



# CGD982HC

1 GHz, 22 dB gain GaAs high output power doubler

Rev. 1 — 26 May 2014

Product data sheet

## 1. Product profile

### 1.1 General description

Hybrid amplifier module in a SOT115J package, operating at a supply voltage of 24 V Direct Current (DC), employing Hetero junction Field Effect Transistor (HFET) GaAs dies.

### 1.2 Features and benefits

- Excellent linearity
- Optimized for flat PAL D and flat NTSC loading
- Extremely low noise
- Excellent return loss properties
- Gain compensation over temperature
- Rugged construction
- Unconditionally stable
- Thermally optimized design
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

### 1.3 Applications

- CATV systems operating in the 40 MHz to 862 MHz / 1003 MHz frequency range using PAL D or NTSC channel conditions.

### 1.4 Quick reference data

**Table 1. Quick reference data**

Bandwidth 40 MHz to 1003 MHz;  $V_B = 24$  V (DC);  $Z_S = Z_L = 75 \Omega$ ;  $T_{mb} = 35$  °C; unless otherwise specified.

| Symbol    | Parameter                         | Conditions                                     | Min | Typ  | Max | Unit |
|-----------|-----------------------------------|--|-----|------|-----|------|
| $G_p$     | power gain                        | $f = 50$ MHz                                   | -   | 21.5 | -   | dB   |
|           |                                   | $f = 1003$ MHz                                 | 22  | 23   | 24  | dB   |
| CTB       | composite triple beat             | $V_o = 48$ dBmV at 862 MHz <a href="#">[1]</a> | -   | -66  | -62 | dBc  |
| CSO       | composite second-order distortion | $V_o = 48$ dBmV at 862 MHz <a href="#">[1]</a> | -   | -69  | -62 | dBc  |
| $I_{tot}$ | total current                     | <a href="#">[2]</a>                            | -   | 440  | 460 | mA   |

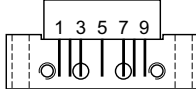
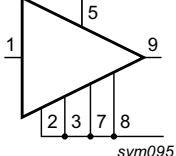
[1] 98 PAL D channels with 8 MHz bandwidth per channel; [ $f = 47$  MHz to 862 MHz]; flat  $V_o$  till 862 MHz.

[2] Direct Current (DC).



## 2. Pinning information

Table 2. Pinning

| Pin  | Description     | Simplified outline   | Graphic symbol  |
|------|-----------------|--|---|
| 1    | input           |  |  |
| 2, 3 | common          |  |   |
| 5    | +V <sub>B</sub> |  |   |
| 7, 8 | common          |  |   |
| 9    | output          |  |   |

## 3. Ordering information

Table 3. Ordering information

| Type number | Package |  |         |
|-------------|---------|--|---------|
|             | Name    | Description  | Version |
| CGD982HC    | -       | 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 <sub>B</sub>     | supply voltage            |             | -   | 30   | V    |
| V <sub>i(RF)</sub> | RF input voltage          | single tone | -   | 75   | dBmV |
| T <sub>stg</sub>   | storage temperature       |             | -40 | +100 | °C   |
| T <sub>mb</sub>    | mounting base temperature |             | -20 | +100 | °C   |

## 5. Characteristics

Table 5. Characteristics

Bandwidth 40 MHz to 1003 MHz; V<sub>B</sub> = 24 V (DC); Z<sub>S</sub> = Z<sub>L</sub> = 75 Ω; T<sub>mb</sub> = 35 °C; unless otherwise specified.

| Symbol           | Parameter                      | Conditions             | Min     | Typ  | Max | Unit |
|------------------|--------------------------------|------------------------|---------|------|-----|------|
| G <sub>p</sub>   | power gain                     | f = 50 MHz             | -       | 21.5 | -   | dB   |
|                  |                                | f = 870 MHz            | -       | 22.5 | -   | dB   |
|                  |                                | f = 1003 MHz           | 22      | 23   | 24  | dB   |
| SL <sub>sl</sub> | slope straight line            | f = 40 MHz to 1003 MHz | [1] 0.5 | -    | 2   | dB   |
| FL               | flatness of frequency response | f = 40 MHz to 1003 MHz | [2] -   | -    | 1   | dB   |

**Table 5. Characteristics ...continued**

Bandwidth 40 MHz to 1003 MHz;  $V_B = 24$  V (DC);  $Z_S = Z_L = 75 \Omega$ ;  $T_{mb} = 35$  °C; unless otherwise specified.

| Symbol            | Parameter          | Conditions              | Min | Typ | Max | Unit |
|-------------------|--------------------|-------------------------|-----|-----|-----|------|
| RL <sub>in</sub>  | input return loss  | f = 40 MHz to 160 MHz   | 20  | -   | -   | dB   |
|                   |                    | f = 160 MHz to 320 MHz  | 20  | -   | -   | dB   |
|                   |                    | f = 320 MHz to 640 MHz  | 19  | -   | -   | dB   |
|                   |                    | f = 640 MHz to 870 MHz  | 17  | -   | -   | dB   |
|                   |                    | f = 870 MHz to 1003 MHz | 16  | -   | -   | dB   |
| RL <sub>out</sub> | output return loss | f = 40 MHz to 160 MHz   | 20  | -   | -   | dB   |
|                   |                    | f = 160 MHz to 320 MHz  | 20  | -   | -   | dB   |
|                   |                    | f = 320 MHz to 640 MHz  | 19  | -   | -   | dB   |
|                   |                    | f = 640 MHz to 870 MHz  | 18  | -   | -   | dB   |
|                   |                    | f = 870 MHz to 1003 MHz | 17  | -   | -   | dB   |
| NF                | noise figure       | f = 50 MHz              | -   | 4.6 | 5.6 | dB   |
|                   |                    | f = 1003 MHz            | -   | 5.5 | 6.5 | dB   |
| I <sub>tot</sub>  | total current      | [3]                     | -   | 440 | 460 | mA   |

- [1] G<sub>p</sub> at 1003 MHz minus G<sub>p</sub> at 40 MHz.
- [2] Flatness is defined as peak deviation to straight line.
- [3] