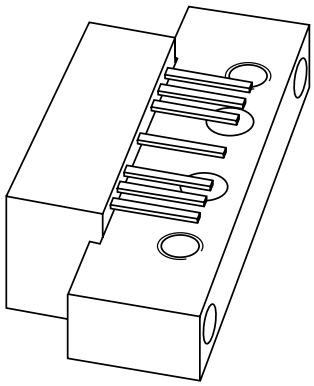
DATA SHEET



BGD902; BGD902MI
CATV amplifier modules

Product specification
Supersedes data of 1998 Aug 31

1999 Mar 29

Philips
Semiconductors

PHILIPS

CATV amplifier modules BGD902; BGD902MI

FEATURES

- Excellent linearity
- Extremely low noise
- Excellent return loss properties
- Silicon nitride passivation
- Rugged construction
- Gold metallization ensures excellent reliability.

APPLICATIONS

- CATV systems operating in the 40 to 900 MHz frequency range.

DESCRIPTION

Hybrid amplifier modules in a SOT115J package operating with a voltage supply of 24 V (DC).
Both modules are electrically identical only the pinning is different.

PINNING - SOT115J

PIN	DESCRIPTION	
	BGD902	BGD902MI
1	input	output
2, 3	common	common
5	$+V_B$	$+V_B$
7, 8	common	common
9	output	input

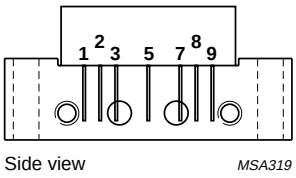


Fig.1 Simplified outline.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
G_p	power gain	f = 50 MHz	18.2	18.8	dB
		f = 900 MHz	19	20	dB
I_{tot}	total current consumption (DC)	V_B = 24 V	405	435	mA

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_B	supply voltage	–	30	V
V_i	RF input voltage	–	70	dBmV
T_{stg}	storage temperature	–40	+100	°C
T_{mb}	operating mounting base temperature	–20	+100	°C

CHARACTERISTICS

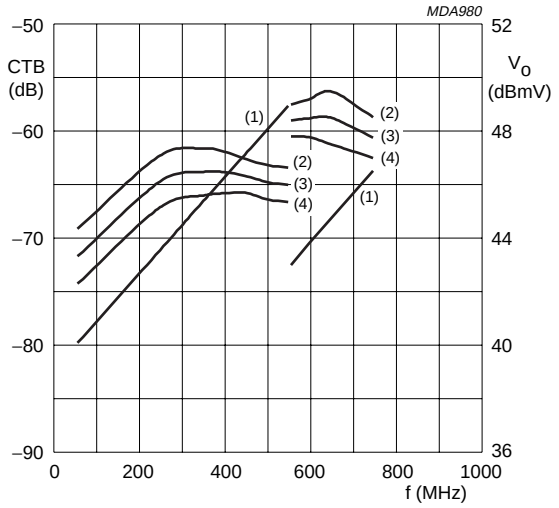
Bandwidth 40 to 900 MHz; V_B = 24 V; T_{mb} = 35 °C; $Z_S = Z_L$ = 75 Ω

