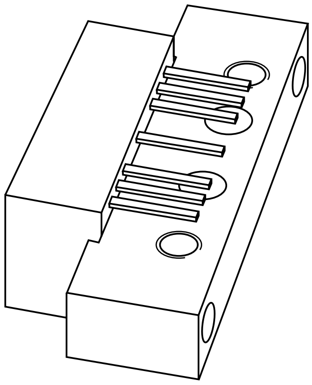
DATA SHEET



BGD904L

860 MHz, 20 dB gain power doubler amplifier

Product specification
Supersedes data of 1999 Aug 17

2001 Nov 01

Philips Semiconductors

PHILIPS

860 MHz, 20 dB gain power doubler amplifier BGD904L

FEATURES

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

APPLICATIONS

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

DESCRIPTION

Hybrid amplifier module in a SOT115J package operating with a supply voltage of 24 V.

PINNING - SOT115J

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

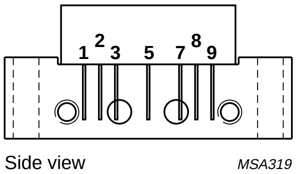


Fig.1 Simplified outline.

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	350	380	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

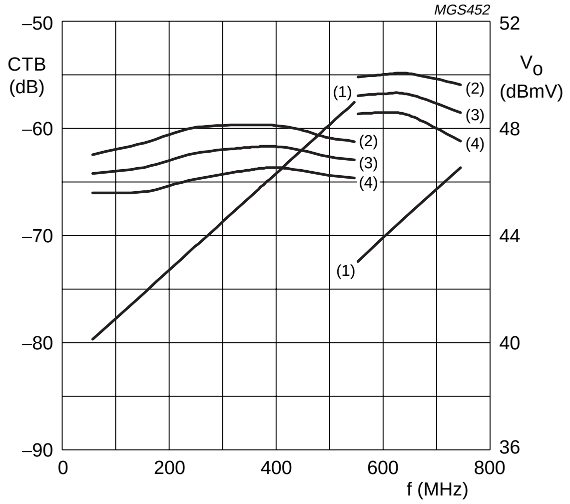
Bandwidth 40 to 900 MHz; V_B = 24 V; T_{mb} = 35 °C; Z_S = Z_L = 75 Ω.

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 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	19	25	–	dB
		f = 320 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 channels flat; V_o = 47 dBmV; f_m = 859.25 MHz	–	–65.5	–64	dB
		77 channels flat; V_o = 44 dBmV; f_m = 547.25 MHz	–	–67.5	–65.5	dB
		110 channels flat; V_o = 44 dBmV; f_m = 745.25 MHz	–	–61	–59.5	dB
		129 channels flat; V_o = 44 dBmV; f_m = 859.25 MHz	–	–57	–55	dB
		110 channels; f_m = 397.25 MHz; V_o = 49 dBmV at 550 MHz; note 1	–	–61.5	–59.5	dB
		129 channels; f_m = 649.25 MHz; V_o = 49.5 dBmV at 860 MHz; note 2	–	–56	–54	dB
X_{mod}	cross modulation	49 channels flat; V_o = 47 dBmV; f_m = 55.25 MHz	–	–64	–61	dB
		77 channels flat; V_o = 44 dBmV; f_m = 55.25 MHz	–	–66.5	–64	dB
		110 channels flat; V_o = 44 dBmV; f_m = 55.25 MHz	–	–63	–60.5	dB
		129 channels flat; V_o = 44 dBmV; f_m = 55.25 MHz	–	–61.5	–59	dB
		110 channels; f_m = 397.25 MHz; V_o = 49 dBmV at 550 MHz; note 1	–	–60	–57.5	dB
		129 channels; f_m = 859.25 MHz; V_o = 49.5 dBmV at 860 MHz; note 2	–	–56	–53.5	dB

