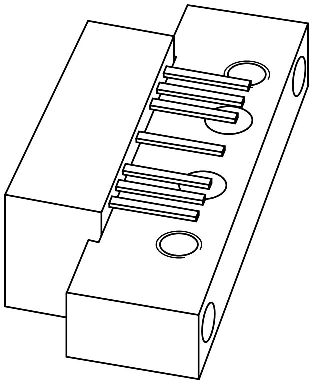
DATA SHEET



BGD904; BGD904MI
860 MHz, 20 dB gain power doubler amplifier

Product specification
Supersedes data of 2000 Jan 10

2001 Nov 01

Philips Semiconductors

860 MHz, 20 dB gain power doubler amplifier BGD904; BGD904MI

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	
	BGD904	BGD904MI
1	input	output
2, 3	common	common
5	$+V_B$	$+V_B$
7, 8	common	common
9	output	input

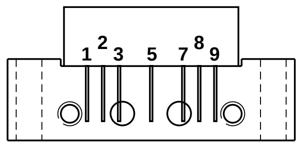


Fig.1 Simplified outline.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
G_p	power gain	f = 50 MHz	19.7	20.3	dB
		f = 900 MHz	20.5	21.5	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 60134).

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

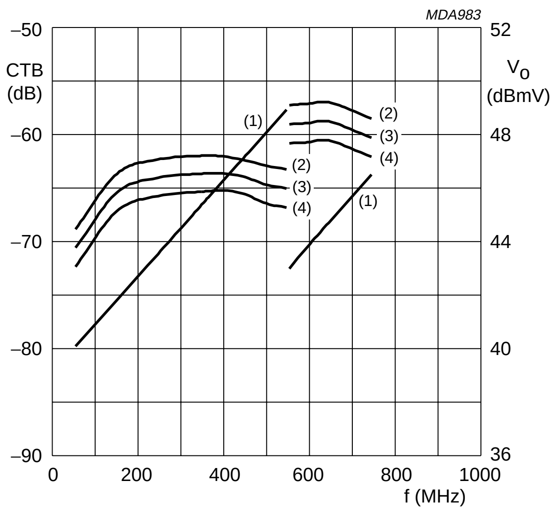
Bandwidth 40 to 900 MHz; V_B = 24 V; T_{mb} = 35 °C; Z_S = Z_L = 75 Ω

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
G_p	power gain	f = 50 MHz	19.7	20	20.3	dB
		f = 900 MHz	20.5	21	21.5	dB
SL	slope straight line	f = 40 to 900 MHz	0.4	0.9	1.4	dB
FL	flatness straight line	f = 40 to 900 MHz	–	±0.15	±0.3	dB
S_{11}	input return losses	f = 40 to 80 MHz	21	25	–	dB
		f = 80 to 160 MHz	22	30	–	dB
		f = 160 to 320 MHz	21	29	–	dB
		f = 320 to 550 MHz	18	24	–	dB
		f = 550 to 650 MHz	17	22	–	dB
		f = 650 to 750 MHz	16	21	–	dB
		f = 750 to 900 MHz	16	21	–	dB
S_{22}	output return losses	f = 40 to 80 MHz	25	29	–	dB
		f = 80 to 160 MHz	23	28	–	dB
		f = 160 to 320 MHz	20	25	–	dB
		f = 320 to 550 MHz	20	24	–	dB
		f = 550 to 650 MHz	19	24	–	dB
		f = 650 to 750 MHz	18	24	–	dB
		f = 750 to 900 MHz	17	23	–	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	–66.5	dB
		77 chs flat; V_o = 44 dBmV; f_m = 547.25 MHz	–	–69.5	–67.5	dB
		110 chs flat; V_o = 44 dBmV; f_m = 745.25 MHz	–	–63	–61.5	dB
		129 chs flat; V_o = 44 dBmV; f_m = 859.25 MHz	–	–59.5	–57.5	dB
		110 chs; f_m = 400 MHz; V_o = 49 dBmV at 550 MHz; note 1	–	–63.5	–61.5	dB
		129 chs; f_m = 650 MHz; V_o = 49.5 dBmV at 860 MHz; note 2	–	–58.5	–56	dB
X_{mod}	cross modulation	49 chs flat; V_o = 47 dBmV; f_m = 55.25 MHz	–	–66	–63	dB
		77 chs flat; V_o = 44 dBmV; f_m = 55.25 MHz	–	–68.5	–66	dB
		110 chs flat; V_o = 44 dBmV; f_m = 55.25 MHz	–	–65.5	–62.5	dB
		129 chs flat; V_o = 44 dBmV; f_m = 55.25 MHz	–	–64	–61	dB
		110 chs; f_m = 400 MHz; V_o = 49 dBmV at 550 MHz; note 1	–	–61.5	–59	dB
		129 chs; f_m = 860 MHz; V_o = 49.5 dBmV at 860 MHz; note 2	–	–60	–57	dB