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
G_p	power gain	f = 50 MHz	18.2	18.5	18.8	dB
		f = 900 MHz	19	19.5	20	dB
SL	slope cable equivalent	f = 40 to 900 MHz	0.4	0.9	1.4	dB
FL	flatness of frequency response	f = 40 to 900 MHz	–	±0.15	±0.3	dB
S_{11}	input return losses	f = 40 to 80 MHz	21	24	–	dB
		f = 80 to 160 MHz	22	26	–	dB
		f = 160 to 320 MHz	22	28	–	dB
		f = 320 to 640 MHz	19	22	–	dB
		f = 640 to 900 MHz	18	21	–	dB
S_{22}	output return losses	f = 40 to 80 MHz	25	32	–	dB
		f = 80 to 160 MHz	25	33	–	dB
		f = 160 to 320 MHz	21	29	–	dB
		f = 320 to 750 MHz	20	25	–	dB
		f = 750 to 900 MHz	19	22	–	dB
S_{21}	phase response	f = 50 MHz	–45	–	+45	deg
CTB	composite triple beat	49 chs flat; V_o = 47 dBmV; f_m = 859.25 MHz	–	–68.5	–67	dB
		77 chs flat; V_o = 44 dBmV; f_m = 547.25 MHz	–	–70	–68	dB
		110 chs flat; V_o = 44 dBmV; f_m = 745.25 MHz	–	–63.5	–62	dB
		129 chs flat; V_o = 44 dBmV; f_m = 859.25 MHz	–	–60	–58	dB
		110 chs; f_m = 400 MHz; V_o = 49 dBmV at 550 MHz; note 1	–	–64	–62	dB
		129 chs; f_m = 650 MHz; V_o = 49.5 dBmV at 860 MHz; note 2	–	–58.5	–56.5	dB
X_{mod}	cross modulation	49 chs flat; V_o = 47 dBmV; f_m = 55.25 MHz	–	–66.5	–64	dB
		77 chs flat; V_o = 44 dBmV; f_m = 55.25 MHz	–	–69.5	–67	dB
		110 chs flat; V_o = 44 dBmV; f_m = 55.25 MHz	–	–66	–63.5	dB
		129 chs flat; V_o = 44 dBmV; f_m = 55.25 MHz	–	–64.5	–62	dB
		110 chs; f_m = 400 MHz; V_o = 49 dBmV at 550 MHz; note 1	–	–63	–60	dB
		129 chs; f_m = 860 MHz; V_o = 49.5 dBmV at 860 MHz; note 2	–	–61	–58	dB
CSO	composite second order distortion	49 chs flat; V_o = 47 dBmV; f_m = 860.5 MHz	–	–65	–62	dB
		77 chs flat; V_o = 44 dBmV; f_m = 548.5 MHz	–	–72	–67	dB
		110 chs flat; V_o = 44 dBmV; f_m = 746.5 MHz	–	–65	–60	dB
		129 chs flat; V_o = 44 dBmV; f_m = 860.5 MHz	–	–61	–58	dB
		110 chs; f_m = 250 MHz; V_o = 49 dBmV at 550 MHz; note 1	–	–67	–63	dB
		129 chs; f_m = 250 MHz; V_o = 49.5 dBmV at 860 MHz; note 2	–	–62	–58	dB

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
d_2	second order distortion	note 3	–	–80	–74	dB
		note 4	–	–83	–77	dB
		note 5	–	–84	–78	dB
V_o	output voltage	d_{im} = –60 dB; note 6	64.5	66	–	dBmV
		d_{im} = –60 dB; note 7	65.5	67	–	dBmV
		d_{im} = –60 dB; note 8	67.5	69	–	dBmV
		CTB compression = 1 dB; 129 chs flat; f = 859.25 MHz	48.5	49.5	–	dBmV
		CSO compression = 1 dB; 129 chs flat; f = 860.5 MHz	50	53	–	dBmV
F	noise figure	f = 50 MHz	–	4.5	5	dB
		f = 550 MHz	–	5	5.5	dB
		f = 750 MHz	–	5.5	6.5	dB
		f = 900 MHz	–	6.5	8	dB
I_{tot}	total current consumption (DC)	note 9	405	420	435	mA

Notes

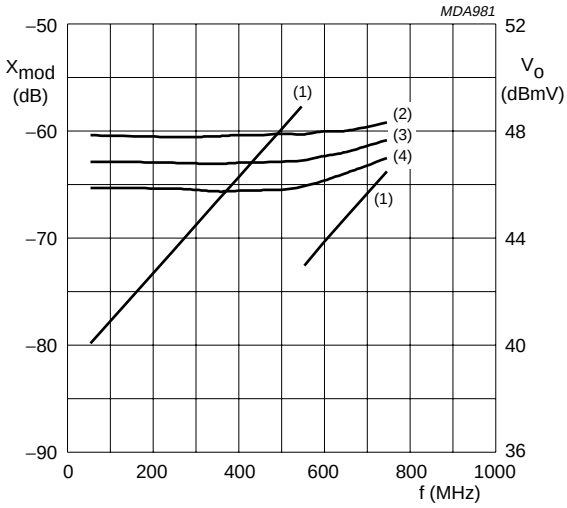
1. Tilt = 9 dB (50 to 550 MHz); tilt = 3.5 dB at –6 dB offset (550 to 750 MHz).
2. Tilt = 12.5 dB (50 to 860 MHz).
3. f_p = 55.25 MHz; V_p = 44 dBmV;
   f_q = 805.25 MHz; V_q = 44 dBmV;
   measured at $f_p + f_q$ = 860.5 MHz.
4. f_p = 55.25 MHz; V_p = 44 dBmV;
   f_q = 691.25 MHz; V_q = 44 dBmV;
   measured at $f_p + f_q$ = 746.5 MHz.
5. f_p = 55.25 MHz; V_p = 44 dBmV;
   f_q = 493.25 MHz; V_q = 44 dBmV;
   measured at $f_p + f_q$ = 548.5 MHz.
6. Measured according to DIN45004B:
   f_p = 851.25 MHz; $V_p = V_o$;
   f_q = 858.25 MHz; $V_q = V_o$ –6 dB;
   f_r = 860.25 MHz; $V_r = V_o$ –6 dB;
   measured at $f_p + f_q - f_r$ = 849.25 MHz.
7. Measured according to DIN45004B:
   f_p = 740.25 MHz; $V_p = V_o$;
   f_q = 747.25 MHz; $V_q = V_o$ –6 dB;
   f_r = 749.25 MHz; $V_r = V_o$ –6 dB;
   measured at $f_p + f_q - f_r$ = 738.25 MHz.
8. Measured according to DIN45004B:
   f_p = 540.25 MHz; $V_p = V_o$;
   f_q = 547.25 MHz; $V_q = V_o$ –6 dB;
   f_r = 549.25 MHz; $V_r = V_o$ –6 dB;
   measured at $f_p + f_q - f_r$ = 538.25 MHz.
9. The module normally operates at V_B = 24 V, but is able to withstand supply transients up to 35 V.



