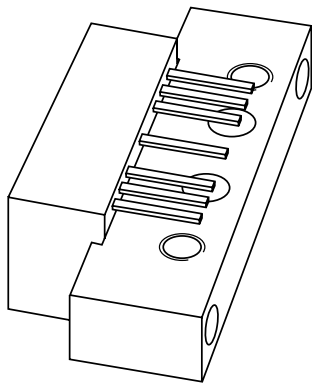


# DATA SHEET



## **BGD802N**

**860 MHz, 18.5 dB gain power  
doubler amplifier**

Product specification  
Supersedes data of 1999 Mar 22

2001 Nov 2

## 860 MHz, 18.5 dB gain power doubler amplifier

## BGD802N

## FEATURES

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

## APPLICATIONS

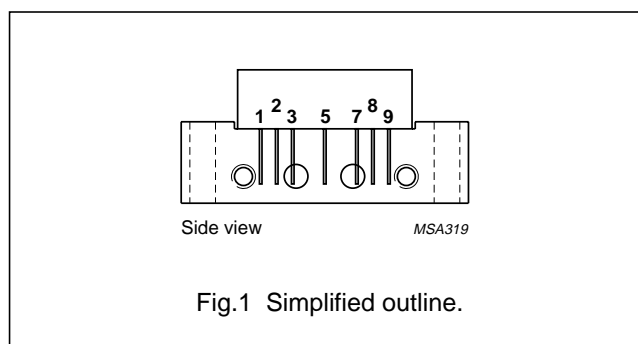
- CATV systems operating in the 40 to 860 MHz frequency range.

## DESCRIPTION

Hybrid amplifier module in a SOT115J package operating at a supply voltage 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	18	19	dB
		f = 860 MHz	18.5	–	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 60134).

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>	operating mounting base temperature	–20	+100	°C

## 860 MHz, 18.5 dB gain power doubler amplifier

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## CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$G_p$	power gain	$f = 50$ MHz	18	18.5	19	dB
		$f = 860$ MHz	18.5	19.5	–	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	32	–	dB
		$f = 80$ to 160 MHz	18.5	27	–	dB
		$f = 160$ to 320 MHz	17	24	–	dB
		$f = 320$ to 640 MHz	15.5	22	–	dB
		$f = 640$ to 860 MHz	14	20.5	–	dB
$S_{22}$	output return losses	$f = 40$ to 80 MHz	20	33	–	dB
		$f = 80$ to 160 MHz	18.5	29	–	dB
		$f = 160$ to 860 MHz	17	22	–	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	–63	dB
$X_{mod}$	cross modulation	49 channels flat; $V_o = 47$ dBmV; measured at 55.25 MHz	–	–64	–62	dB
CSO	composite second order distortion	49 channels flat; $V_o = 47$ dBmV; measured at 860.5 MHz	–	–68	–60	dB
$d_2$	second order distortion	note 1	–	–75	–69	dB
$V_o$	output voltage	$d_{im} = -60$ dB; note 2	61.5	63.5	–	dBmV
F	noise figure	$f = 50$ MHz	–	4.5	5.5	dB
		$f = 550$ MHz	–	–	6	dB
		$f = 650$ MHz	–	–	7	dB
		$f = 750$ MHz	–	–	7.5	dB
		$f = 860$ MHz	–	6.5	9	dB
$I_{tot}$	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.

## 860 MHz, 18.5 dB gain power doubler amplifier

## BGD802N

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$G_p$	power gain	$f = 50$ MHz	18	18.5	19	dB
		$f = 860$ MHz	18.5	19.5	–	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	32	–	dB
		$f = 80$ to 160 MHz	18.5	27	–	dB
		$f = 160$ to 320 MHz	17	24	–	dB
		$f = 320$ to 640 MHz	15.5	22	–	dB
		$f = 640$ to 860 MHz	14	20.5	–	dB
$S_{22}$	output return losses	$f = 40$ to 80 MHz	20	33	–	dB
		$f = 80$ to 160 MHz	18.5	29	–	dB
		$f = 160$ to 860 MHz	17	22	–	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	dB
$X_{mod}$	cross modulation	129 channels flat; $V_o = 44$ dBmV; measured at 55.25 MHz	–	–	–59	dB
CSO	composite second order distortion	129 channels flat; $V_o = 44$ dBmV; measured at 860.5 MHz	–	–	–56	dB
$d_2$	second order distortion	note 1	–	–75	–69	dB
$V_o$	output voltage	$d_{im} = -60$ dB; note 2	61.5	63.5	–	dBmV
F	noise figure	see Table 1	–	–	–	dB
$I_{tot}$	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.