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
CSO	composite second order distortion	49 chs flat; V_o = 47 dBmV; $_m$ = 860.5 MHz	–	–68	–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	–	–68	–62	dB
		129 chs flat; V_o = 44 dBmV; f_m = 860.5 MHz	–	–64	–58	dB
		110 chs; f_m = 250 MHz; V_o = 49 dBmV at 550 MHz; note 1	–	–67	–62	dB
		129 chs; f_m = 250 MHz; V_o = 49.5 dBmV at 860 MHz; note 2	–	–62	–58	dB
d_2	second order distortion	note 3	–	–82	–75	dB
		note 4	–	–82	–76	dB
		note 5	–	–83	–77	dB
V_o	output voltage	d_{im} = –60 dB; note 6	64	65.5	–	dBmV
		d_{im} = –60 dB; note 7	65	67	–	dBmV
		d_{im} = –60 dB; note 8	67	69	–	dBmV
		CTB compression = 1 dB; 129 chs flat; f = 859.25 MHz	48.5	49	–	dBmV
		CSO compression = 1 dB; 129 chs flat; f = 860.5 MHz	50	52	–	dBmV
F	noise figure	f = 50 MHz	–	4	5	dB
		f = 550 MHz	–	4.5	5.5	dB
		f = 750 MHz	–	5.1	6.5	dB
		f = 900 MHz	–	6.2	7.5	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.

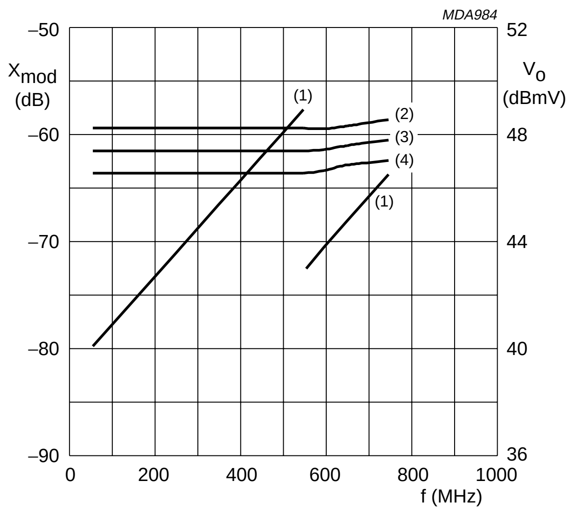


$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 110 chs; tilt = 9 dB (50 to 550 MHz); tilt = 3.5 dB at −6 dB offset (550 to 750 MHz).

(1) V_o. (3) Typ.

(2) Typ. +3 σ. (4) Typ. −3 σ.

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

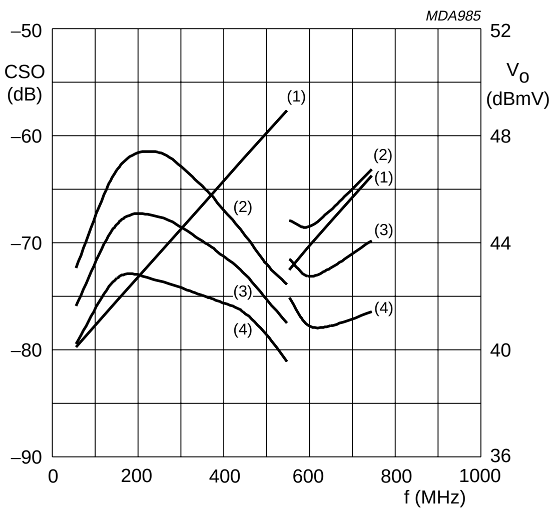


$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 110 chs; tilt = 9 dB (50 to 550 MHz); tilt = 3.5 dB at −6 dB offset (550 to 750 MHz).

(1) V_o. (3) Typ.

(2) Typ. +3 σ. (4) Typ. −3 σ.

