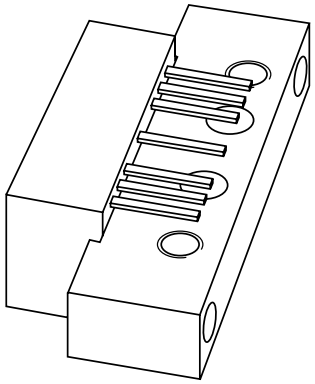
DATA SHEET



BGD804N

860 MHz, 20 dB gain power doubler amplifier

Product specification

2001 Nov 01

Supersedes data of 1999 Mar 26

Philips
Semiconductors

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860 MHz, 20 dB gain power doubler amplifier BGD804N

FEATURES

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

APPLICATIONS

CATV systems operating in the 40 to 860 MHz frequency range.

DESCRIPTION

Hybrid amplifier module in a SOT115J package operating at a voltage supply of 24 V (DC).

PINNING - SOT115J

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

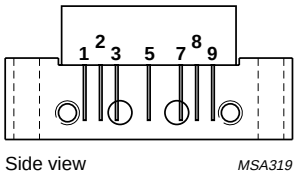


Fig.1 Simplified outline.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
G_p	power gain	f = 50 MHz	19.5	20.5	dB
		f = 860 MHz	20	–	dB
I_{tot}	total current consumption (DC)	V_B = 24 V	–	410	mA

LIMITING VALUES

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

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_B	supply voltage	–	25	V
V_i	RF input voltage	–	65	dBmV
T_{stg}	storage temperature	–40	+100	°C
T_{mb}	operating mounting base temperature	–20	+100	°C

CHARACTERISTICS

Table 1 Bandwidth 40 to 860 MHz; V_B = 24 V; T_{case} = 35 °C; $Z_S = Z_L$ = 75 Ω

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
G_p	power gain	f = 50 MHz	19.5	20	20.5	dB
		f = 860 MHz	20	21	–	dB
SL	slope cable equivalent	f = 40 to 860 MHz	0.2	0.9	2	dB
FL	flatness of frequency response	f = 40 to 860 MHz	–	±0.1	±0.25	dB
S_{11}	input return losses	f = 40 to 80 MHz	20	29.5	–	dB
		f = 80 to 160 MHz	18.5	23.5	–	dB
		f = 160 to 320 MHz	17	20.5	–	dB
		f = 320 to 640 MHz	15.5	19.5	–	dB
		f = 640 to 860 MHz	14	17.5	–	dB
S_{22}	output return losses	f = 40 to 80 MHz	20	30	–	dB
		f = 80 to 160 MHz	18.5	31	–	dB
		f = 160 to 860 MHz	17	21	–	dB
S_{21}	phase response	f = 50 MHz	–45	–	+45	deg
CTB	composite triple beat	49 channels flat; V_o = 47 dBmV; measured at 859.25 MHz	–	–65	–62	dB
X_{mod}	cross modulation	49 channels flat; V_o = 47 dBmV; measured at 55.25 MHz	–	–64	–61	dB
CSO	composite second order distortion	49 channels flat; V_o = 47 dBmV; measured at 860.5 MHz	–	–66	–58	dB
d_2	second order distortion	note 1	–	–77.5	–67	dB
V_o	output voltage	d_{im} = –60 dB; note 2	61	63	–	dBmV
F	noise figure	f = 50 MHz	–	4.5	5	dB
		f = 550 MHz	–	–	5.5	dB
		f = 650 MHz	–	–	6.5	dB
		f = 750 MHz	–	–	7	dB
		f = 860 MHz	–	6.5	8	dB
I_{tot}	total current consumption (DC)	note 3	–	395	410	mA

Notes

1. 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.
2. 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.
3. The module normally operates at V_B = 24 V, but is able to withstand supply transients up to 30 V.

Table 2 Bandwidth 40 to 860 MHz; V_B = 24 V; T_{case} = 30 °C; $Z_S = Z_L$ = 75 Ω

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
G_p	power gain	f = 50 MHz	19.5	20	20.5	dB
		f = 860 MHz	20	21	–	dB
SL	slope cable equivalent	f = 40 to 860 MHz	0.2	0.9	2	dB
FL	flatness of frequency response	f = 40 to 860 MHz	–	±0.1	±0.25	dB
S_{11}	input return losses	f = 40 to 80 MHz	20	29.5	–	dB
		f = 80 to 160 MHz	18.5	23.5	–	dB
		f = 160 to 320 MHz	17	20.5	–	dB
		f = 320 to 640 MHz	15.5	19.5	–	dB
		f = 640 to 860 MHz	14	17.5	–	dB
S_{22}	output return losses	f = 40 to 80 MHz	20	30	–	dB
		f = 80 to 160 MHz	18.5	31	–	dB
		f = 160 to 860 MHz	17	21	–	dB
S_{21}	phase response	f = 50 MHz	–45	–	+45	deg
CTB	composite triple beat	129 channels flat; V_o = 44 dBmV; measured at 859.25 MHz	–	–	–53	dB
X_{mod}	cross modulation	129 channels flat; V_o = 44 dBmV; measured at 55.25 MHz	–	–	–58	dB
CSO	composite second order distortion	129 channels flat; V_o = 44 dBmV; measured at 860.5 MHz	–	–	–54	dB
d_2	second order distortion	note 1	–	–77.5	–67	dB
V_o	output voltage	d_{im} = –60 dB; note 2	61	63	–	dBmV
F	noise figure	see Table 1	–	–	–	dB
I_{tot}	total current consumption (DC)	note 3	–	395	410	mA

Notes

1. 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.
2. 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.
3. The module normally operates at V_B = 24 V, but is able to withstand supply transients up to 30 V.

Table 3 Bandwidth 40 to 750 MHz; V_B = 24 V; T_{case} = 30 °C; $Z_S = Z_L$ = 75 Ω

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
G_p	power gain	f = 50 MHz	19.5	20	20.5	dB
		f = 750 MHz	20	–	–	dB
SL	slope cable equivalent	f = 40 to 750 MHz	0.2	–	2	dB
FL	flatness of frequency response	f = 40 to 750 MHz	–	–	±0.25	dB
S_{11}	input return losses	f = 40 to 80 MHz	20	29.5	–	dB
		f = 80 to 160 MHz	18.5	23.5	–	dB
		f = 160 to 320 MHz	17	20.5	–	dB
		f = 320 to 640 MHz	15.5	19.5	–	dB
		f = 640 to 750 MHz	14	17.5	–	dB
S_{22}	output return losses	f = 40 to 80 MHz	20	30	–	dB
		f = 80 to 160 MHz	18.5	31	–	dB
		f = 160 to 750 MHz	17	21	–	dB
S_{21}	phase response	f = 50 MHz	–45	–	+45	deg
CTB	composite triple beat	110 channels flat; V_o = 44 dBmV; measured at 745.25 MHz	–	–	–58	dB
X_{mod}	cross modulation	110 channels flat; V_o = 44 dBmV; measured at 55.25 MHz	–	–	–59	dB
CSO	composite second order distortion	110 channels flat; V_o = 44 dBmV; measured at 746.5 MHz	–	–	–58	dB
d_2	second order distortion	note 1	–	–	–70	dB
V_o	output voltage	d_{im} = –60 dB; note 2	63	–	–	dBmV
F	noise figure	see Table 1	–	–	–	dB
I_{tot}	total current consumption (DC)	note 3	–	395	410	mA

Notes

1. 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.
2. 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.
3. The module normally operates at V_B = 24 V, but is able to withstand supply transients up to 30 V.

