

BGD704

750 MHz, 20 dB gain power doubler amplifier

Rev. 8 — 28 September 2010 Product data sheet

1. Product profile

1.1 General description

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

CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

1.2 Features and benefits

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

1.3 Applications

- CATV systems in the frequency range of 40 MHz to 750 MHz

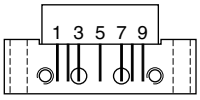
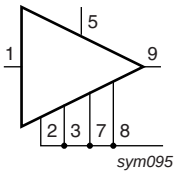
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	f = 50 MHz	19.5	20	20.5	dB
		f = 750 MHz	20	21	-	dB
I_{tot}	total current consumption (DC)	V_B = 24 V	-	425	435	mA

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	input		
2	common		
3	common		
5	$+V_B$		
7	common		
8	common		
9	output		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BGD704	-	rectangular single-ended package; aluminium flange; 2 vertical mounting holes; 2 × 6-32 UNC and 2 extra horizontal mounting holes; 7 gold-plated in-line leads	SOT115J

4. Limiting values

Table 4. Limiting values

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

Symbol	Parameter	Conditions	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

5. Characteristics

Table 5. Characteristics

Bandwidth 40 MHz to 750 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	19.5	20	20.5	dB
		f = 750 MHz	20	21	-	dB
SL	slope cable equivalent	f = 40 MHz to 750 MHz	0	1	2	dB
FL	flatness of frequency response	f = 40 MHz to 750 MHz	-	±0.2	±0.5	dB
s_{11}	input return losses	f = 40 MHz to 80 MHz	20	31	-	dB
		f = 80 MHz to 160 MHz	19	29	-	dB
		f = 160 MHz to 320 MHz	18	25	-	dB
		f = 320 MHz to 640 MHz	17	21	-	dB
		f = 640 MHz to 750 MHz	16	21	-	dB

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Table 5. Characteristics *...continued*

Bandwidth 40 MHz to 750 MHz; V_B = 24 V; T_{mb} = 35 °C; Z_S = Z_L = 75 Ω.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
s_{22}	output return losses	f = 40 MHz to 80 MHz		20	26	-	dB
		f = 80 MHz to 160 MHz		19	27	-	dB
		f = 160 MHz to 320 MHz		18	26	-	dB
		f = 320 MHz to 640 MHz		17	24	-	dB
		f = 640 MHz to 750 MHz		16	23	-	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	–57	dB
X_{mod}	cross modulation	110 channels flat; V_o = 44 dBmV; measured at 55.25 MHz		-	–63	–61	dB
CSO	composite second order distortion	110 channels flat; V_o = 44 dBmV; measured at 746.5 MHz		-	–61	–56	dB
d_2	second order distortion		[1]	-	–75	–66	dB
V_o	output voltage	d_{im} = –60 dB	[2]	60.5	63.5	-	dBmV
F	noise figure	f = 50 MHz		-	4.5	5	dB
		f = 450 MHz		-	-	6.5	dB
		f = 550 MHz		-	-	7	dB
		f = 600 MHz		-	-	7	dB
		f = 750 MHz		-	6.5	8.5	dB
I_{tot}	total current consumption (DC)		[3]	-	425	435	mA

[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] Measure 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 6. Characteristics

Bandwidth 40 MHz to 600 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	19.5	20	20.5	dB
		f = 600 MHz	20	20.7	-	dB
SL	slope cable equivalent	f = 40 MHz to 600 MHz	0	-	2	dB
FL	flatness of frequency response	f = 40 MHz to 600 MHz	-	-	±0.3	dB
s_{11}	input return losses	f = 40 MHz to 80 MHz	20	31	-	dB
		f = 80 MHz to 160 MHz	19	29	-	dB
		f = 160 MHz to 320 MHz	18	25	-	dB
		f = 320 MHz to 600 MHz	17	21	-	dB
s_{22}	output return losses	f = 40 MHz to 80 MHz	20	26	-	dB
		f = 80 MHz to 160 MHz	19	27	-	dB
		f = 160 MHz to 320 MHz	18	26	-	dB
		f = 320 MHz to 600 MHz	17	24	-	dB
s_{21}	phase response	f = 50 MHz	–45	-	+45	deg

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Table 6. Characteristics *...continued*

Bandwidth 40 MHz to 600 MHz; V_B = 24 V; T_{mb} = 35 °C; $Z_S = Z_L$ = 75 Ω.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
CTB	composite triple beat	85 channels flat; V_o = 44 dBmV; measured at 595.25 MHz		-	–65	–64	dB
X_{mod}	cross modulation	85 channels flat; V_o = 44 dBmV; measured at 55.25 MHz		-	–65	–64	dB
CSO	composite second order distortion	85 channels flat; V_o = 44 dBmV; measured at 596.5 MHz		-	–66	–58	dB
d_2	second order distortion		[1]	-	-	–68	dB
V_o	output voltage	d_{im} = –60 dB	[2]	63	-	-	dBmV
F	noise figure	see Table 5		-	-	-	dBmV
I_{tot}	total current consumption (DC)		[3]	-	425	435	mA

[1] f_p = 55.25 MHz; V_p = 44 dBmV; f_q = 541.25 MHz; V_q = 44 dBmV; measured at $f_p + f_q$ = 596.5 MHz.