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

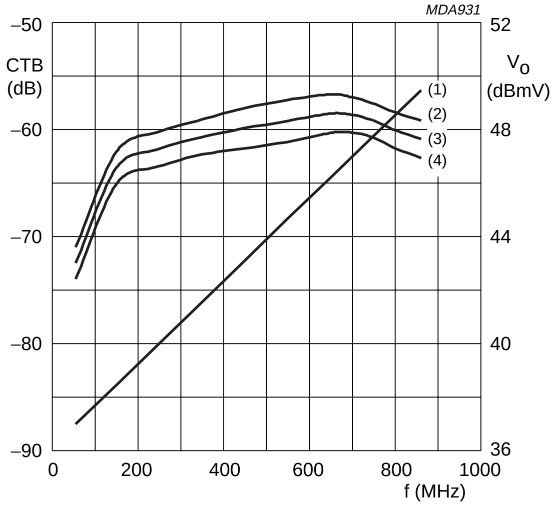


$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 110 chs; tilt = 9 dB (50 to 550 MHz); tilt = 3.5 dB at −6 dB offset (550 to 750 MHz).

(1) V_o. (3) Typ.

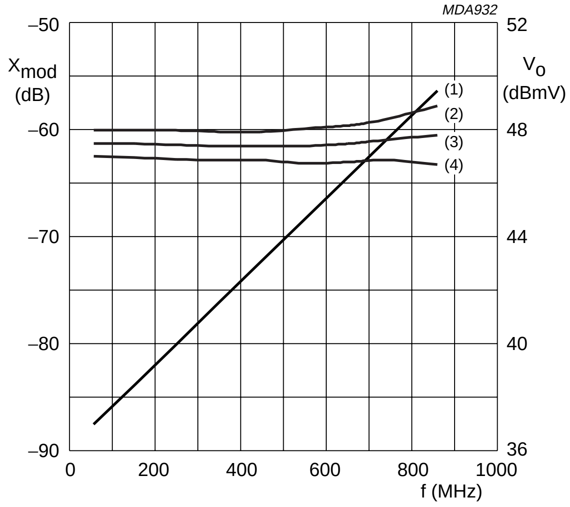
(2) Typ. +3 σ. (4) Typ. −3 σ.

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



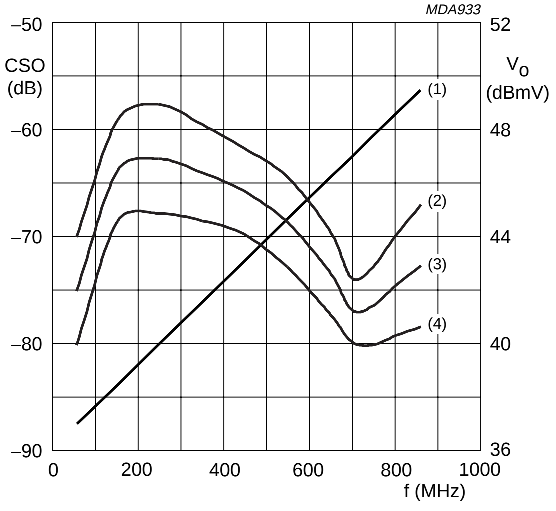
$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs;
tilt = 12.5 dB; (50 to 860 MHz).
(1) V_o. (3) Typ.
(2) Typ. +3 σ. (4) Typ. −3 σ.

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



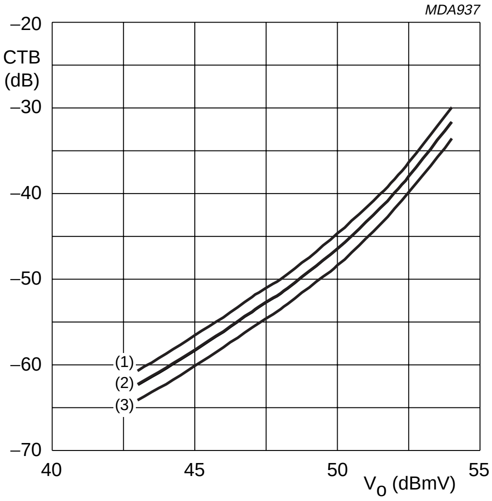
$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs;
tilt = 12.5 dB; (50 to 860 MHz).
(1) V_o. (3) Typ.
(2) Typ. +3 σ. (4) Typ. −3 σ.

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



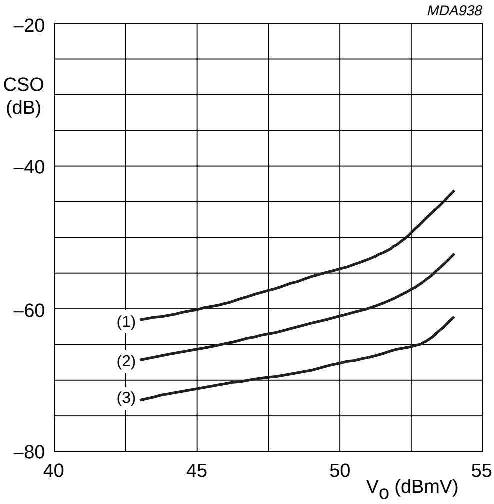
$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs; $f_m = 859.25$ MHz.

