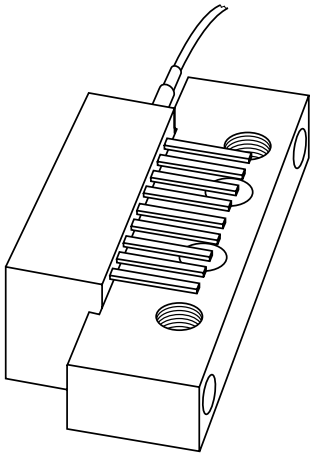
DATA SHEET



CGO869; CGO869/SC0
870 MHz optical receiver with integrated gain control

Product specification
Supersedes data of 2002 Sep 10

2002 Dec 10

Philips
Semiconductors

PHILIPS

870 MHz optical receiver with integrated gain control

CGO869; CGO869/SC0

FEATURES

- Excellent linearity
- Extremely low noise up to 870 MHz
- Excellent flatness (straight line)
- Standard CATV outline
- Rugged construction
- Gold metallization ensures excellent reliability.

APPLICATIONS

- CATV systems operating in the 40 to 870 MHz frequency range.

DESCRIPTION

Hybrid high dynamic range optical receiver amplifier modules in a SOT115 package where the non-jacketed fibre has either no connector or an SC/APC connector. Two of the module pins are for connection to 24 V (DC), one for amplifier supply voltage and the other for the photodiode bias.

The modules contain a monomode optical input suitable for wavelengths from 1290 to 1600 nm, a terminal to monitor the photodiode current and an electrical output with an impedance of 75 Ω. The gain of the amplifier can be adjusted with one module pin.

PINNING

PIN	DESCRIPTION
1	monitor current
2, 3	common
4	$+V_B$ of the photo diode
5	$+V_B$ of the amplifier
6	V_C (gain control)
7, 8	common
9	output

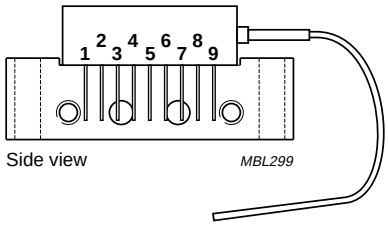


Fig.1 Simplified outline CGO869 (SOT115AD).

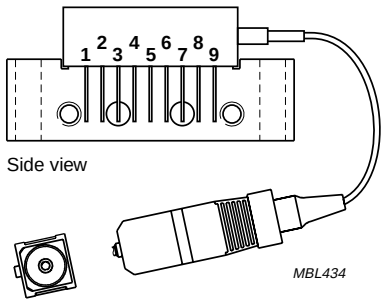


Fig.2 Simplified outline CGO869/SC0 (SOT115AG).

CAUTION

This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A and SNW-FQ-302B.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
f	frequency range		40	870	MHz
s_{22}	output return losses	f = 40 to 870 MHz	16	–	dB
	optical input return losses		45	–	dB
d_2	second order distortion	f = 854.5 MHz	–	–61	dB
F	equivalent input noise	f = 40 MHz	–	5	pA/√Hz
I_{tot}	total current consumption (DC)	V_B = 24 V	175	205	mA

HANDLING

Fibreglass optical coupling: maximum tensile strength = 5 N; minimum bending radius = 35 mm.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
f	frequency range		40	870	MHz
T_{stg}	storage temperature		–40	+85	°C
T_{mb}	operating mounting base temperature		–20	+85	°C
P_{in}	optical input power	continuous	–	5	mW
ESD	ESD sensitivity	human body model; R = 1.5 kΩ; C = 100 pF	500	–	V

