

BGY785A

750 MHz, 18.5 dB gain push-pull amplifier

Rev. 05 — 22 March 2005

Product data sheet

1. Product profile

1.1 General description

Hybrid high dynamic range cascode 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

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

1.3 Applications

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

1.4 Quick reference data

Table 1: Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	$f = 50 \text{ MHz}$	18	18.5	19	dB
		$f = 750 \text{ MHz}$	18.5	19.5	-	dB
I_{tot}	total current consumption (DC)	$V_B = 24 \text{ V}$	[1] -	225	240	mA

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

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2. Pinning information

Table 2: Pinning

Pin	Description	Simplified outline	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
BGY785A	-	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 temperature		-20	+100	°C

5. Characteristics

Table 5: Bandwidth 40 MHz to 750 MHz
 $V_B = 24\text{ V}$; $T_{case} = 30\text{ °C}$; $Z_S = Z_L = 75\ \Omega$; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
G_p	power gain	$f = 50\text{ MHz}$	18	18.5	19	dB	
		$f = 750\text{ MHz}$	18.5	19.5	-	dB	
SL	slope cable equivalent	$f = 40\text{ MHz to }750\text{ MHz}$	0	0.9	2	dB	
FL	flatness of frequency response	$f = 40\text{ MHz to }750\text{ MHz}$	-	± 0.1	± 0.3	dB	
S_{11}	input return losses	$f = 40\text{ MHz to }80\text{ MHz}$	20	30	-	dB	
		$f = 80\text{ MHz to }160\text{ MHz}$	18.5	29.5	-	dB	
		$f = 160\text{ MHz to }320\text{ MHz}$	17	28	-	dB	
		$f = 320\text{ MHz to }640\text{ MHz}$	15.5	26	-	dB	
		$f = 640\text{ MHz to }750\text{ MHz}$	14	21	-	dB	
S_{22}	output return losses	$f = 40\text{ MHz to }80\text{ MHz}$	20	29	-	dB	
		$f = 80\text{ MHz to }160\text{ MHz}$	18.5	26	-	dB	
		$f = 160\text{ MHz to }320\text{ MHz}$	17	23.5	-	dB	
		$f = 320\text{ MHz to }640\text{ MHz}$	15.5	22	-	dB	
		$f = 640\text{ MHz to }750\text{ MHz}$	14	24	-	dB	
CTB	composite triple beat	110 channels flat; $V_o = 44\text{ dBmV}$; measured at 745.25 MHz	-	-54.5	-53	dB	
X_{mod}	cross modulation	110 channels flat; $V_o = 44\text{ dBmV}$; measured at 55.25 MHz	-	-57.5	-56	dB	
CSO	composite second order distortion	110 channels flat; $V_o = 44\text{ dBmV}$; measured at 746.5 MHz	-	-62	-53	dB	
d_2	second order distortion		[1]	-	-77	-65	dB
V_o	output voltage	$d_{im} = -60\text{ dB}$	[2]	59	62	-	dBmV
F	noise figure	$f = 50\text{ MHz}$	-	4.5	5.5	dB	
		$f = 450\text{ MHz}$	-	-	5.5	dB	
		$f = 550\text{ MHz}$	-	-	5.5	dB	
		$f = 600\text{ MHz}$	-	-	6	dB	
		$f = 750\text{ MHz}$	-	6	7	dB	
I_{tot}	total current consumption (DC)		[3]	-	225	240	mA

[1] $f_p = 55.25\text{ MHz}$; $V_p = 44\text{ dBmV}$; $f_q = 691.25\text{ MHz}$; $V_q = 44\text{ dBmV}$; measured at $f_p + f_q = 746.5\text{ MHz}$.

[2] Measured according to DIN45004B;

$f_p = 740.25\text{ MHz}$; $V_p = V_o$; $f_q = 747.25\text{ MHz}$; $V_q = V_o - 6\text{ dB}$; $f_r = 749.25\text{ MHz}$; $V_r = V_o - 6\text{ dB}$; measured at $f_p + f_q - f_r = 738.25\text{ MHz}$.

