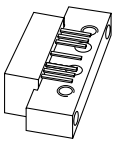


# BGY785A

## 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**

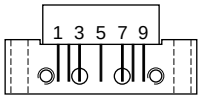
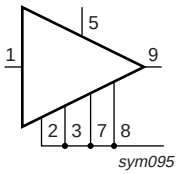
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $G_p$ | power gain | f = 50 MHz | | 18 | 18.5 | 19 | dB |
| | | f = 750 MHz | | 18.5 | 19.5 | - | dB |
| $I_{tot}$ | total current consumption (DC) | $V_B$ = 24 V | [1] | - | 225 | 240 | mA |

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

PHILIPS

## 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 V; $T_{case}$ = 30 °C; $Z_S$ = $Z_L$ = 75 Ω; unless otherwise specified.*

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $G_p$ | power gain | f = 50 MHz | | 18 | 18.5 | 19 | dB |
| | | f = 750 MHz | | 18.5 | 19.5 | - | dB |
| SL | slope cable equivalent | f = 40 MHz to 750 MHz | | 0 | 0.9 | 2 | dB |
| FL | flatness of frequency response | f = 40 MHz to 750 MHz | | - | ±0.1 | ±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 640 MHz | | 15.5 | 26 | - | dB |
| | | f = 640 MHz to 750 MHz | | 14 | 21 | - | 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 640 MHz | | 15.5 | 22 | - | dB |
| | | f = 640 MHz to 750 MHz | | 14 | 24 | - | dB |
| CTB | composite triple beat | 110 channels flat; $V_o$ = 44 dBmV; measured at 745.25 MHz | | - | –54.5 | –53 | dB |
| $X_{mod}$ | cross modulation | 110 channels flat; $V_o$ = 44 dBmV; measured at 55.25 MHz | | - | –57.5 | –56 | dB |
| CSO | composite second order distortion | 110 channels flat; $V_o$ = 44 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 dB | [2] | 59 | 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 |
| | | f = 600 MHz | | - | - | 6 | dB |
| | | f = 750 MHz | | - | 6 | 7 | dB |
| $I_{tot}$ | total current consumption (DC) | | [3] | - | 225 | 240 | 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] 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.

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

**Table 6: Bandwidth 40 MHz to 600 MHz**

*$V_B$ = 24 V; $T_{case}$ = 30 °C; $Z_S = Z_L$ = 75 Ω; 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 V; $T_{case}$ = 30 °C; $Z_S = Z_L$ = 75 Ω; 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 V; $T_{case}$ = 30 °C; $Z_S = Z_L$ = 75 Ω; 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 |

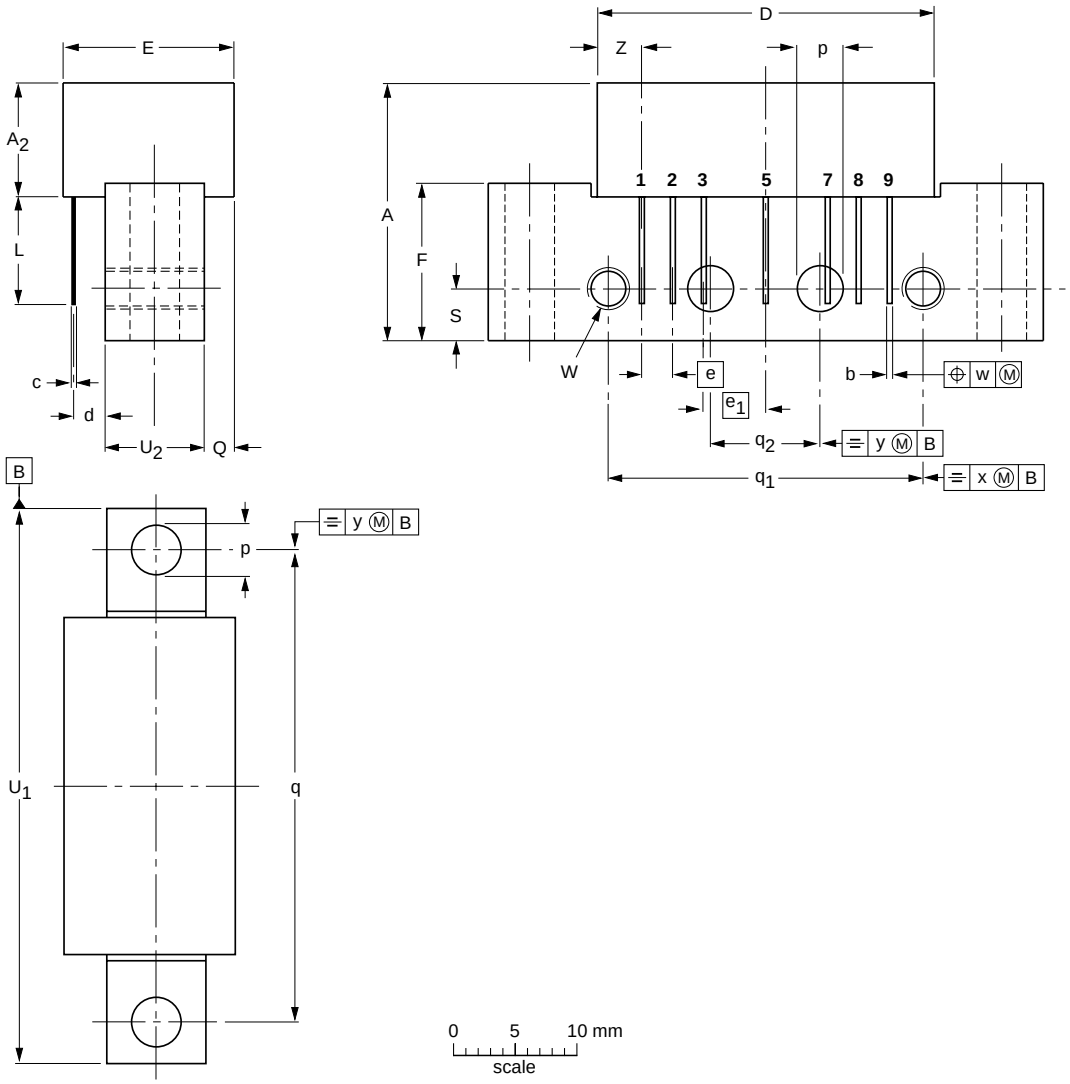
[1] $f_p$ = 55.25 MHz; $V_p$ = 46 dBmV; $f_q$ = 391.25 MHz; $V_q$ = 46 dBmV; measured at $f_p + f_q$ = 446.5 MHz.

[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<br>0.38 | 0.25 | 27.2 | 2.54 | 13.75 | 2.54 | 5.08 | 12.7 | 8.8 | 4.15<br>3.85 | 2.4 | 38.1 | 25.4 | 10.2 | 4.2 | 44.75<br>44.25 | 8.2<br>7.8 | 6-32<br>UNC | 0.25 | 0.7 | 0.1 | 3.8 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT115J | | | | | | ~~99-02-06~~<br>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: | • 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. |
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[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.

[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.

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## 12. Contents





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