## 860 MHz, 18.5 dB gain power doubler amplifier

## BGD802N

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
G <sub>p</sub>	power gain	f = 50 MHz	18	18.5	19	dB
		f = 750 MHz	18.5	–	–	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 <sub>11</sub>	input return losses	f = 40 to 80 MHz	20	32	–	dB
		f = 80 to 160 MHz	18.5	27	–	dB
		f = 160 to 320 MHz	17	24	–	dB
		f = 320 to 640 MHz	15.5	22	–	dB
		f = 640 to 750 MHz	14	20.5	–	dB
S <sub>22</sub>	output return losses	f = 40 to 80 MHz	20	33	–	dB
		f = 80 to 160 MHz	18.5	29	–	dB
		f = 160 to 750 MHz	17	22	–	dB
S <sub>21</sub>	phase response	f = 50 MHz	–45	–	+45	deg
CTB	composite triple beat	110 channels flat; V <sub>o</sub> = 44 dBmV; measured at 745.25 MHz	–	–	–59	dB
X <sub>mod</sub>	cross modulation	110 channels flat; V <sub>o</sub> = 44 dBmV; measured at 55.25 MHz	–	–	–60	dB
CSO	composite second order distortion	110 channels flat; V <sub>o</sub> = 44 dBmV; measured at 746.5 MHz	–	–	–60	dB
d <sub>2</sub>	second order distortion	note 1	–	–	–72	dB
V <sub>o</sub>	output voltage	d <sub>im</sub> = –60 dB; note 2	64	–	–	dBmV
F	noise figure	see Table 1	–	–	–	dB
I <sub>tot</sub>	total current consumption (DC)	note 3	–	395	410	mA

**Notes**

- f<sub>p</sub> = 55.25 MHz; V<sub>p</sub> = 44 dBmV;  
f<sub>q</sub> = 691.25 MHz; V<sub>q</sub> = 44 dBmV;  
measured at f<sub>p</sub> + f<sub>q</sub> = 746.5 MHz.
- Measured according to DIN45004B:  
f<sub>p</sub> = 740.25 MHz; V<sub>p</sub> = V<sub>o</sub>;  
f<sub>q</sub> = 747.25 MHz; V<sub>q</sub> = V<sub>o</sub> –6 dB;  
f<sub>r</sub> = 749.25 MHz; V<sub>r</sub> = V<sub>o</sub> –6 dB;  
measured at f<sub>p</sub> + f<sub>q</sub> – f<sub>r</sub> = 738.25 MHz.
- The module normally operates at V<sub>B</sub> = 24 V, but is able to withstand supply transients up to 30 V.

## 860 MHz, 18.5 dB gain power doubler amplifier

## BGD802N

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$G_p$	power gain	$f = 50$ MHz	18	18.5	19	dB
		$f = 650$ MHz	18.5	–	–	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	32	–	dB
		$f = 80$ to 160 MHz	18.5	27	–	dB
		$f = 160$ to 320 MHz	17	24	–	dB
		$f = 320$ to 650 MHz	15	22	–	dB
$S_{22}$	output return losses	$f = 40$ to 80 MHz	20	33	–	dB
		$f = 80$ to 160 MHz	18.5	29	–	dB
		$f = 160$ to 650 MHz	17	22	–	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	–	–	–61	dB
$X_{mod}$	cross modulation	94 channels flat; $V_o = 44$ dBmV; measured at 55.25 MHz	–	–	–61	dB
CSO	composite second order distortion	94 channels flat; $V_o = 44$ dBmV; measured at 650.5 MHz	–	–	–62	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**

- $f_p = 55.25$  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.

## 860 MHz, 18.5 dB gain power doubler amplifier

## BGD802N

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$G_p$	power gain	$f = 50$ MHz	18	18.5	19	dB
		$f = 550$ MHz	18.5	–	–	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	32	–	dB
		$f = 80$ to 160 MHz	18.5	27	–	dB
		$f = 160$ to 320 MHz	17	24	–	dB
		$f = 320$ to 550 MHz	16	22	–	dB
$S_{22}$	output return losses	$f = 40$ to 80 MHz	20	33	–	dB
		$f = 80$ to 160 MHz	18.5	29	–	dB
		$f = 160$ to 550 MHz	17	22	–	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	–	–	–65	dB
$X_{mod}$	cross modulation	77 channels flat; $V_o = 44$ dBmV; measured at 55.25 MHz	–	–	–63	dB
CSO	composite second order distortion	77 channels flat; $V_o = 44$ dBmV; measured at 548.5 MHz	–	–	–65	dB
$d_2$	second order distortion	note 1	–	–	–74	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**

- $f_p = 55.25$  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.