$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 110 chs; tilt = 9 dB (50 to 550 MHz); tilt = 3.5 dB at −6 dB offset (550 to 750 MHz).

(1) V_o. (3) Typ.
(2) Typ. +3 σ. (4) Typ. −3 σ.

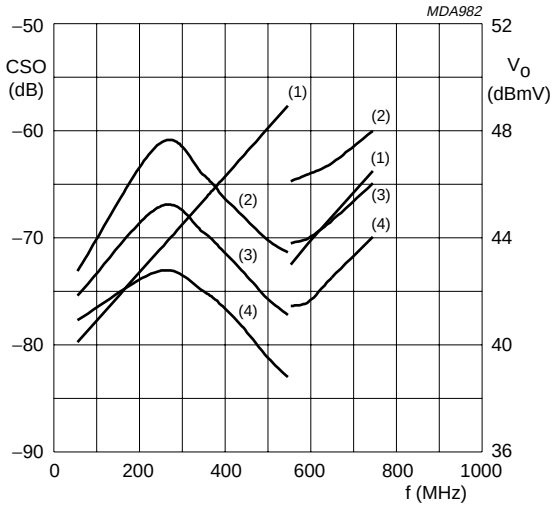
Fig.2 Composite triple beat as function of frequency under tilted conditions.



$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 110 chs; tilt = 9 dB (50 to 550 MHz); tilt = 3.5 dB at −6 dB offset (550 to 750 MHz).

(1) V_o. (3) Typ.
(2) Typ. +3 σ. (4) Typ. −3 σ.

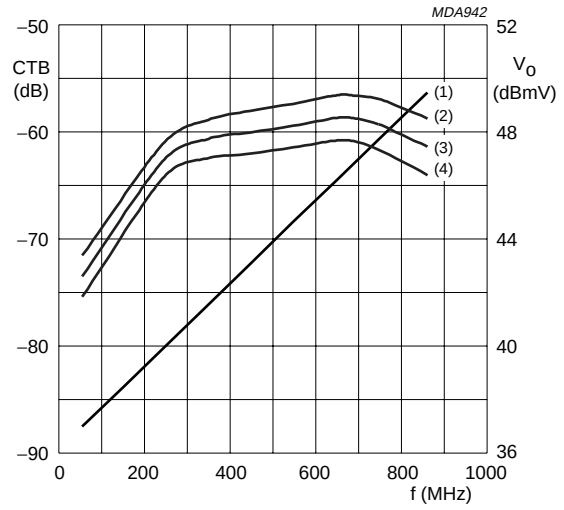
Fig.3 Cross modulation as function of frequency under tilted conditions.



$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 110 chs; tilt = 9 dB (50 to 550 MHz); tilt = 3.5 dB at −6 dB offset (550 to 750 MHz).

