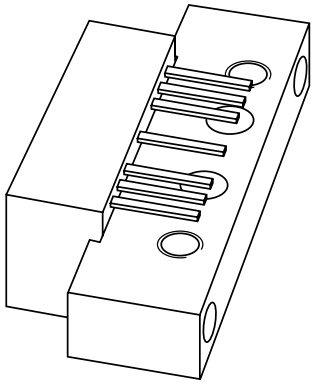
DATA SHEET



BGD904L

860 MHz, 20 dB gain power doubler amplifier

Product specification

2001 Nov 01

Supersedes data of 1999 Aug 17

Philips
Semiconductors

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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

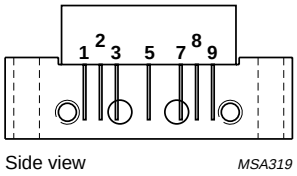


Fig.1 Simplified outline.

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

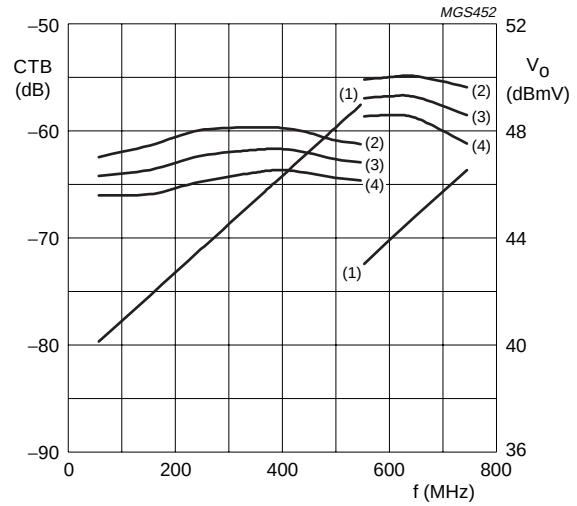
Bandwidth 40 to 900 MHz; V_B = 24 V; T_{mb} = 35 °C; $Z_S = Z_L$ = 75 Ω.

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

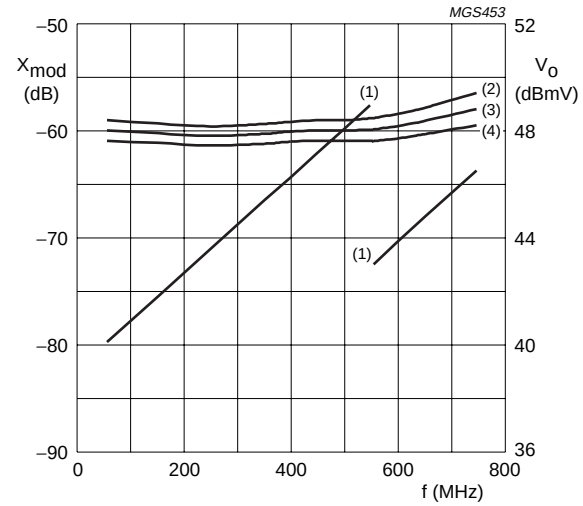
1. Tilt = 9 dB (50 to 550 MHz); tilt = 3.5 dB at –6 dB offset (550 to 750 MHz).
2. Tilt = 12.5 dB (50 to 860 MHz).
3. f_p = 55.25 MHz; V_p = 44 dBmV; f_q = 805.25 MHz; V_q = 44 dBmV; measured at $f_p + f_q$ = 860.5 MHz.
4. f_p = 55.25 MHz; V_p = 44 dBmV; f_q = 691.25 MHz; V_q = 44 dBmV; measured at $f_p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

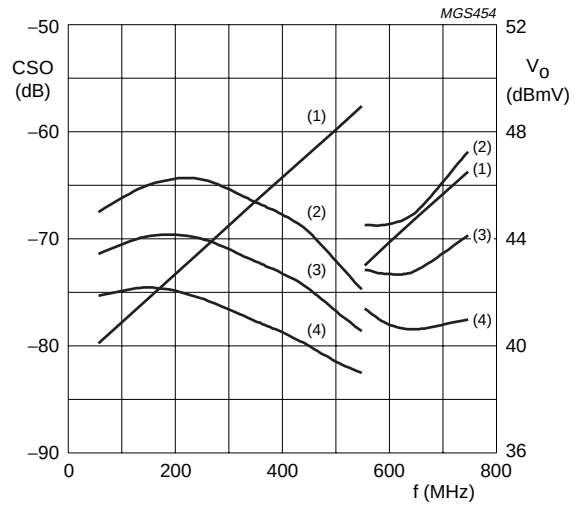
Fig.2 Composite triple beat as a function of frequency under tilted conditions.