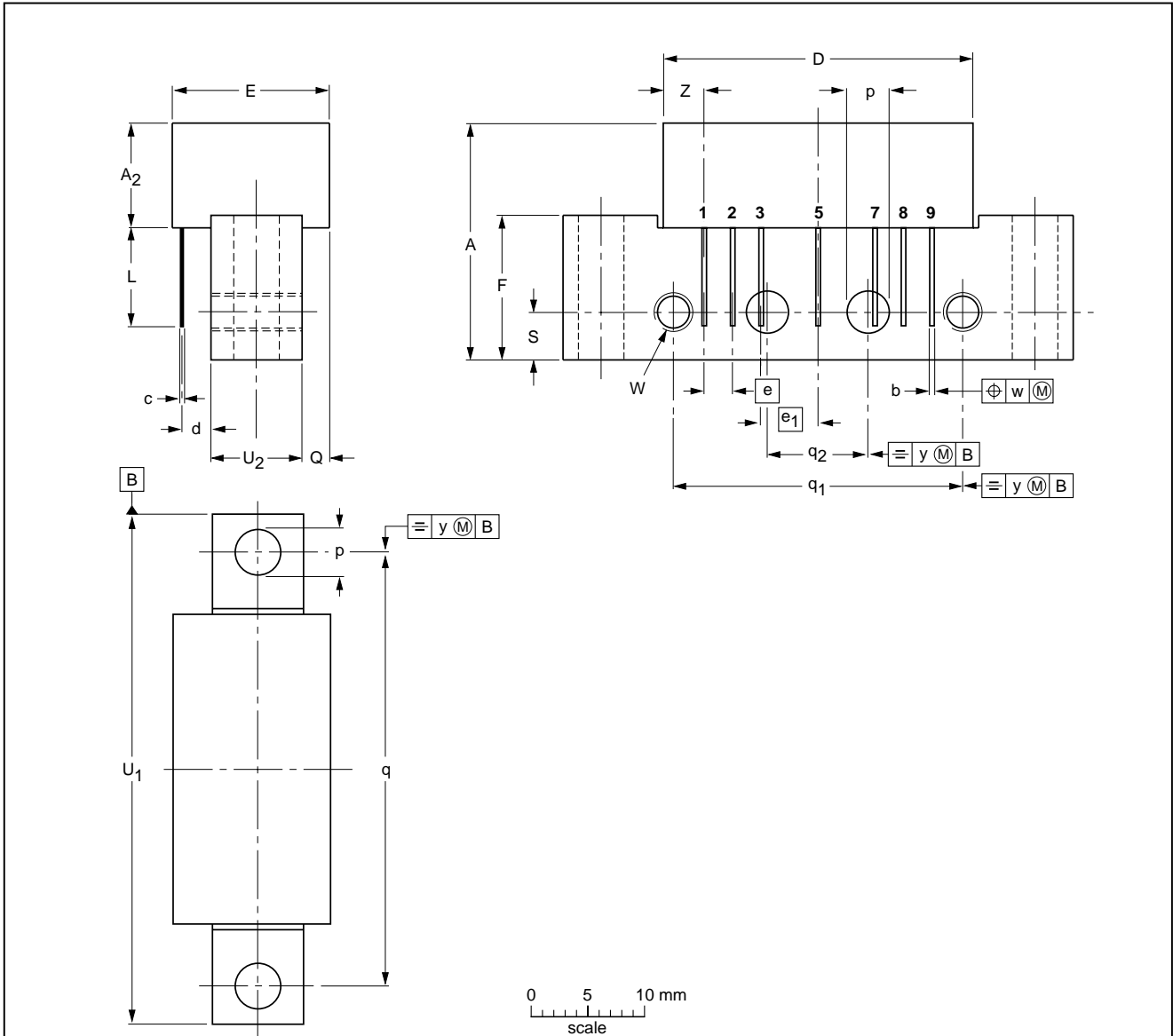
860 MHz, 18.5 dB gain power doubler amplifier

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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.	A2 max.	b	c	D max.	d max.	E max.	e	e1	F	L min.	p	Q max.	q	q1	q2	S	U1 max.	U2	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



## 860 MHz, 18.5 dB gain power doubler amplifier

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## DATA SHEET STATUS

DATA SHEET STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	DEFINITIONS
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**NOTES**

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**NOTES**

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