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
CSO	composite second order distortion	49 channels flat; V_o = 47 dBmV; f_m = 860.5 MHz	–	–69	–63	dB
		77 channels flat; V_o = 44 dBmV; f_m = 548.5 MHz	–	–73	–68	dB
		110 channels flat; V_o = 44 dBmV; f_m = 746.5 MHz	–	–69	–63	dB
		129 channels flat; V_o = 44 dBmV; f_m = 860.5 MHz	–	–65	–59	dB
		110 channels; f_m = 150 MHz; V_o = 49 dBmV at 550 MHz; note 1	–	–68	–63	dB
		129 channels; f_m = 150 MHz; V_o = 49.5 dBmV at 860 MHz; note 2	–	–63	–58	dB
d_2	second order distortion	note 3	–	–82	–75	dB
		note 4	–	–83	–76	dB
		note 5	–	–83	–77	dB
V_o	output voltage	d_{im} = –60 dB; note 6	62.5	64	–	dBmV
		d_{im} = –60 dB; note 7	63.5	65.5	–	dBmV
		d_{im} = –60 dB; note 8	65.5	67.5	–	dBmV
		CTB compression = 1 dB; 129 channels flat; f = 859.25 MHz	47.5	48.5	–	dBmV
		CSO compression = 1 dB; 129 channels flat; f = 860.5 MHz	50	52	–	dBmV
NF	noise figure	f = 50 MHz	–	3.8	5	dB
		f = 550 MHz	–	4.1	5.5	dB
		f = 750 MHz	–	4.8	6.5	dB
		f = 900 MHz	–	5.9	7.5	dB
I_{tot}	total current consumption (DC)	note 9	350	365	380	mA

Notes

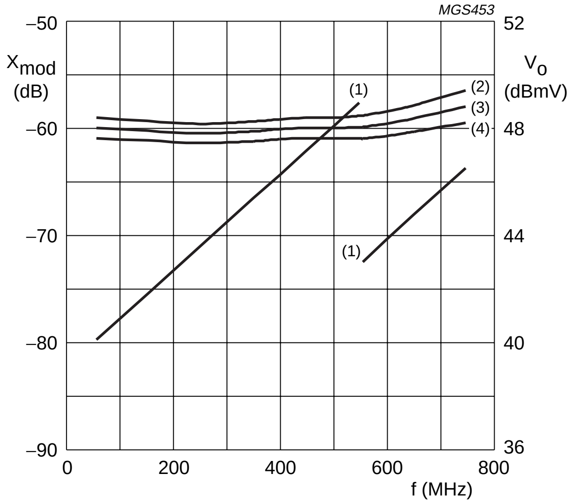
1. Tilt = 9 dB (50 to 550 MHz); tilt = 3.5 dB at –6 dB offset (550 to 750 MHz).
2. Tilt = 12.5 dB (50 to 860 MHz).
3. f_p = 55.25 MHz; V_p = 44 dBmV; f_q = 805.25 MHz; V_q = 44 dBmV; measured at $f_p + f_q$ = 860.5 MHz.
4. f_p = 55.25 MHz; V_p = 44 dBmV; f_q = 691.25 MHz; V_q = 44 dBmV; measured at $f_p + f_q$ = 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.
(2) Typ. +3 σ.
(3) Typ.
(4) Typ. −3 σ.

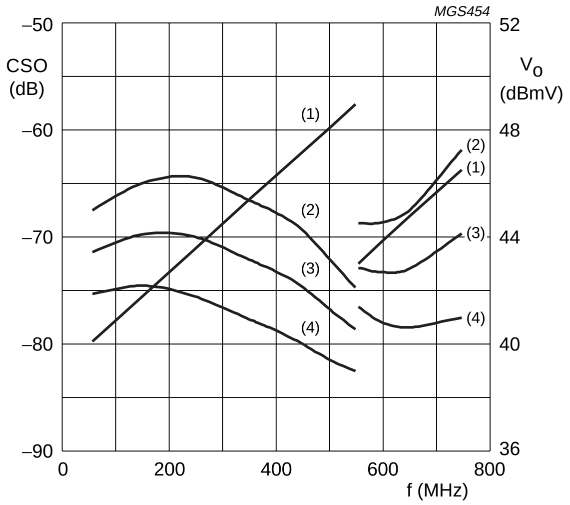
Fig.2 Composite triple beat as a function of frequency under tilted conditions.



$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ 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.
(2) Typ. +3 σ.
(3) Typ.
(4) Typ. −3 σ.

