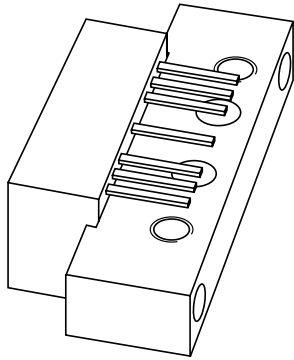


# DATA SHEET



## **BGD804N** CATV amplifier module

Product specification  
Supersedes data of 1997 Oct 28

1999 Mar 26

# CATV amplifier module

# 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

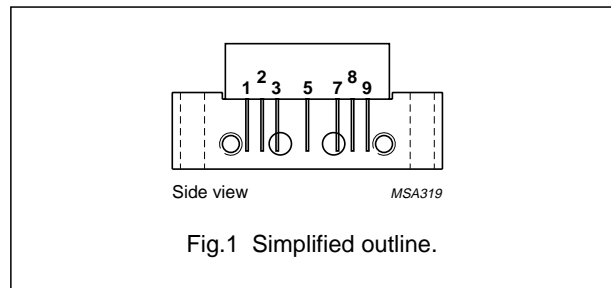
CATV systems operating in the 40 to 860 MHz frequency range.

### 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 <sub>B</sub>
7	common
8	common
9	output



### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
G <sub>p</sub>	power gain	f = 50 MHz	19.5	20.5	dB
		f = 860 MHz	20	–	dB
I <sub>tot</sub>	total current consumption (DC)	V <sub>B</sub> = 24 V	–	410	mA

### LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V <sub>B</sub>	supply voltage	–	25	V
V <sub>i</sub>	RF input voltage	–	65	dBmV
T <sub>stg</sub>	storage temperature	–40	+100	°C
T <sub>mb</sub>	mounting base operating temperature	–20	+100	°C

## CATV amplifier module

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## CHARACTERISTICS

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

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	–	$\pm 0.1$	$\pm 0.25$	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
$X_{\text{mod}}$	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	$d_{\text{im}} = -60$ 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
$I_{\text{tot}}$	total current consumption (DC)	note 3	–	395	410	mA

## Notes

- $f_p = 55.25$  MHz;  $V_p = 44$  dBmV;  
 $f_q = 805.25$  MHz;  $V_q = 44$  dBmV;  
measured at  $f_p + f_q = 860.5$  MHz.
- 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.
- The module normally operates at  $V_B = 24$  V, but is able to withstand supply transients up to 30 V.

## CATV amplifier module

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

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	–	$\pm 0.1$	$\pm 0.25$	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
$X_{\text{mod}}$	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	$d_{\text{im}} = -60$ dB; note 2	61	63	–	dBmV
F	noise figure	see Table 1	–	–	–	dB
$I_{\text{tot}}$	total current consumption (DC)	note 3	–	395	410	mA

**Notes**

- $f_p = 55.25$  MHz;  $V_p = 44$  dBmV;  
 $f_q = 805.25$  MHz;  $V_q = 44$  dBmV;  
measured at  $f_p + f_q = 860.5$  MHz.
- 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.
- The module normally operates at  $V_B = 24$  V, but is able to withstand supply transients up to 30 V.

## CATV amplifier module

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

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	–	–	$\pm 0.25$	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
$X_{\text{mod}}$	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	$d_{\text{im}} = -60$ dB; note 2	63	–	–	dBmV
F	noise figure	see Table 1	–	–	–	dB
$I_{\text{tot}}$	total current consumption (DC)	note 3	–	395	410	mA

**Notes**

- $f_p = 55.25$  MHz;  $V_p = 44$  dBmV;  
 $f_q = 691.25$  MHz;  $V_q = 44$  dBmV;  
measured at  $f_p + f_q = 746.5$  MHz.
- 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.
- The module normally operates at  $V_B = 24$  V, but is able to withstand supply transients up to 30 V.

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

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	–	–	$\pm 0.2$	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
$X_{\text{mod}}$	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	$d_{\text{im}} = -60$ dB; note 2	64	–	–	dBmV
F	noise figure	see Table 1	–	–	–	dB
$I_{\text{tot}}$	total current consumption (DC)	note 3	–	395	410	mA

**Notes**

- $f_p = 55.25$  MHz;  $V_p = 44$  dBmV;  
 $f_q = 595.25$  MHz;  $V_q = 44$  dBmV;  
measured at  $f_p + f_q = 650.5$  MHz.
- 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.
- The module normally operates at  $V_B = 24$  V, but is able to withstand supply transients up to 30 V.

