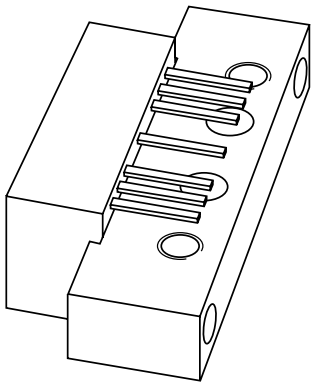
DATA SHEET



BGD804
CATV amplifier module

Product specification
Supersedes data of 1997 Mar 25

1999 Mar 26

Philips
Semiconductors

PHILIPS

CATV amplifier module BGD804

FEATURES

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

APPLICATIONS

CATV systems 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

PIN CONFIGURATION

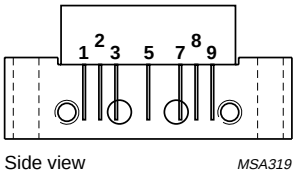


Fig.1 Simplified outline.

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 134).

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

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	1.1	2	dB
FL	flatness of frequency response	f = 40 to 860 MHz	–	±0.2	±0.5	dB
S_{11}	input return losses	f = 40 to 80 MHz	20	28	–	dB
		f = 80 to 160 MHz	18.5	23	–	dB
		f = 160 to 320 MHz	17	20	–	dB
		f = 320 to 640 MHz	15.5	20	–	dB
		f = 640 to 860 MHz	14	20	–	dB
S_{22}	output return losses	f = 40 to 80 MHz	20	28.5	–	dB
		f = 80 to 160 MHz	18.5	28	–	dB
		f = 160 to 320 MHz	17	24	–	dB
		f = 320 to 640 MHz	15.5	19	–	dB
		f = 640 to 860 MHz	14	19	–	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	–	–64	–61	dB
X_{mod}	cross modulation	49 channels flat; V_o = 47 dBmV; measured at 55.25 MHz	–	–65.5	–62	dB
CSO	composite second order distortion	49 channels flat; V_o = 47 dBmV; measured at 860.5 MHz	–	–63	–58	dB
d_2	second order distortion	note 1	–	–73	–67	dB
V_o	output voltage	d_{im} = –60 dB; note 2	+60	–61.5	–	dBmV
F	noise figure	f = 50 MHz	–	4.5	5	dB
		f = 550 MHz	–	–	6	dB
		f = 650 MHz	–	–	6	dB
		f = 750 MHz	–	–	6.5	dB
		f = 860 MHz	–	6.5	7.5	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} = 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	1.1	2	dB
FL	flatness of frequency response	f = 40 to 860 MHz	–	±0.2	±0.5	dB
S_{11}	input return losses	f = 40 to 80 MHz	20	28	–	dB
		f = 80 to 160 MHz	18.5	23	–	dB
		f = 160 to 320 MHz	17	20	–	dB
		f = 320 to 640 MHz	15.5	20	–	dB
		f = 640 to 860 MHz	14	20	–	dB
S_{22}	output return losses	f = 40 to 80 MHz	20	28.5	–	dB
		f = 80 to 160 MHz	18.5	28	–	dB
		f = 160 to 320 MHz	17	24	–	dB
		f = 320 to 640 MHz	15.5	19	–	dB
		f = 640 to 860 MHz	14	19	–	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	–	–54	–53	dB
X_{mod}	cross modulation	129 channels flat; V_o = 44 dBmV; measured at 55.25 MHz	–	–62	–61	dB
CSO	composite second order distortion	129 channels flat; V_o = 44 dBmV; measured at 860.5 MHz	–	–60.5	–54	dB
d_2	second order distortion	note 1	–	–73	–67	dB
V_o	output voltage	d_{im} = –60 dB; note 2	+60	–61.5	–	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} = 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 = 750 MHz	20	20.8	–	dB
SL	slope cable equivalent	f = 40 to 750 MHz	0.2	–	2	dB
FL	flatness of frequency response	f = 40 to 750 MHz	–	–	±0.45	dB
S_{11}	input return losses	f = 40 to 80 MHz	20	28	–	dB
		f = 80 to 160 MHz	18.5	23	–	dB
		f = 160 to 320 MHz	17	20	–	dB
		f = 320 to 640 MHz	15.5	20	–	dB
		f = 640 to 750 MHz	14	20	–	dB
S_{22}	output return losses	f = 40 to 80 MHz	20	28.5	–	dB
		f = 80 to 160 MHz	18.5	28	–	dB
		f = 160 to 320 MHz	17	24	–	dB
		f = 320 to 640 MHz	15.5	19	–	dB
		f = 640 to 750 MHz	14	19	–	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	–	–59	–57	dB
X_{mod}	cross modulation	110 channels flat; V_o = 44 dBmV; measured at 55.25 MHz	–	–64	–62	dB
CSO	composite second order distortion	110 channels flat; V_o = 44 dBmV; measured at 746.5 MHz	–	–62	–56	dB
d_2	second order distortion	note 1	–	–	–68	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} = 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 = 650 MHz	20	20.7	–	dB
SL	slope cable equivalent	f = 40 to 650 MHz	0.2	–	2	dB
FL	flatness of frequency response	f = 40 to 650 MHz	–	–	±0.35	dB
S_{11}	input return losses	f = 40 to 80 MHz	20	28	–	dB
		f = 80 to 160 MHz	18.5	23	–	dB
		f = 160 to 320 MHz	17	20	–	dB
		f = 320 to 650 MHz	15	20	–	dB
S_{22}	output return losses	f = 40 to 80 MHz	20	28.5	–	dB
		f = 80 to 160 MHz	18.5	28	–	dB
		f = 160 to 320 MHz	17	24	–	dB
		f = 320 to 650 MHz	15	19	–	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	–	–	–62	dB
CSO	composite second order distortion	94 channels flat; V_o = 44 dBmV; measured at 650.5 MHz	–	–	–58	dB
d_2	second order distortion	note 1	–	–	–69	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 = 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} = 35 °C; $Z_S = Z_L$ = 75 Ω

