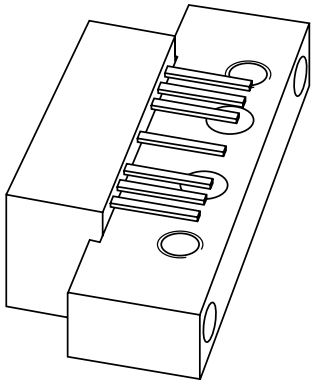
# DATA SHEET



# BGD712

## 750 MHz, 18.5 dB gain power doubler amplifier

Product specification
Supersedes data of 2001 Oct 29

2001 Nov 02

Philips
Semiconductors

PHILIPS

# 750 MHz, 18.5 dB gain power doubler amplifier BGD712

## FEATURES

- 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 750 MHz frequency range.

## DESCRIPTION

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

## PINNING - SOT115J

| PIN | DESCRIPTION |
|---|---|
| 1 | input |
| 2, 3 | common |
| 5 | $+V_B$ |
| 7, 8 | common |
| 9 | output |

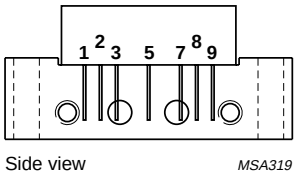



Fig.1 Simplified outline.

## QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| $G_p$ | power gain | f = 45 MHz | 18.2 | 18.8 | dB |
| | | f = 750 MHz | 19 | 20 | dB |
| $I_{tot}$ | total current consumption (DC) | $V_B$ = 24 V | 380 | 410 | mA |

## LIMITING VALUES

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

| SYMBOL | PARAMETER | MIN. | MAX. | UNIT |
|---|---|---|---|---|
| $V_B$ | supply voltage | – | 30 | V |
| $V_i$ | RF input voltage | – | 70 | dBmV |
| $T_{stg}$ | storage temperature | –40 | +100 | °C |
| $T_{mb}$ | operating mounting base temperature | –20 | +100 | °C |

## CHARACTERISTICS

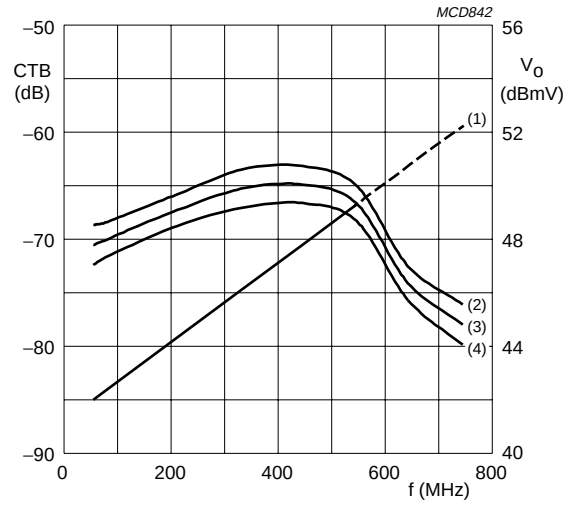
Bandwidth 40 to 750 MHz; $V_B$ = 24 V; $T_{mb}$ = 35 °C; $Z_S = Z_L$ = 75 Ω

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $G_p$ | power gain | f = 45 MHz | 18.2 | 18.5 | 18.8 | dB |
| | | f = 750 MHz | 19 | 19.5 | 20 | dB |
| SL | slope straight line | f = 45 to 750 MHz; note 1 | 0.5 | 1 | 1.5 | dB |
| FL | flatness straight line | f = 45 to 100 MHz | – | – | ±0.35 | dB |
| | | f = 100 to 700 MHz | – | – | ±0.5 | dB |
| | | f = 700 to 750 MHz | – | – | ±0.15 | dB |
| $S_{11}$ | input return losses | f = 45 to 80 MHz | 23 | – | – | dB |
| | | f = 80 to 160 MHz | 23 | – | – | dB |
| | | f = 160 to 320 MHz | 21 | – | – | dB |
| | | f = 320 to 550 MHz | 20 | – | – | dB |
| | | f = 550 to 650 MHz | 20 | – | – | dB |
| | | f = 650 to 750 MHz | 19 | – | – | dB |
| | | f = 750 to 790 MHz | 17 | – | – | dB |
| $S_{22}$ | output return losses | f = 45 to 80 MHz | 23 | – | – | dB |
| | | f = 80 to 160 MHz | 23 | – | – | dB |
| | | f = 160 to 320 MHz | 20 | – | – | dB |
| | | f = 320 to 550 MHz | 20 | – | – | dB |
| | | f = 550 to 650 MHz | 19 | – | – | dB |
| | | f = 650 to 750 MHz | 19 | – | – | dB |
| | | f = 750 to 790 MHz | 17 | – | – | dB |
| $S_{21}$ | phase response | f = 50 MHz | –45 | – | +45 | deg |
| CTB | composite triple beat | 112 channels flat; $V_o$ = 44 dBmV; $f_m$ = 745.25 MHz | – | – | –62 | dB |
| | | 79 channels flat; $V_o$ = 44 dBmV; $f_m$ = 547.25 MHz | – | – | –68 | dB |
| | | 79 channels; $f_m$ = 445.25 MHz; $V_o$ = 49.3 dBmV at 547 MHz; note 2 | – | – | –63 | dB |
| $X_{mod}$ | cross modulation | 112 channels flat; $V_o$ = 44 dBmV; $f_m$ = 55.25 MHz | – | – | –63 | dB |
| | | 79 channels flat; $V_o$ = 44 dBmV; $f_m$ = 55.25 MHz | – | – | –69 | dB |
| | | 79 channels; $f_m$ = 745.25 MHz; $V_o$ = 49.3 dBmV at 547 MHz; note 2 | – | – | –60 | dB |

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| CSO | composite second order distortion | 112 channels flat; $V_o$ = 44 dBmV; $f_m$ = 746.5 MHz | – | – | –63 | dB |
| | | 79 channels flat; $V_o$ = 44 dBmV; $f_m$ = 548.5 MHz | – | – | –68 | dB |
| | | 79 channels; $f_m$ = 746.5 MHz; $V_o$ = 49.3 dBmV at 547 MHz; note 2 | – | – | –62 | dB |
| $d_2$ | second order distortion | note 3 | – | – | –74 | dB |
| $V_o$ | output voltage | $d_{im}$ = –60 dB; note 4 | 64 | – | – | dBmV |
| NF | noise figure | f = 50 MHz | – | – | 5.5 | dB |
| | | f = 550 MHz | – | – | 5.5 | dB |
| | | f = 750 MHz | – | – | 7 | dB |
| $I_{tot}$ | total current consumption (DC) | note 5 | 380 | 395 | 410 | mA |

**Notes**

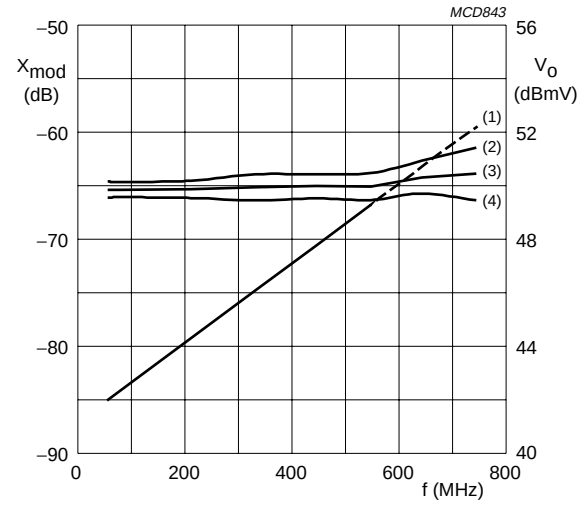
1. Slope straight line is defined as gain at 750 MHz – gain at 45 MHz.
2. Tilt = 7.3 dB (55 to 547 MHz).
3. $f_p$ = 55.25 MHz; $V_p$ = 44 dBmV;
   $f_q$ = 691.25 MHz; $V_q$ = 44 dBmV;
   measured at $f_p + f_q$ = 746.5 MHz.
4. Measured according to DIN45004B:
   $f_p$ = 740.25 MHz; $V_p = V_o$;
   $f_q$ = 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.
5. The module normally operates at $V_B$ = 24 V, but is able to withstand supply transients up to 30 V.




$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 79 channels;
tilt = 7.3 dB (50 to 550 MHz).

(1) $V_o$. (3) Typ.
(2) Typ. +3 σ. (4) Typ. –3 σ.

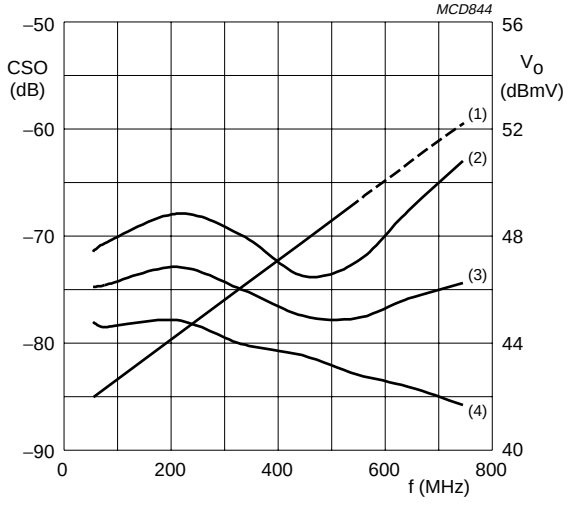
Fig.2 Composite triple beat as a function of frequency under tilted conditions.