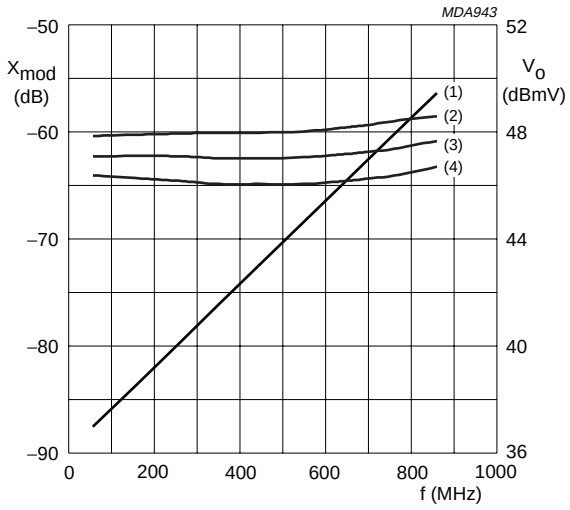
(1) V_o. (3) Typ.
(2) Typ. +3 σ. (4) Typ. −3 σ.

Fig.4 Composite second order distortion as function of frequency under tilted conditions.



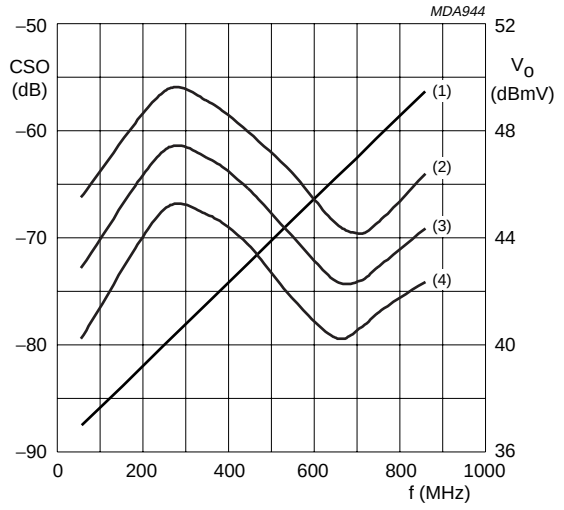
$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs;
tilt = 12.5 dB; (50 to 860 MHz).
(1) V_o. (3) Typ.
(2) Typ. +3 σ. (4) Typ. −3 σ.

Fig.5 Composite triple beat as function of frequency under tilted conditions.



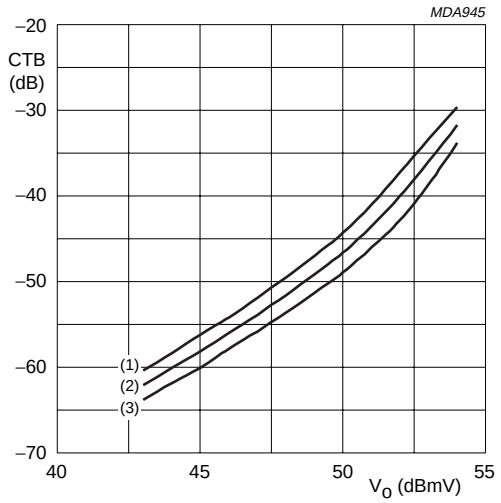
$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs;
tilt = 12.5 dB; (50 to 860 MHz).
(1) V_o. (3) Typ.
(2) Typ. +3 σ. (4) Typ. −3 σ.

Fig.6 Cross modulation as function of frequency under tilted conditions.



$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs;
tilt = 12.5 dB; (50 to 860 MHz).
(1) V_o. (3) Typ.
(2) Typ. +3 σ. (4) Typ. −3 σ.

Fig.7 Composite second order distortion as function of frequency under tilted conditions.



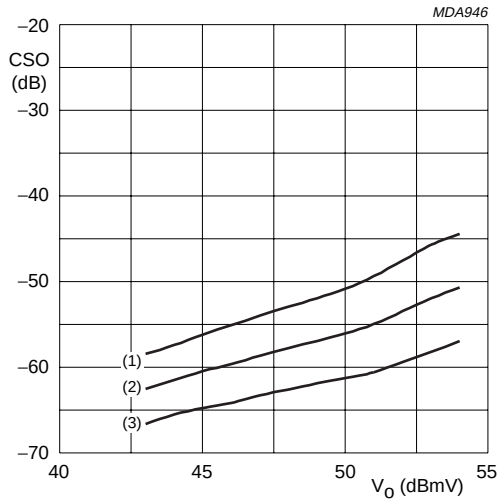
$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs; $f_m = 859.25$ MHz.

(1) Typ. +3 σ.

(2) Typ.

(3) Typ. –3 σ.

Fig.8 Composite triple beat as function of output voltage.



$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs; $f_m = 860.5$ MHz.

(1) Typ. +3 σ.