Table 4 Bandwidth 40 to 650 MHz; V_B = 24 V; T_{case} = 30 °C; $Z_S = Z_L$ = 75 Ω

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
G_p	power gain	f = 50 MHz	19.5	20	20.5	dB
		f = 650 MHz	20	–	–	dB
SL	slope cable equivalent	f = 40 to 650 MHz	0.2	–	2	dB
FL	flatness of frequency response	f = 40 to 650 MHz	–	–	±0.2	dB
S_{11}	input return losses	f = 40 to 80 MHz	20	29.5	–	dB
		f = 80 to 160 MHz	18.5	23.5	–	dB
		f = 160 to 320 MHz	17	20.5	–	dB
		f = 320 to 650 MHz	15	19.5	–	dB
S_{22}	output return losses	f = 40 to 80 MHz	20	30	–	dB
		f = 80 to 160 MHz	18.5	31	–	dB
		f = 160 to 650 MHz	17	21	–	dB
S_{21}	phase response	f = 50 MHz	–45	–	+45	deg
CTB	composite triple beat	94 channels flat; V_o = 44 dBmV; measured at 649.25 MHz	–	–	–60	dB
X_{mod}	cross modulation	94 channels flat; V_o = 44 dBmV; measured at 55.25 MHz	–	–	–60	dB
CSO	composite second order distortion	94 channels flat; V_o = 44 dBmV; measured at 650.5 MHz	–	–	–60	dB
d_2	second order distortion	note 1	–	–	–70	dB
V_o	output voltage	d_{im} = –60 dB; note 2	64	–	–	dBmV
F	noise figure	see Table 1	–	–	–	dB
I_{tot}	total current consumption (DC)	note 3	–	395	410	mA

Notes

1. f_p = 55.25 MHz; V_p = 44 dBmV;
   f_q = 595.25 MHz; V_q = 44 dBmV;
   measured at $f_p + f_q$ = 650.5 MHz.
2. Measured according to DIN45004B;
   f_p = 640.25 MHz; $V_p = V_o$;
   f_q = 647.25 MHz; $V_q = V_o$ –6 dB;
   f_r = 649.25 MHz; $V_r = V_o$ –6 dB;
   measured at $f_p + f_q - f_r$ = 638.25 MHz.
3. The module normally operates at V_B = 24 V, but is able to withstand supply transients up to 30 V.

Table 5 Bandwidth 40 to 550 MHz; V_B = 24 V; T_{case} = 30 °C; $Z_S = Z_L$ = 75 Ω