CHARACTERISTICS

Bandwidth 40 to 870 MHz; V_B = 24 V; T_{mb} = 35 °C; Z_L = 75 Ω; gain control V_C = 0 V.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
S	responsivity				
	CGO869	λ = 1550 nm	2000	–	V/W
	CGO869/SC0	λ = 1550 nm	1885	–	V/W
FL	flatness straight line	peak to valley; f = 40 to 870 MHz	–	1.1	dB
SL	slope straight line	f = 40 to 870 MHz	0	2	dB
s_{22}	output return losses	f = 40 to 870 MHz	16	–	dB
	optical input return losses		45	–	dB
d_2	second order distortion	f_m = 54 MHz; notes 1 and 3	–	–74	dB
		f_m = 446.5 MHz; notes 1 and 4	–	–66	dB
		f_m = 548.5 MHz; notes 1 and 5	–	–66	dB
		f_m = 746.5 MHz; notes 1 and 6	–	–64	dB
		f_m = 854.5 MHz; notes 1 and 7	–	–61	dB

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
d_3	third order distortion	f_m = 55.25 MHz; notes 2 and 8	–	–76	dB
		f_m = 445.25 MHz; notes 2 and 9	–	–74	dB
		f_m = 547.25 MHz; notes 2 and 10	–	–73	dB
		f_m = 745.25 MHz; notes 2 and 11	–	–73	dB
		f_m = 853.25 MHz; notes 2 and 12	–	–69	dB
F	equivalent input noise	f = 40 to 750 MHz	–	5.5	pA/√Hz
		f = 750 to 870 MHz	–	6.5	pA/√Hz
s_λ	spectral sensitivity	λ = 1310 ±20 nm	0.85	–	A/W
		λ = 1550 ±20 nm	0.9	–	A/W
λ	optical wavelength		1290	1600	nm
L	length of optical fibre				
	CGO869	fibre; SM type; 9/125 µm	1	–	m
	CGO869/SC0	fibre; SM type; 9/125 µm	746	861	mm
I_{tot}	total current consumption (DC)		175	205	mA
I_{bias}	diode bias current at pin4 (DC)		–	25	mA

Notes

1. Two laser test; each laser with 40% modulation index; P_{opt} = 0.5 mW (total).
2. Three laser test; each laser with 60% modulation index; P_{opt} = 0.5 mW (total).
3. f_m = 54 MHz; f_p = 187.25 MHz; f_q = 133.25 MHz.
4. f_m = 446.5 MHz; f_p = 97.25 MHz; f_q = 349.25 MHz.
5. f_m = 548 .5MHz; f_p = 109.25 MHz; f_q = 439.25 MHz.
6. f_m = 746.5 MHz; f_p = 133.25 MHz; f_q = 613.25 MHz.
7. f_m = 854.5 MHz; f_p = 133.25 MHz; f_q = 721.25 MHz.
8. f_m = 55.25 MHz; f_p = 109.25 MHz; f_q = 133.25 MHz; f_r = 187.25 MHz.
9. f_m = 445.25 MHz; f_p = 193.25 MHz; f_q = 349.25 MHz; f_r = 97.25 MHz.
10. f_m = 547.25 MHz; f_p = 217.25 MHz; f_q = 439.25 MHz; f_r = 109.25 MHz.
11. f_m = 745.25 MHz; f_p = 133.25 MHz; f_q = 265.25 MHz; f_r = 613.25 MHz.
12. f_m = 853.25 MHz; f_p = 133.25 MHz; f_q = 265.25 MHz; f_r = 721.25 MHz.

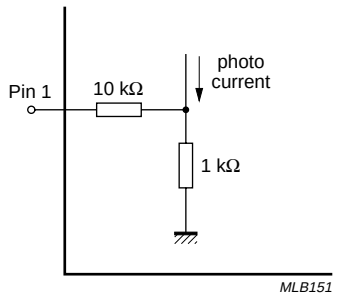


Fig.3 Monitor current pin.