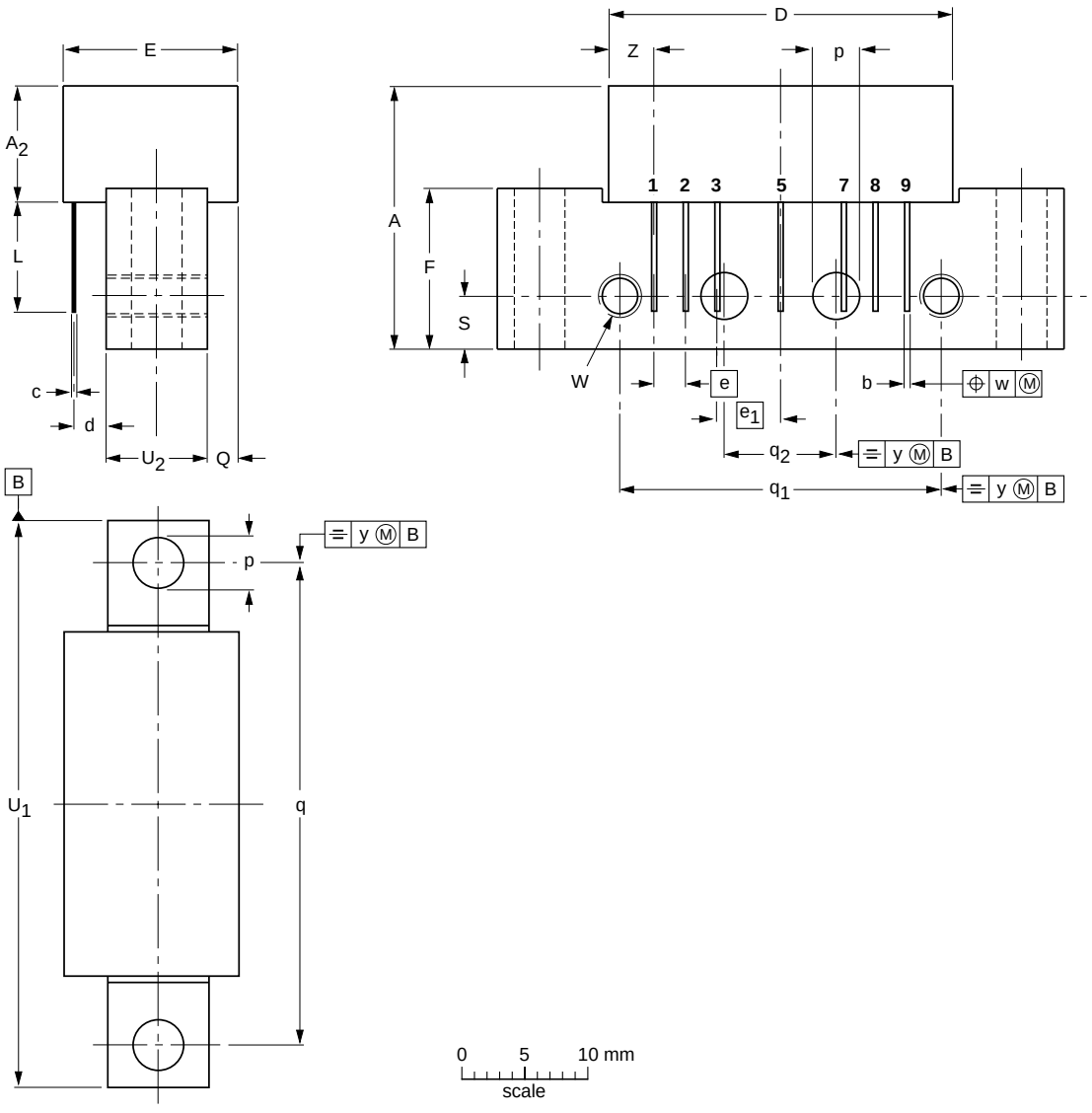
(2) Typ.

(3) Typ. –3 σ.

Fig.9 Composite second order distortion as function of output voltage.

PACKAGE OUTLINE

Rectangular single-ended package; aluminium flange; 2 vertical mounting holes; 2 x 6-32 UNC and 2 extra horizontal mounting holes; 7 gold-plated in-line leads **SOT115J**



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.	p	Q max.	q	q_1	q_2	S	U_1 max.	U_2	W	w	y	Z max.
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	4.15 3.85	2.4	38.1	25.4	10.2	4.2	44.75	8	6-32 UNC	0.25	0.1	3.8

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT115J						99-02-06

DEFINITIONS

Data Sheet Status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

NOTES

NOTES

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