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

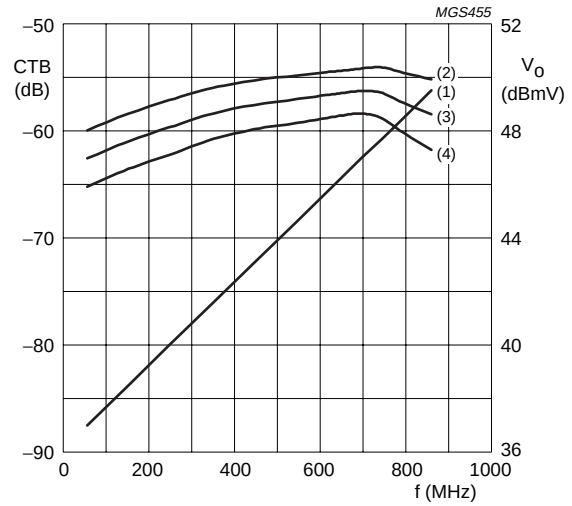
Fig.3 Cross modulation as a function of frequency under tilted conditions.



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

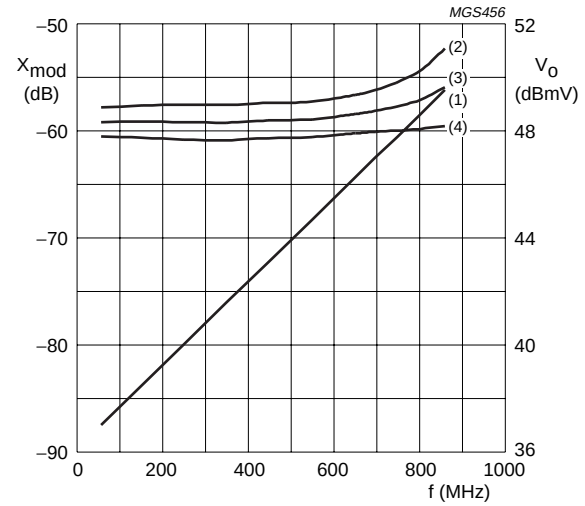
(1) V_o. (3) Typ.
(2) Typ. +3 σ. (4) Typ. −3 σ.

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



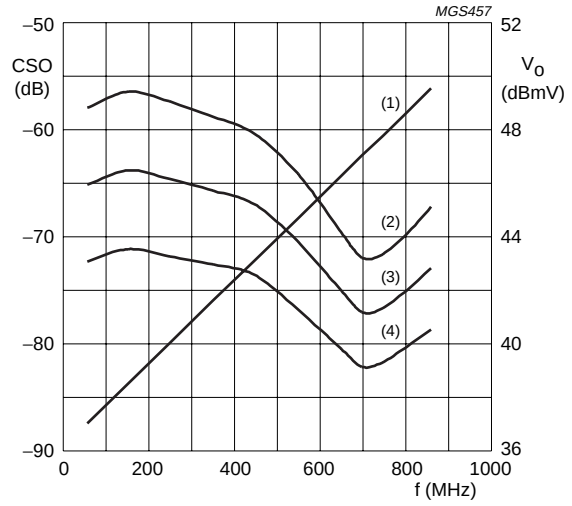
$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs;
tilt = 12.5 dB; (50 to 860 MHz).
(1) V_o. (3) Typ.
(2) Typ. +3 σ. (4) Typ. –3 σ.

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



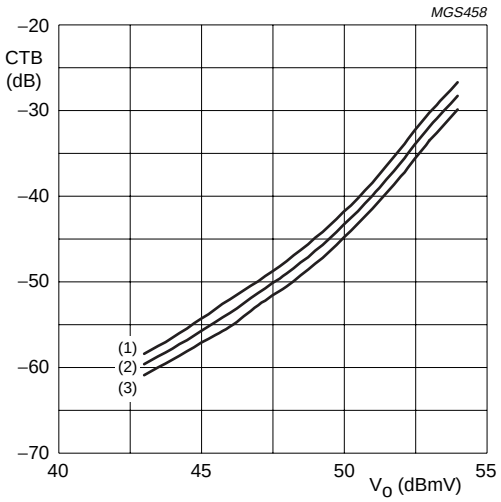
$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs;
tilt = 12.5 dB; (50 to 860 MHz).
(1) V_o. (3) Typ.
(2) Typ. +3 σ. (4) Typ. –3 σ.