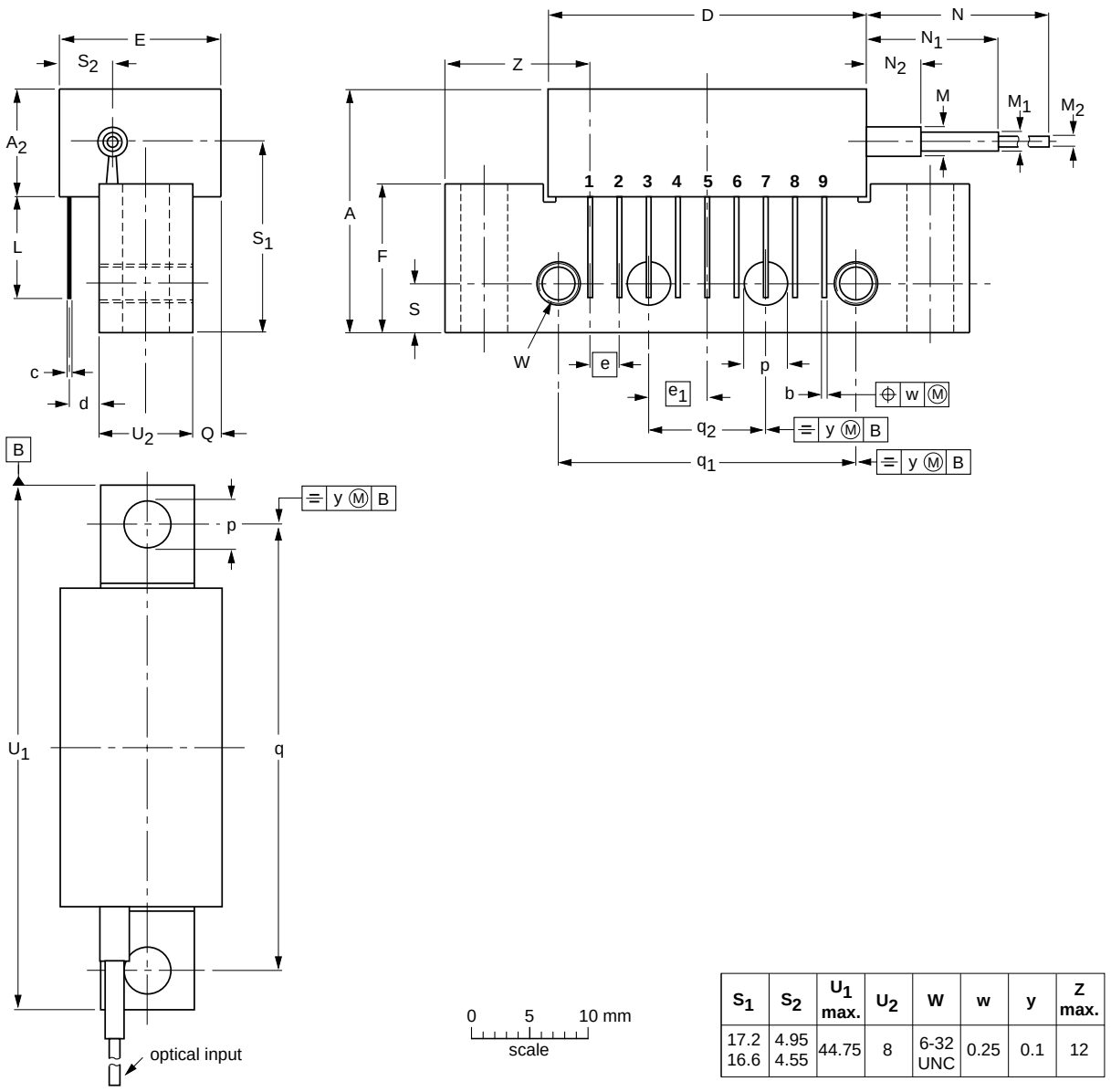
Gain control

Bandwidth 40 to 870 MHz; V_B = 24 V; T_{mb} = 35 °C; Z_L = 75 Ω.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
S	responsivity (CGO869)	V_C = 0 V; f = 40 MHz	2000	–	–	V/W
		V_C = 24 V; f = 40 MHz	900	–	–	V/W
G_v	electric gain control range		–	6.5	–	dB
P_{in} = 0.5 mW; V_C = 0 V						
V_o	output voltage (CGO869)	OMI = 4%; f = 870 MHz	29	–	–	dBmV
F	equivalent input noise	f = 870 MHz	–	–	6.5	pA/√Hz
CNR	carrier to noise ratio	OMI = 4%; RIN = –155 dB/Hz; I_{PD} = 0.425 mA; BW = 5 MHz	50.9	–	–	dB
P_{in} = 0.75 mW; V_C = 12 V						
V_o	output voltage (CGO869)	OMI = 4%; f = 870 MHz	29	–	–	dBmV
F	equivalent input noise	f = 870 MHz	–	–	12	pA/√Hz
CNR	carrier to noise ratio	OMI = 4%; RIN = –155 dB/Hz; I_{PD} = 0.6 mA; BW = 5 MHz	51.1	–	–	dB
P_{in} = 1 mW; V_C = 24 V						
V_o	output voltage (CGO869)	OMI = 4%; f = 870 MHz	29	–	–	dBmV
F	equivalent input noise	f = 870 MHz	–	–	17	pA/√Hz
CNR	carrier to noise ratio	OMI = 4%; RIN = –155 dB/Hz; I_{PD} = 0.85 mA; BW = 5 MHz	51.7	–	–	dB
P_{in} = 0.5 to 1 mW						
d_2	second order distortion	OMI = 40%; f_m = 854.5 MHz; V_C adjusted to V_{out} = 49 dBmV	–	–	–61	dB
d_3	third order distortion	OMI = 60%; f_m = 853.25 MHz; V_C adjusted to V_{out} = 49 dBmV	–	–	–69	dB

PACKAGE OUTLINES

Rectangular single-ended package; aluminium flange; 2 vertical mounting holes; 2 x 6-32 UNC and 2 extra horizontal mounting holes; optical input; 9 gold-plated in-line leads **SOT115AD**