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

Table 6: Bandwidth 40 MHz to 600 MHz

$V_B = 24\text{ V}$; $T_{case} = 30\text{ °C}$; $Z_S = Z_L = 75\ \Omega$; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
G _p	power gain	f = 50 MHz	18	18.5	19	dB	
		f = 600 MHz	18.5	-	-	dB	
SL	slope cable equivalent	f = 40 MHz to 600 MHz	0	-	1.5	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	30	-	dB	
		f = 80 MHz to 160 MHz	18.5	29.5	-	dB	
		f = 160 MHz to 320 MHz	17	28	-	dB	
		f = 320 MHz to 600 MHz	16	26	-	dB	
S ₂₂	output return losses	f = 40 MHz to 80 MHz	20	29	-	dB	
		f = 80 MHz to 160 MHz	18.5	26	-	dB	
		f = 160 MHz to 320 MHz	17	23.5	-	dB	
		f = 320 MHz to 600 MHz	16	22	-	dB	
CTB	composite triple beat	85 channels flat; V _o = 44 dBmV; measured at 595.25 MHz	-	-	-57	dB	
X _{mod}	cross modulation	85 channels flat; V _o = 44 dBmV; measured at 55.25 MHz	-	-	-59	dB	
CSO	composite second order distortion	85 channels flat; V _o = 44 dBmV; measured at 596.5 MHz	-	-	-58	dB	
d ₂	second order distortion		[1]	-	-	-70	dB
V _o	output voltage	d _{im} = -60 dB	[2]	61	-	-	dBmV
F	noise figure	f = 50 MHz	-	4.5	5.5	dB	
		f = 450 MHz	-	-	5.5	dB	
		f = 550 MHz	-	-	5.5	dB	
		f = 600 MHz	-	-	6	dB	
I _{tot}	total current consumption (DC)		[3]	-	225	240	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: Bandwidth 40 MHz to 550 MHz

$V_B = 24\text{ V}$; $T_{case} = 30\text{ °C}$; $Z_S = Z_L = 75\ \Omega$; unless otherwise specified.

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 MHz to 550 MHz	0	-	1.5	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	30	-	dB
		f = 80 MHz to 160 MHz	18.5	29.5	-	dB
		f = 160 MHz to 320 MHz	17	28	-	dB
		f = 320 MHz to 550 MHz	16	26	-	dB
S ₂₂	output return losses	f = 40 MHz to 80 MHz	20	29	-	dB
		f = 80 MHz to 160 MHz	18.5	26	-	dB
		f = 160 MHz to 320 MHz	17	23.5	-	dB
		f = 320 MHz to 550 MHz	16	22	-	dB
CTB	composite triple beat	77 channels flat; V _o = 44 dBmV; measured at 547.25 MHz	-	-61	-60	dB
X _{mod}	cross modulation	77 channels flat; V _o = 44 dBmV; measured at 55.25 MHz	-	-61	-60	dB
CSO	composite second order distortion	77 channels flat; V _o = 44 dBmV; measured at 548.5 MHz	-	-67.5	-60	dB
d ₂	second order distortion		[1] -	-	-72	dB
V _o	output voltage	d _{im} = -60 dB	[2] 62	-	-	dBmV
F	noise figure	f = 50 MHz	-	4.5	5.5	dB
		f = 450 MHz	-	-	5.5	dB
		f = 550 MHz	-	-	5.5	dB
I _{tot}	total current consumption (DC)		[3] -	225	240	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.

[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.

Table 8: Bandwidth 40 MHz to 450 MHz

$V_B = 24\text{ V}$; $T_{case} = 30\text{ °C}$; $Z_S = Z_L = 75\ \Omega$; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
G _p	power gain	f = 50 MHz	18	18.5	19	dB	
		f = 450 MHz	18.5	-	-	dB	
SL	slope cable equivalent	f = 40 MHz to 450 MHz	0	-	1.5	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	30	-	dB	
		f = 80 MHz to 160 MHz	18.5	29.5	-	dB	
		f = 160 MHz to 320 MHz	17	28	-	dB	
		f = 320 MHz to 450 MHz	16	26	-	dB	
S ₂₂	output return losses	f = 40 MHz to 80 MHz	20	29	-	dB	
		f = 80 MHz to 160 MHz	18.5	26	-	dB	
		f = 160 MHz to 320 MHz	17	23.5	-	dB	
		f = 320 MHz to 450 MHz	16	22	-	dB	
CTB	composite triple beat	60 channels flat; V _o = 44 dBmV; measured at 445.25 MHz	-	-	-61	dB	
X _{mod}	cross modulation	60 channels flat; V _o = 44 dBmV; measured at 55.25 MHz	-	-	-60	dB	
CSO	composite second order distortion	60 channels flat; V _o = 44 dBmV; measured at 446.5 MHz	-	-	-61	dB	
d ₂	second order distortion		[1]	-	-	-75	dB
V _o	output voltage	d _{im} = -60 dB	[2]	64	-	-	dBmV
F	noise figure	f = 50 MHz	-	4.5	5.5	dB	
		f = 450 MHz	-	-	5.5	dB	
I _{tot}	total current consumption (DC)		[3]	-	225	240	mA

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

[2] Measured according to DIN45004B;