[2] Measured according to DIN45004B; f_p = 590.25 MHz; $V_p = V_o$; f_q = 597.25 MHz; $V_q = V_o$ – 6 dB; f_r = 599.25 MHz; $V_r = V_o$ – 6 dB; measured at $f_p + f_q - f_r$ = 588.25 MHz.

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

Table 7. Characteristics

Bandwidth 40 MHz to 550 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	19.5	20	20.5	dB
		f = 550 MHz	20	20.6	-	dB
SL	slope cable equivalent	f = 40 MHz to 550 MHz	0	-	2	dB
FL	flatness of frequency response	f = 40 MHz to 550 MHz	-	-	±0.3	dB
s_{11}	input return losses	f = 40 MHz to 80 MHz	20	31	-	dB
		f = 80 MHz to 160 MHz	19	29	-	dB
		f = 160 MHz to 320 MHz	18	25	-	dB
		f = 320 MHz to 550 MHz	17	21	-	dB
s_{22}	output return losses	f = 40 MHz to 80 MHz	20	26	-	dB
		f = 80 MHz to 160 MHz	19	27	-	dB
		f = 160 MHz to 320 MHz	18	26	-	dB
		f = 320 MHz to 550 MHz	17	24	-	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	-	–67	–66	dB
X_{mod}	cross modulation	77 channels flat; V_o = 44 dBmV; measured at 55.25 MHz	-	–67	–66	dB
CSO	composite second order distortion	77 channels flat; V_o = 44 dBmV; measured at 548.5 MHz	-	–67	–60	dB
d_2	second order distortion		[1] -	-	–70	dB
V_o	output voltage	d_{im} = –60 dB	[2] 63.5	-	-	dBmV
F	noise figure	see Table 5	-	-	-	dB
I_{tot}	total current consumption (DC)		[3] -	425	435	mA

[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.

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[2] Measure 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.

Table 8. Characteristics

Bandwidth 40 MHz to 450 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		19.5	20	20.5	dB
		f = 450 MHz		20	20.6	-	dB
SL	slope cable equivalent	f = 40 MHz to 450 MHz		0	-	2	dB
FL	flatness of frequency response	f = 40 MHz to 450 MHz		-	-	±0.3	dB
s_{11}	input return losses	f = 40 MHz to 80 MHz		20	31	-	dB
		f = 80 MHz to 160 MHz		19	29	-	dB
		f = 160 MHz to 320 MHz		18	25	-	dB
		f = 320 MHz to 450 MHz		17	21	-	dB
s_{22}	output return losses	f = 40 MHz to 80 MHz		20	26	-	dB
		f = 80 MHz to 160 MHz		19	27	-	dB
		f = 160 MHz to 320 MHz		18	26	-	dB
		f = 320 MHz to 450 MHz		17	24	-	dB
s_{21}	phase response	f = 50 MHz		–45	-	+45	deg
CTB	composite triple beat	60 channels flat; V_o = 46 dBmV; measured at 445.25 MHz		-	-	–67	dB
X_{mod}	cross modulation	60 channels flat; V_o = 46 dBmV; measured at 55.25 MHz		-	-	–64	dB
CSO	composite second order distortion	60 channels flat; V_o = 46 dBmV; measured at 446.5 MHz		-	-	–63	dB
d_2	second order distortion		[1]	-	-	–73	dB
V_o	output voltage	d_{im} = –60 dB	[2]	66	-	-	dBmV
F	noise figure	see Table 5		-	-	-	dB
I_{tot}	total current consumption (DC)		[3]	-	425	435	mA

[1] f_p = 55.25 MHz; V_p = 44 dBmV; f_q = 391.25 MHz; V_q = 46 dBmV; measured at $f_p + f_q$ = 446.5 MHz.

[2] Measured according to DIN45004B; f_p = 440.25 MHz; $V_p = V_o$; f_q = 447.25 MHz; $V_q = V_o - 6$ dB; f_r = 449.25 MHz; $V_r = V_o - 6$ dB; measured at $f_p + f_q - f_r$ = 438.25 MHz.

