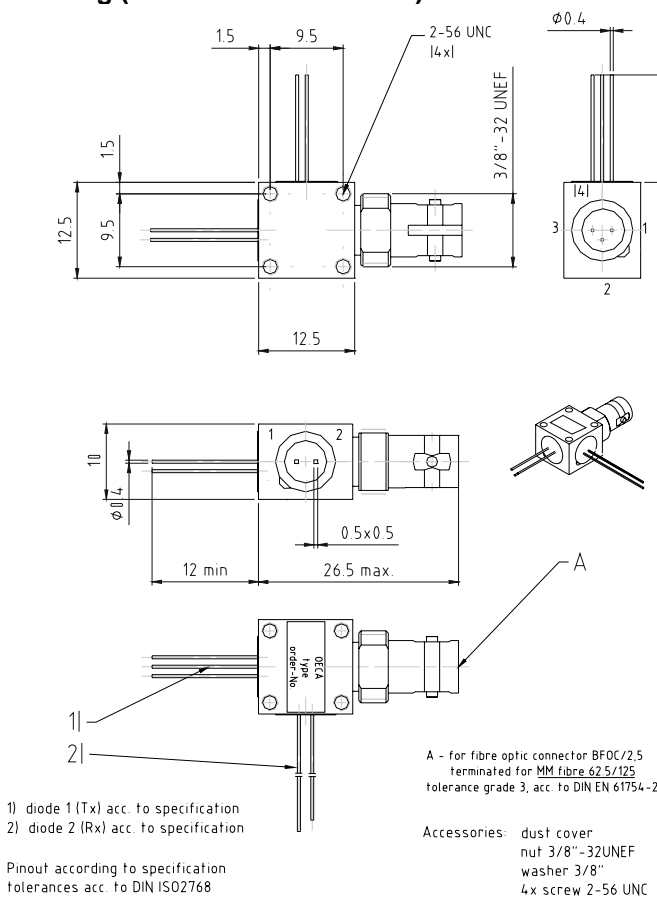
Optical and Electrical Characteristics

(T = 25°C ± 2°C)

Parameter PD 1A203P2H	Symbol	Condition	min.	typ.	max.	Unit
Wavelength of max. responsivity	λ_{Rmax}			850		nm
Spectral range of sensitivity	λ	R=10% of R_{max}		400...1100		nm
Dark current	I_d	$V_R=5V$		1	10	nA
Responsivity	R_λ	$\lambda=850nm, V_R=5V$ GI 62.5/125 μm ; NA=0.275	0.35			A/W
Rise -, Fall time of photo current	t_r, t_f	$V_R=20V, R_L=50\Omega$		5		ns
Crosstalk current	I_{Cr}	$V_R=5V;$ $I_F(LED)=60mA$ note1		15		nA

note 1: Internal crosstalk with ceramic ferrule inserted but no power from the fiber. Total current=dark current+crosstalk current

Drawing (All Dimensions in mm)



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Pin Out

Pin	LED: 1A1942 diode 1	Pin	PD: 1A203P2H diode 2
1	-	1	anode
2	cathode	2	Cathode (short pin)
3	case TO 46	3	-
4	anode	4	-

LED cathode and anode as well as PD cathode and anode are electrical isolated from TO46 case

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