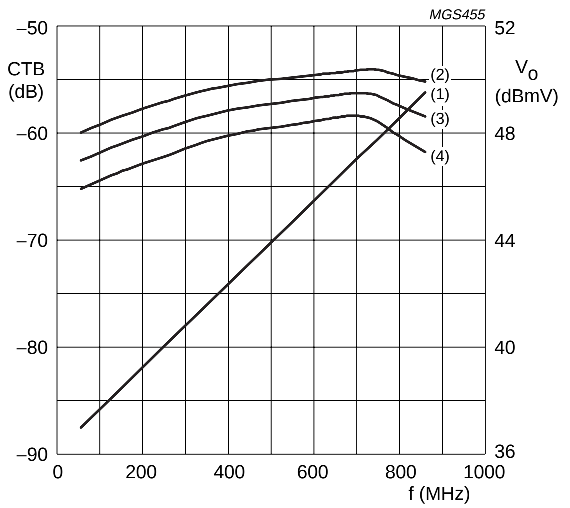
Fig.3 Cross modulation as a function of frequency under tilted conditions.



$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ 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.
(2) Typ. +3 σ.
(3) Typ.
(4) Typ. −3 σ.

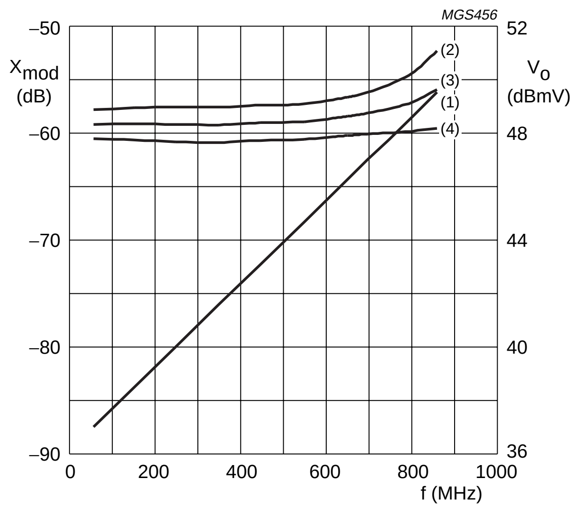
Fig.4 Composite second order distortion as a function of frequency under tilted conditions.



$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs;
tilt = 12.5 dB; (50 to 860 MHz).

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

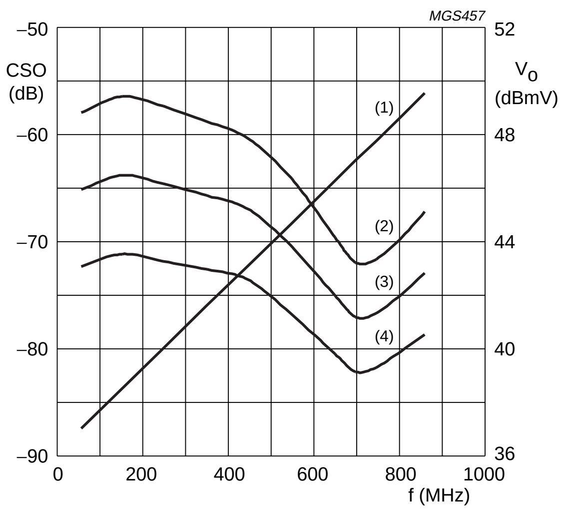
Fig.5 Composite triple beat as a function of frequency under tilted conditions.



$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs;
tilt = 12.5 dB; (50 to 860 MHz).

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

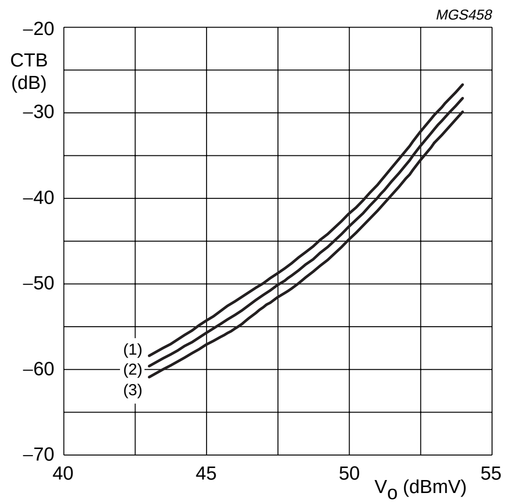
Fig.6 Cross modulation as a function of frequency under tilted conditions.



$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ 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.



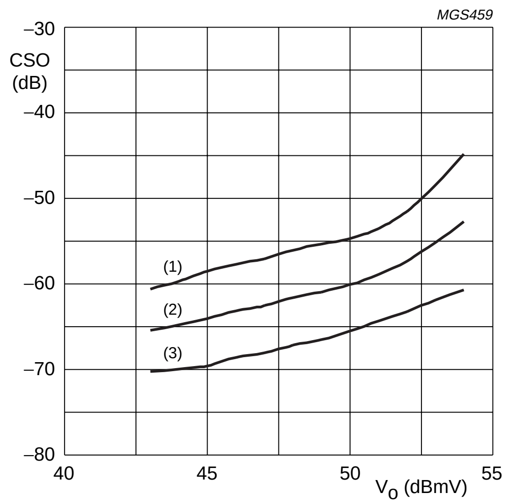
$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs; $f_m = 859.25$ MHz.

