

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

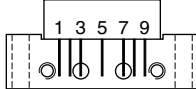
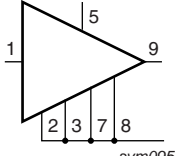
Table 1. Quick reference data

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		Version
	Name	Description	
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

Table 5. Characteristics ...continued

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

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; $V_B = 24\text{ V}$; $T_{mb} = 35\text{ °C}$; $Z_S = Z_L = 75\ \Omega$.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G _p	power gain	f = 50 MHz	19.5	20	20.5	dB
		f = 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

Table 6. Characteristics ...continued

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

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

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

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

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

Table 7. Characteristics

Bandwidth 40 MHz to 550 MHz; $V_B = 24\text{ V}$; $T_{mb} = 35\text{ °C}$; $Z_S = Z_L = 75\ \Omega$.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	$f = 50\text{ MHz}$	19.5	20	20.5	dB
		$f = 550\text{ MHz}$	20	20.6	-	dB
SL	slope cable equivalent	$f = 40\text{ MHz to }550\text{ MHz}$	0	-	2	dB
FL	flatness of frequency response	$f = 40\text{ MHz to }550\text{ MHz}$	-	-	± 0.3	dB
S_{11}	input return losses	$f = 40\text{ MHz to }80\text{ MHz}$	20	31	-	dB
		$f = 80\text{ MHz to }160\text{ MHz}$	19	29	-	dB
		$f = 160\text{ MHz to }320\text{ MHz}$	18	25	-	dB
		$f = 320\text{ MHz to }550\text{ MHz}$	17	21	-	dB
S_{22}	output return losses	$f = 40\text{ MHz to }80\text{ MHz}$	20	26	-	dB
		$f = 80\text{ MHz to }160\text{ MHz}$	19	27	-	dB
		$f = 160\text{ MHz to }320\text{ MHz}$	18	26	-	dB
		$f = 320\text{ MHz to }550\text{ MHz}$	17	24	-	dB
S_{21}	phase response	$f = 50\text{ MHz}$	-45	-	+45	deg
CTB	composite triple beat	77 channels flat; $V_o = 44\text{ dBmV}$; measured at 547.25 MHz	-	-67	-66	dB
X_{mod}	cross modulation	77 channels flat; $V_o = 44\text{ dBmV}$; measured at 55.25 MHz	-	-67	-66	dB
CSO	composite second order distortion	77 channels flat; $V_o = 44\text{ dBmV}$; measured at 548.5 MHz	-	-67	-60	dB
d_2	second order distortion		[1]	-	-70	dB
V_o	output voltage	$d_{im} = -60\text{ dB}$	[2]	63.5	-	dBmV
F	noise figure	see Table 5	-	-	-	dB
I_{tot}	total current consumption (DC)		[3]	-	425	435 mA

[1] $f_p = 55.25\text{ MHz}$; $V_p = 44\text{ dBmV}$; $f_q = 493.25\text{ MHz}$; $V_q = 44\text{ dBmV}$; measured at $f_p + f_q = 548.5\text{ MHz}$.

- [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; $Z_S = Z_L = 75 \Omega$.

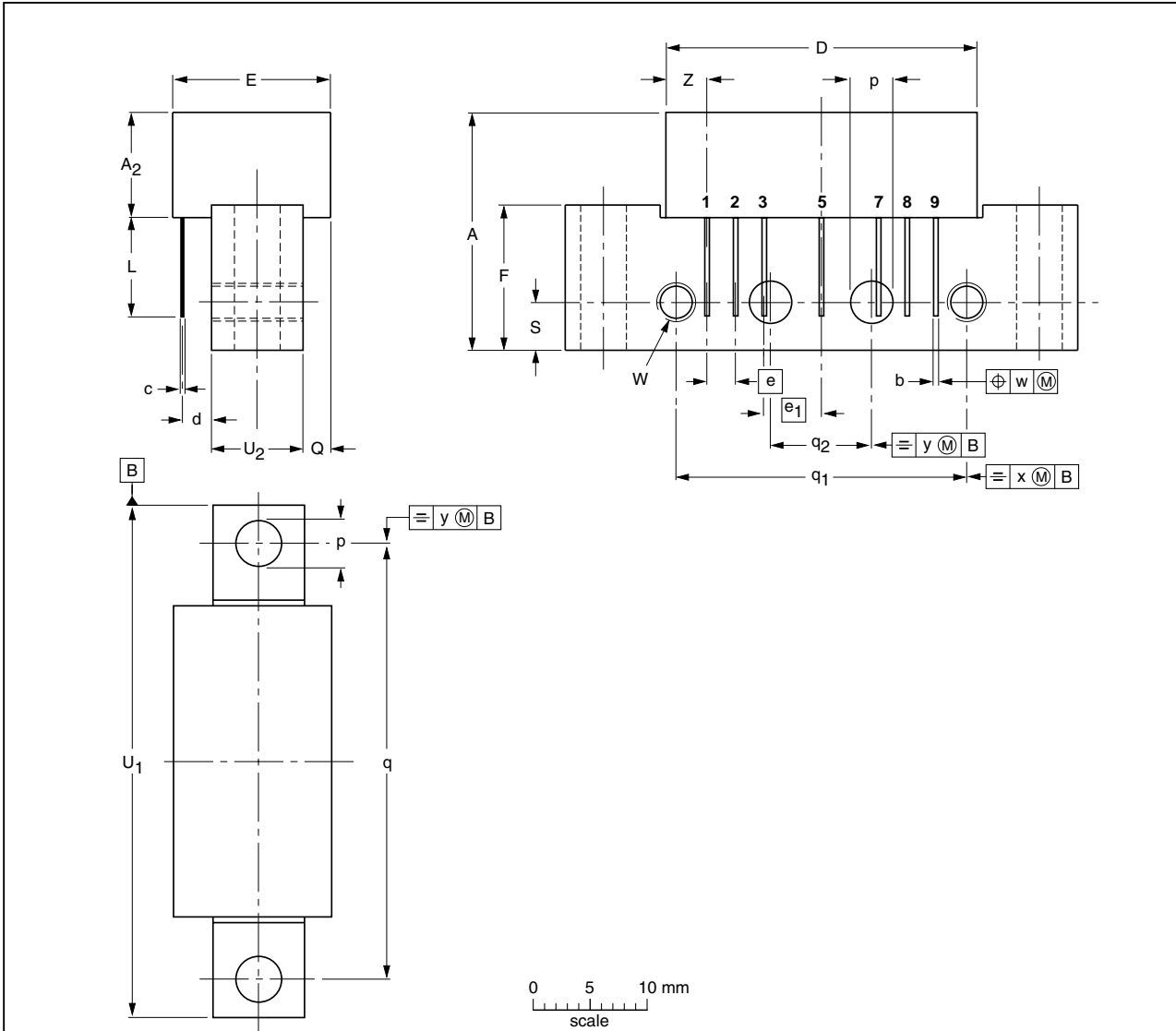
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
G _p	power gain	f = 50 MHz	19.5	20	20.5	dB	
		f = 450 MHz	20	20.6	-	dB	
SL	slope cable equivalent	f = 40 MHz to 450 MHz	0	-	2	dB	
FL	flatness of frequency response	f = 40 MHz to 450 MHz	-	-	±0.3	dB	
S ₁₁	input return losses	f = 40 MHz to 80 MHz	20	31	-	dB	
		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.

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

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:		<ul style="list-style-type: none"> • 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	-	-

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.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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