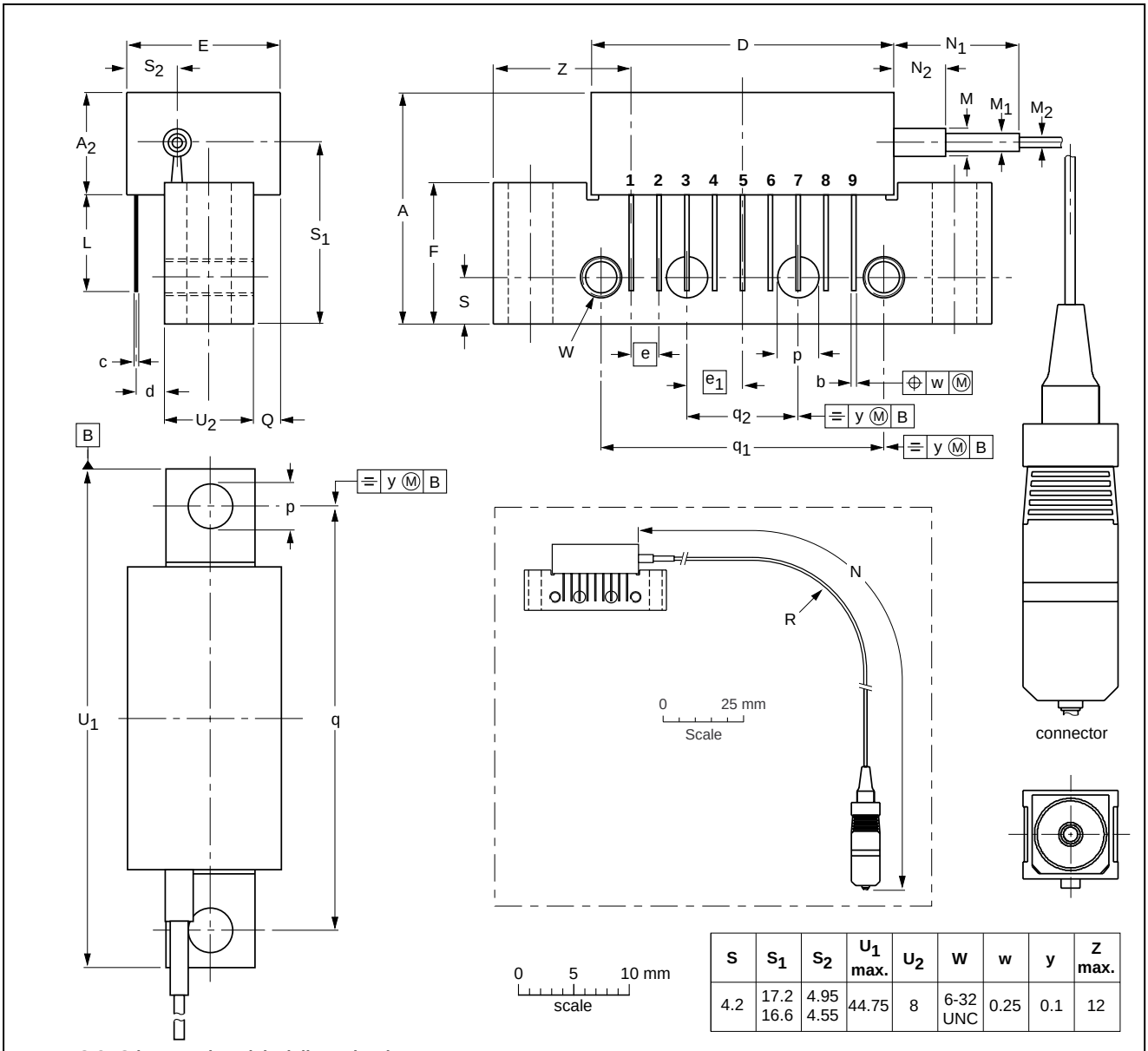
S_1	S_2	U_1 max.	U_2	W	w	y	Z max.
17.2 16.6	4.95 4.55	44.75	8	6-32 UNC	0.25	0.1	12

DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_2 max.	b	c	D max.	d max.	E max.	e	e_1	F	L min.	M	M_1	M_2	N min.	N_1 max.	N_2 max.	p	Q max.	q	q_1	q_2	S
mm	20.8	9.1	0.51 0.38	0.25	27.2	2.54	13.75	2.54	5.08	12.7	8.8	2.5	1.6	0.9	1000	10.7	5.0	4.15 3.85	2.4	38.1	25.4	10.2	4.2

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT115AD						~~02-03-01~~ 02-03-13

Rectangular single-ended package; aluminium flange; 2 vertical mounting holes; 2 x 6-32 UNC and 2 extra horizontal mounting holes; optical input with connector; 9 gold-plated in-line leads **SOT115AG**



S	S_1	S_2	U_1 max.	U_2	W	w	y	Z max.
4.2	17.2 16.6	4.95 4.55	44.75	8	6-32 UNC	0.25	0.1	12

DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_2 max.	b	c	D max.	d max.	E max.	e	e_1	F	L min.	M	M_1	M_2	N	N_1 max.	N_2 max.	p	Q max.	q	q_1	q_2	R min.
mm	20.8	9.1	0.51 0.38	0.25	27.2	2.54	13.75	2.54	5.08	12.7	8.8	2.5	1.6	0.9	861 746	10.7	5.0	4.15 3.85	2.4	38.1	25.4	10.2	35

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT115AG						02-03-18

DATA SHEET STATUS

LEVEL	DATA SHEET STATUS(1)	PRODUCT STATUS(2)(3)	DEFINITION
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

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3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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