(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.

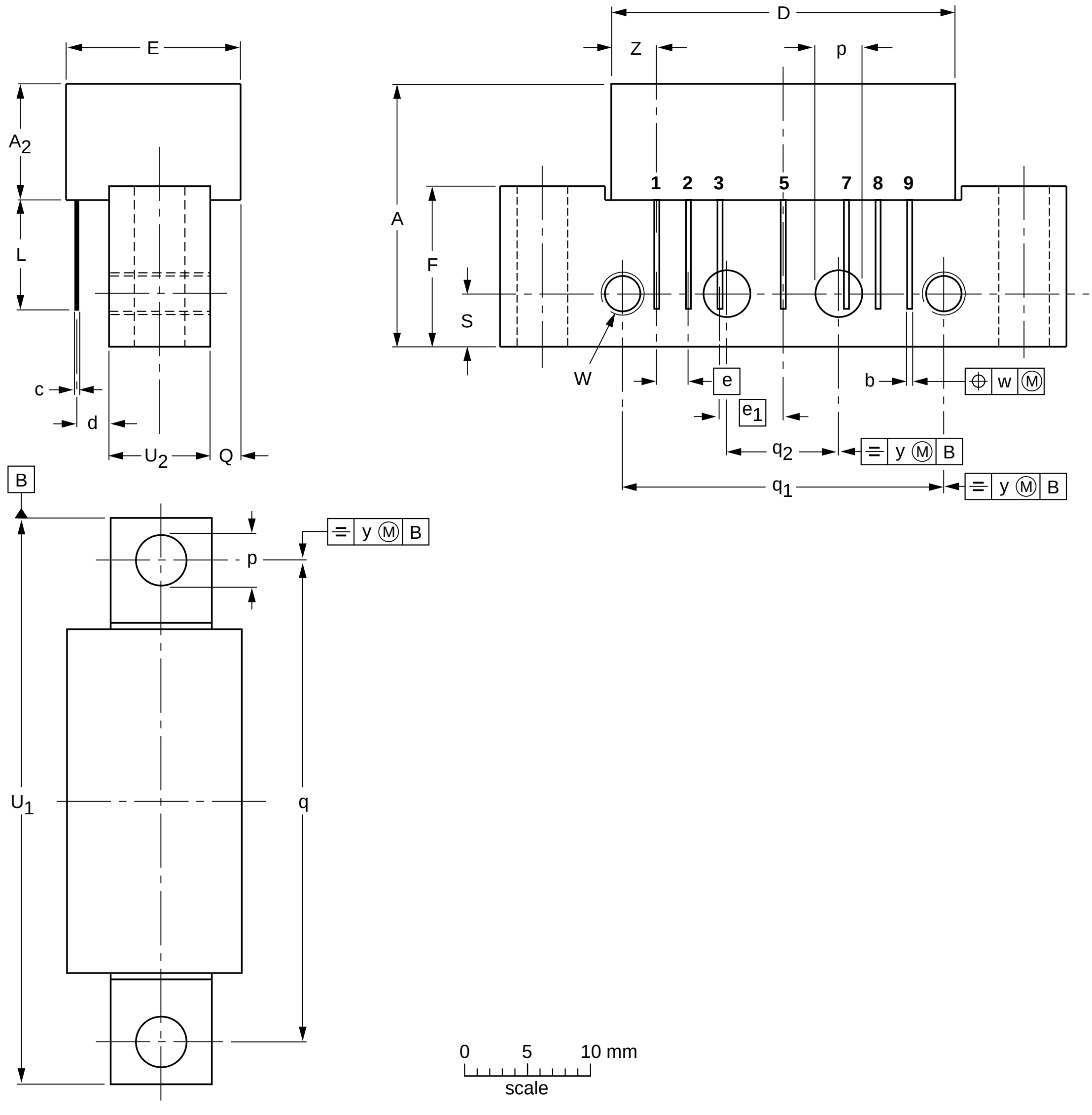
(2) Typ.

(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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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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.

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