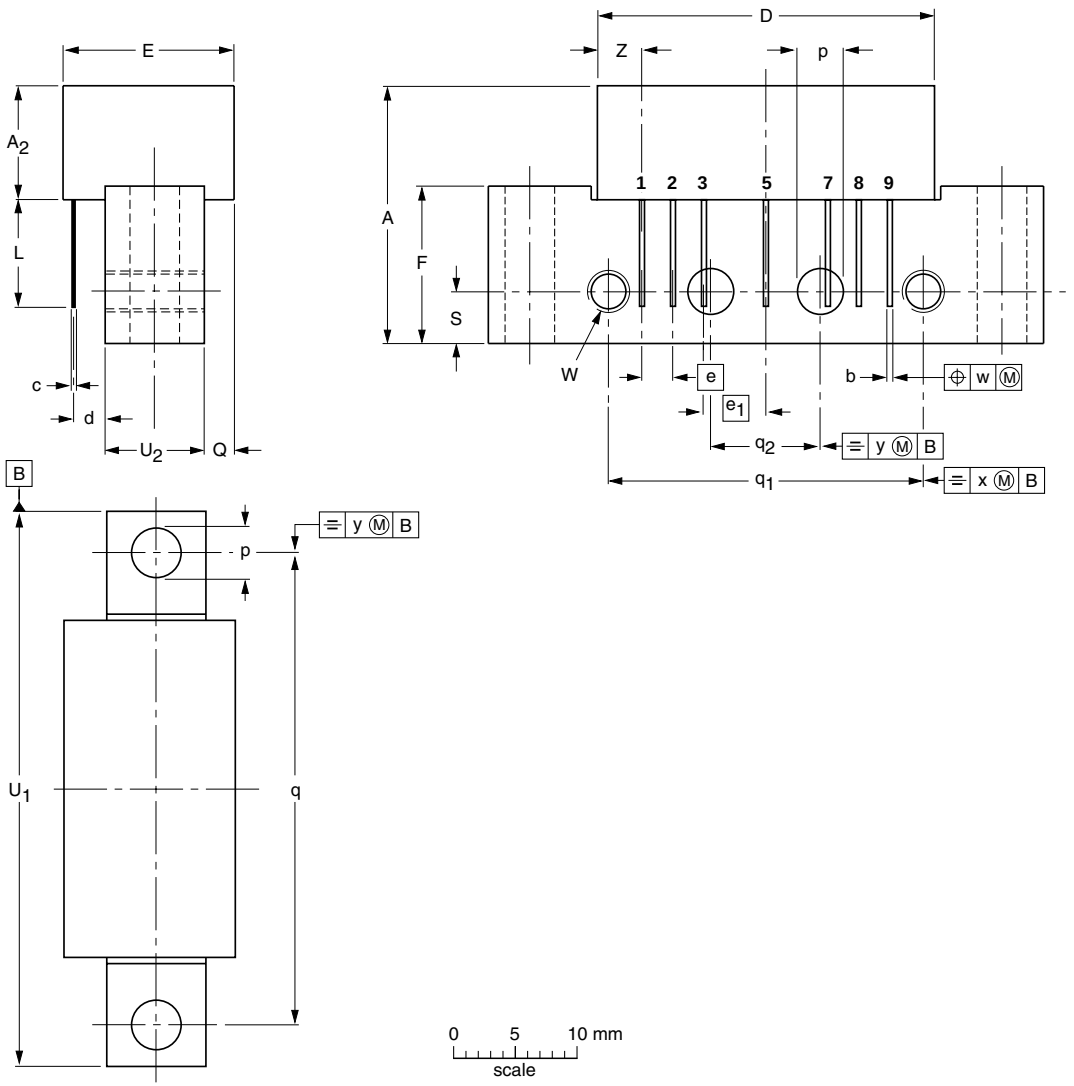
[3] The module normally operates at V_B = 24 V, but is able to withstand supply transients up to 30 V.

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6. 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	E max.	e	e_1	F	L min.	p	Q max.	q	q_1	q_2	S	U_1	U_2	W	w	x	y	Z max.
mm	20.8	9.5	0.51 0.38	0.25	27.2	2.04 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 44.25	8.2 7.8	6-32 UNC	0.25	0.7	0.1	3.8

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT115J						~~04-02-04~~ 10-06-18

Fig 1. Package outline SOT115J

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7. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BGD704 v.8	20100928	Product data sheet	-	BGD704 v.7
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Package outline drawings have been updated to the latest version.			
BGD704 v.7 (9397 750 14776)	20050401	Product data sheet	-	BGD704 v.6
BGD704 v.6 (9397 750 09027)	20011102	Product specification	-	BGD704 v.5
BGD704 v.5 (9397 750 08846)	20011029	Product specification	-	BGD704 v.4
BGD704 v.4 (9397 750 05295)	19990322	Product specification	-	BGD704 v.3
BGD704 v.3 (9397 750 01971)	19970402	Product specification	-	BGD704 v.2
BGD704 v.2 (9397 750 01392)	19961220	Product specification	-	-

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8. Legal information

8.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
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