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

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	–	–	$\pm 0.2$	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
$X_{\text{mod}}$	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	$d_{\text{im}} = -60$ dB; note 2	65	–	–	dBmV
F	noise figure	see Table 1	–	–	–	dB
$I_{\text{tot}}$	total current consumption (DC)	note 3	–	395	410	mA

**Notes**

- $f_p = 55.25$  MHz;  $V_p = 44$  dBmV;  
 $f_q = 493.25$  MHz;  $V_q = 44$  dBmV;  
measured at  $f_p + f_q = 548.5$  MHz.
- 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.
- The module normally operates at  $V_B = 24$  V, but is able to withstand supply transients up to 30 V.

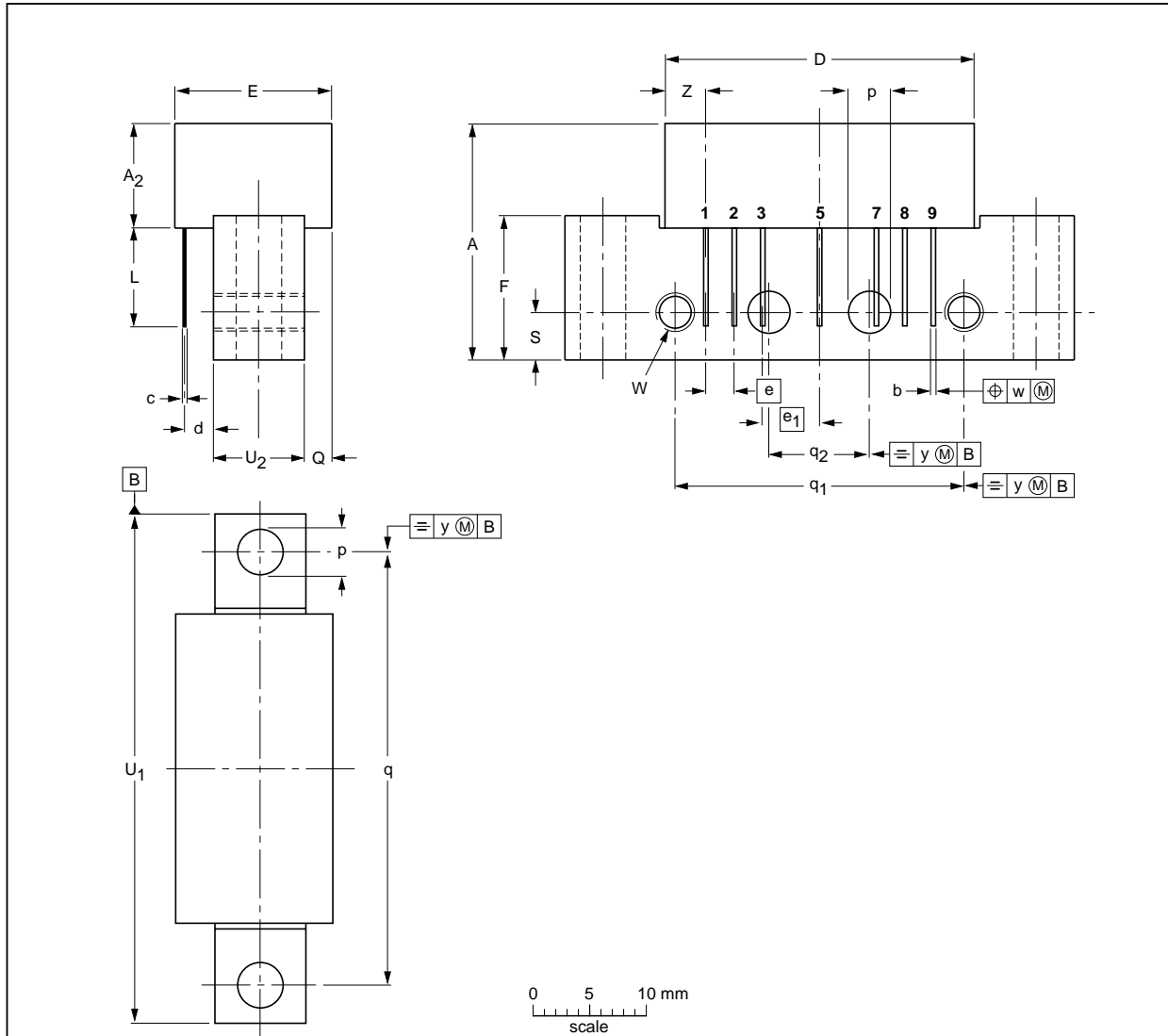
CATV amplifier module

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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 <sub>2</sub> max.	b	c	D max.	d max.	E max.	e	e <sub>1</sub>	F	L min.	p	Q max.	q	q <sub>1</sub>	q <sub>2</sub>	s	U <sub>1</sub> max.	U <sub>2</sub>	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



## CATV amplifier module

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**DEFINITIONS**

<b>Data Sheet Status</b>	
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.
<b>Limiting values</b>	
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.	
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Where application information is given, it is advisory and does not form part of the specification.	

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**NOTES**

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