$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 79 channels;
tilt = 7.3 dB (50 to 550 MHz).

(1) $V_o$. (3) Typ.
(2) Typ. +3 σ. (4) Typ. –3 σ.

Fig.3 Cross modulation as a function of frequency under tilted conditions.



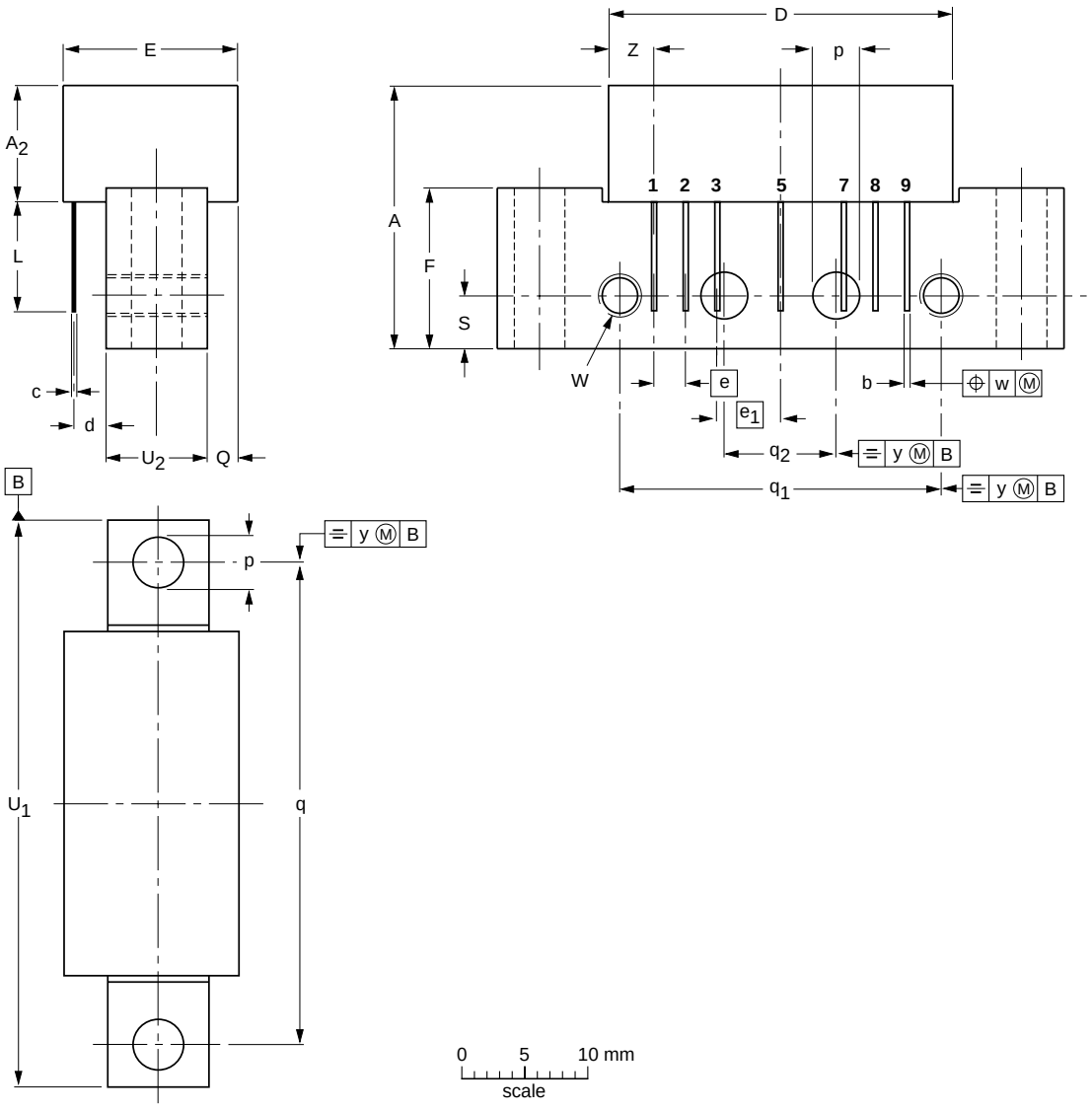

$Z_S = Z_L = 75\ \Omega$; $V_B = 24$ V; 79 channels;
tilt = 7.3 dB (50 to 550 MHz).

(1) $V_o$. (3) Typ.
(2) Typ. +3 σ. (4) Typ. –3 σ.

Fig.4 Composite second order distortion as a function of frequency under tilted conditions.

## 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 | $U_1$ max. | $U_2$ | W | w | 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 | 8 | 6-32<br>UNC | 0.25 | 0.1 | 3.8 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | EIAJ | | | |
| SOT115J | | | | | | 99-02-06 |

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