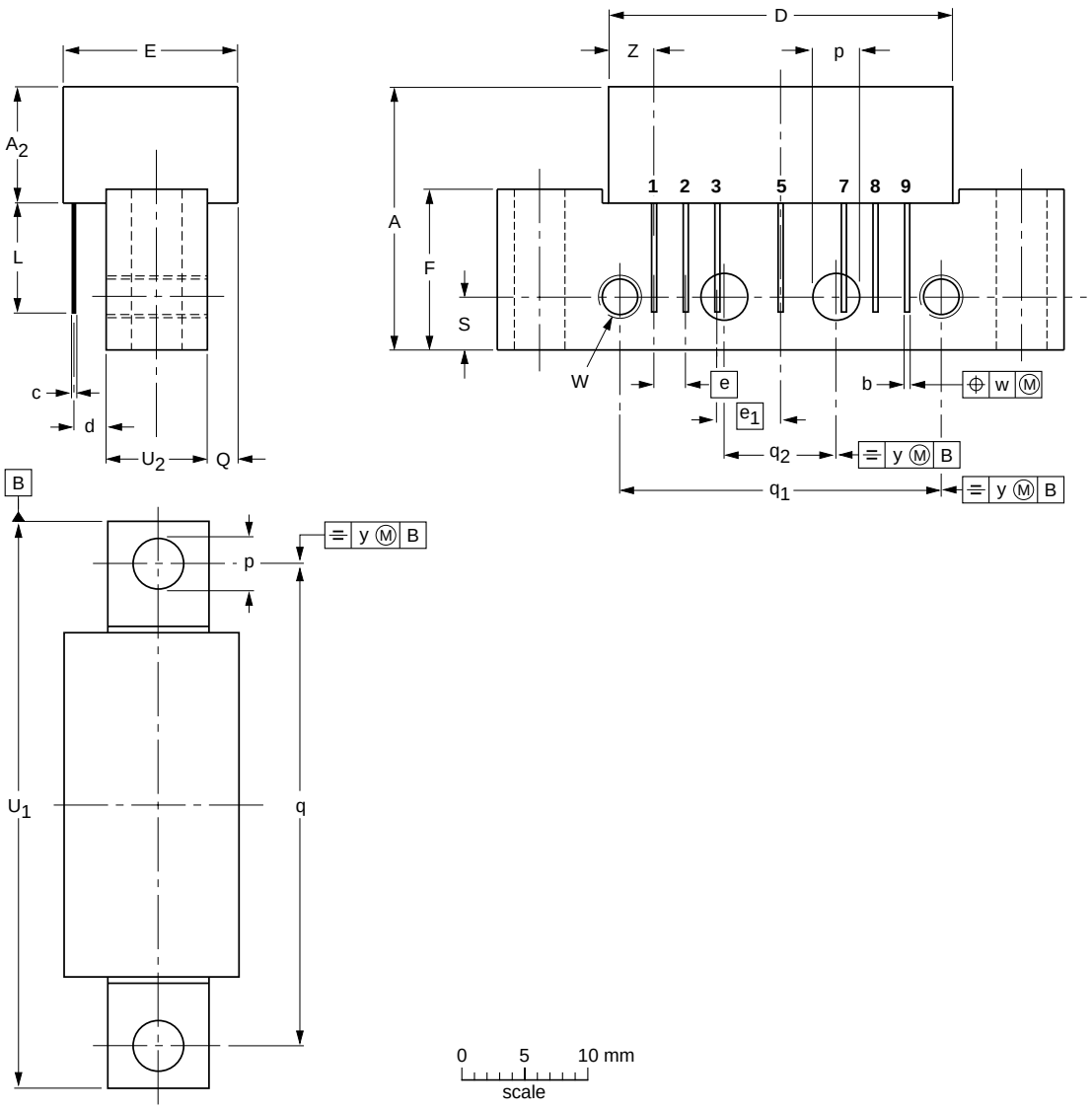
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
G_p	power gain	f = 50 MHz	19.5	20	20.5	dB
		f = 550 MHz	20	20.6	–	dB
SL	slope cable equivalent	f = 40 to 550 MHz	0.2	–	2	dB
FL	flatness of frequency response	f = 40 to 550 MHz	–	–	±0.35	dB
S_{11}	input return losses	f = 40 to 80 MHz	20	28	–	dB
		f = 80 to 160 MHz	18.5	23	–	dB
		f = 160 to 320 MHz	17	20	–	dB
		f = 320 to 550 MHz	16	20	–	dB
S_{22}	output return losses	f = 40 to 80 MHz	20	28.5	–	dB
		f = 80 to 160 MHz	18.5	28	–	dB
		f = 160 to 320 MHz	17	24	–	dB
		f = 320 to 550 MHz	16	19	–	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	–	–66	–64	dB
X_{mod}	cross modulation	77 channels flat; V_o = 44 dBmV; measured at 55.25 MHz	–	–67	–64	dB
CSO	composite second order distortion	77 channels flat; V_o = 44 dBmV; measured at 548.5 MHz	–	–67	–62	dB
d_2	second order distortion	note 1	–	–	–72	dB
V_o	output voltage	d_{im} = –60 dB; note 2	66	–	–	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

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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NOTES

NOTES

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