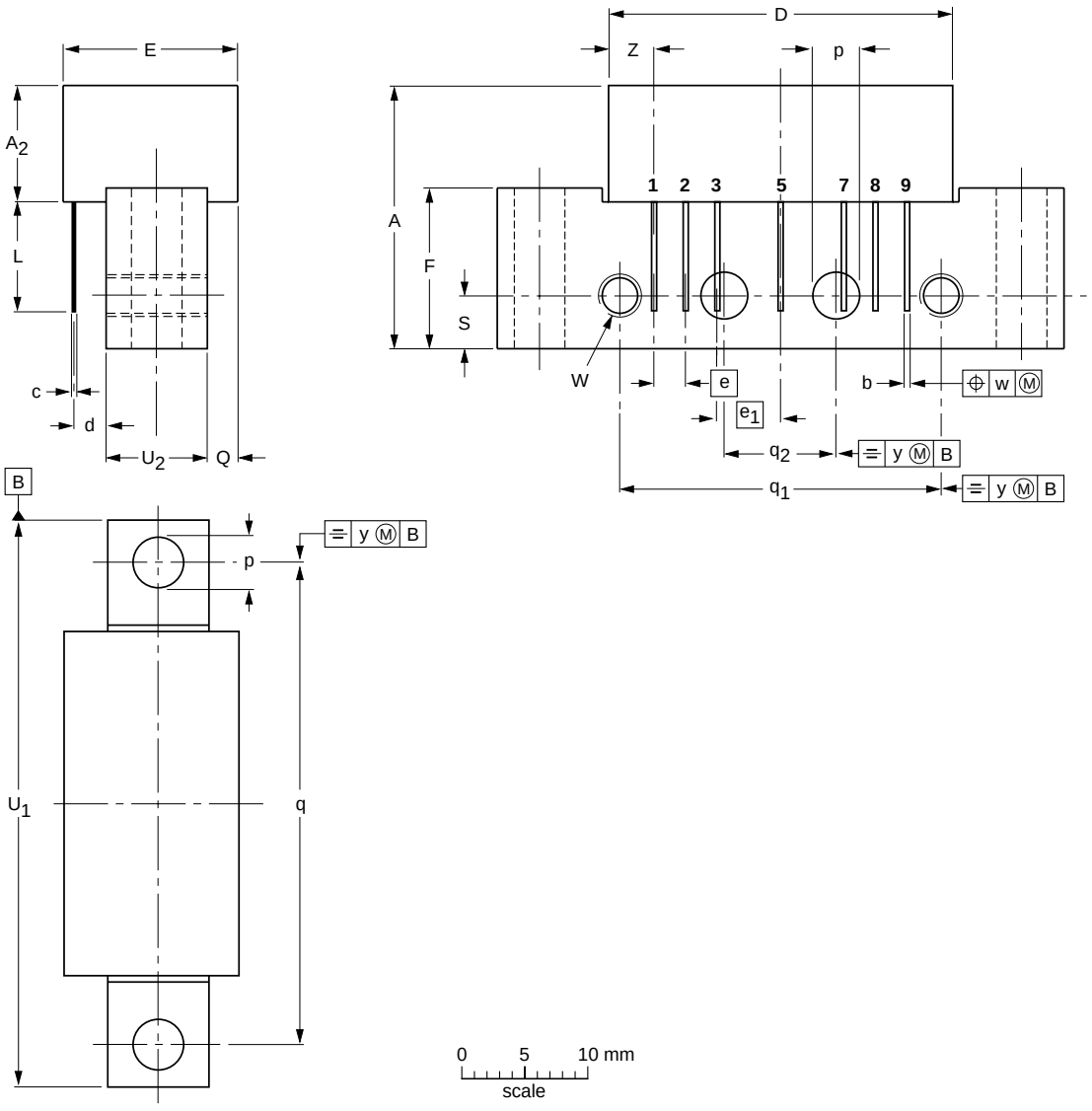
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
G_p	power gain	f = 50 MHz	19.5	20	20.5	dB
		f = 550 MHz	20	–	–	dB
SL	slope cable equivalent	f = 40 to 550 MHz	0.2	–	2	dB
FL	flatness of frequency response	f = 40 to 550 MHz	–	–	±0.2	dB
S_{11}	input return losses	f = 40 to 80 MHz	20	29.5	–	dB
		f = 80 to 160 MHz	18.5	23.5	–	dB
		f = 160 to 320 MHz	17	20.5	–	dB
		f = 320 to 550 MHz	16	19.5	–	dB
S_{22}	output return losses	f = 40 to 80 MHz	20	30	–	dB
		f = 80 to 160 MHz	18.5	31	–	dB
		f = 160 to 550 MHz	17	21	–	dB
S_{21}	phase response	f = 50 MHz	–45	–	+45	deg
CTB	composite triple beat	77 channels flat; V_o = 44 dBmV; measured at 547.25 MHz	–	–	–64	dB
X_{mod}	cross modulation	77 channels flat; V_o = 44 dBmV; measured at 55.25 MHz	–	–	–62	dB
CSO	composite second order distortion	77 channels flat; V_o = 44 dBmV; measured at 548.5 MHz	–	–	–63	dB
d_2	second order distortion	note 1	–	–	–72	dB
V_o	output voltage	d_{im} = –60 dB; note 2	65	–	–	dBmV
F	noise figure	see Table 1	–	–	–	dB
I_{tot}	total current consumption (DC)	note 3	–	395	410	mA

Notes

1. 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.
2. 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.
3. The module normally operates at V_B = 24 V, but is able to withstand supply transients up to 30 V.

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

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