(1) Typ. +3 σ.

(2) Typ.

(3) Typ. −3 σ.

Fig.8 Composite triple beat as a 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.

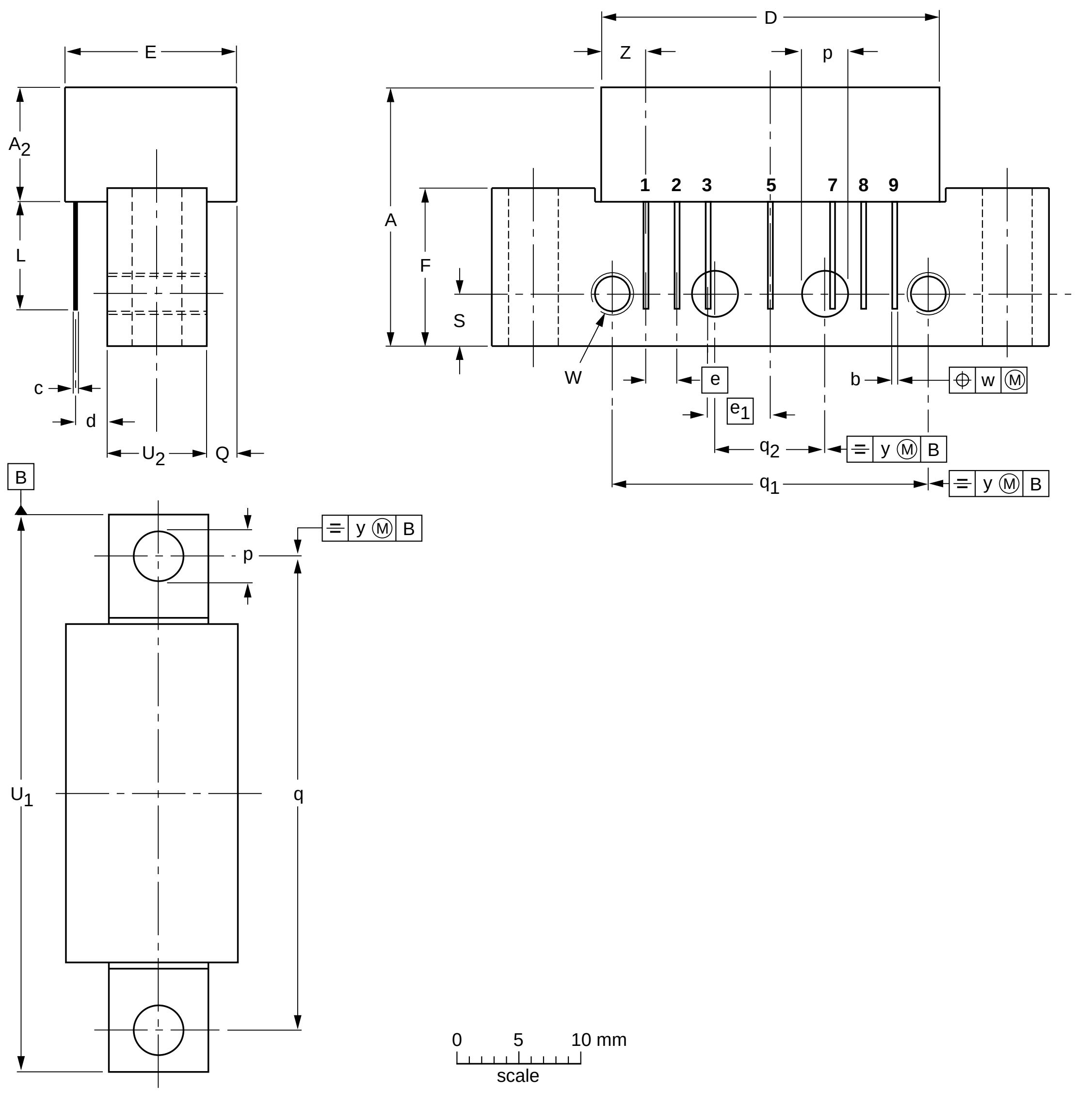
(2) Typ.

(3) Typ. −3 σ.

Fig.9 Composite second order distortion as a 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

DATA SHEET STATUS

DATA SHEET STATUS[1]	PRODUCT STATUS[2]	DEFINITIONS
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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