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



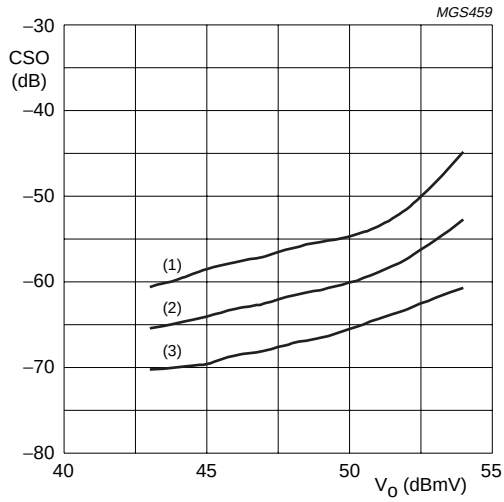
$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs;
tilt = 12.5 dB; (50 to 860 MHz).
(1) V_o. (3) Typ.
(2) Typ. +3 σ. (4) Typ. –3 σ.

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.

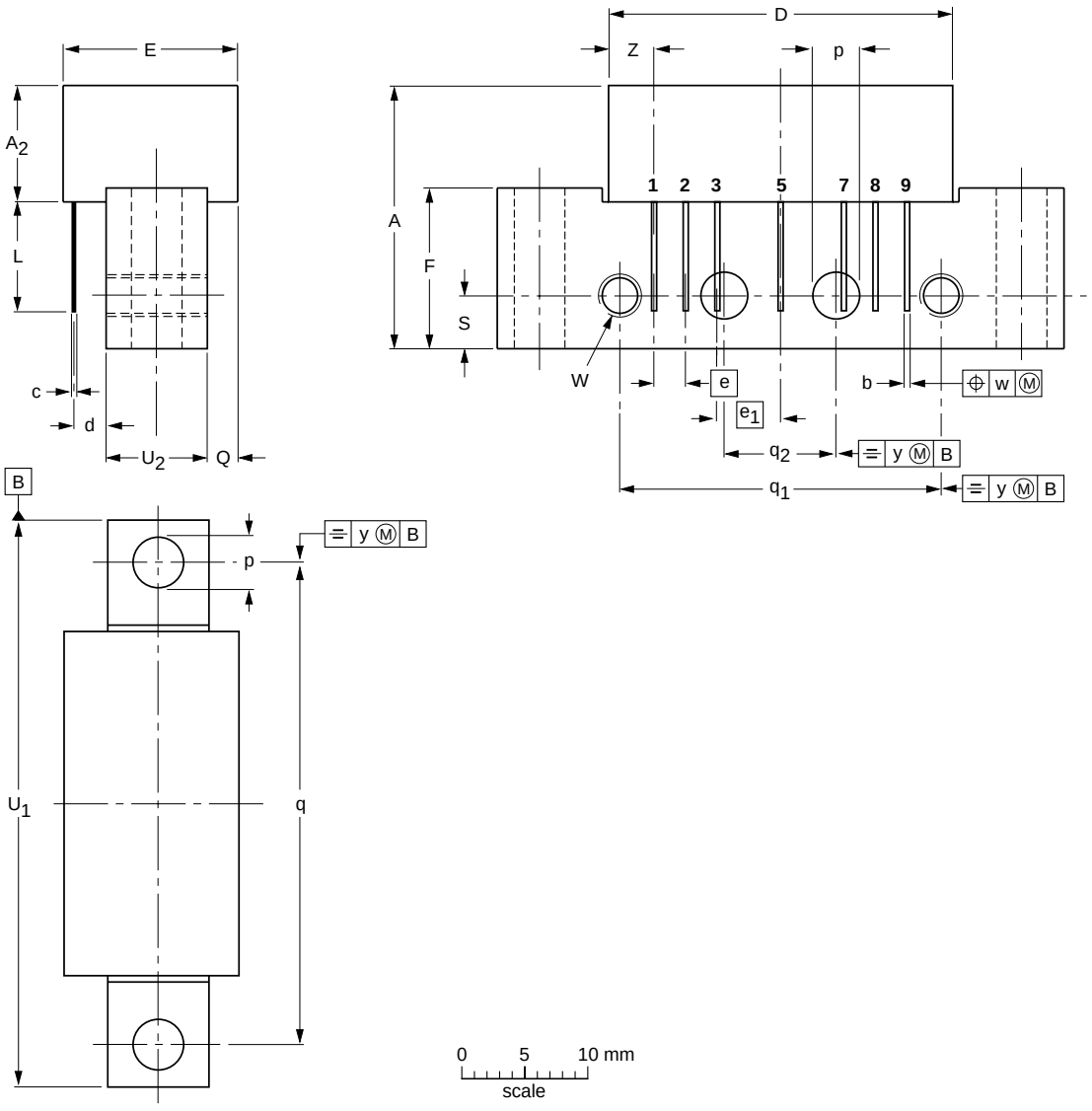


$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 129 chs; $f_m = 860.5$ MHz.
(1) Typ. +3 σ.
(2) Typ.
(3) Typ. −3 σ.

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
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