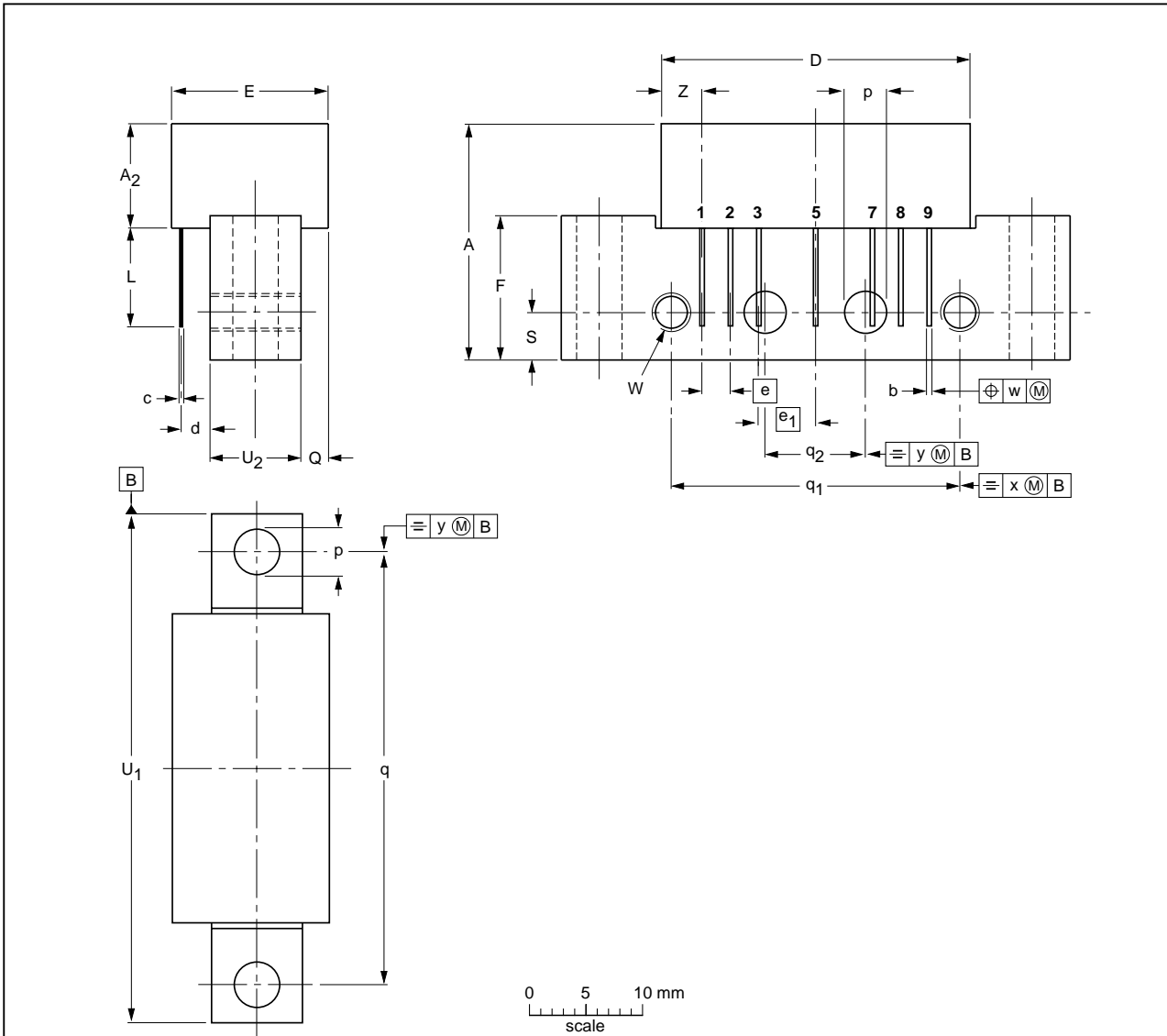
f_p = 440.25 MHz; V_p = V_o; f_q = 447.25 MHz; V_q = V_o - 6 dB; f_r = 449.25 MHz; V_r = V_o - 6 dB; measured at f_p + f_q - f_r = 438.25 MHz.

[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 max.	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	9.1	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 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						99-02-06 04-02-04

Fig 1. Package outline SOT115J

7. Revision history

Table 9: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
BGY785A_5	20050322	Product data sheet	-	9397 750 14772	BGY785A_4
Modifications:	<ul style="list-style-type: none">The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors.				
BGY785A_4	20011115	Product specification	-	9397 750 08808	BGY785A_3
BGY785A_3	19990330	Product specification	-	9397 750 05443	BGY785A_2
BGY785A_2	19970410	Product specification	-	9397 750 02142	n.a.

8. Data sheet status

Level	Data sheet status ^[1]	Product status ^[2] ^[3]	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

9. Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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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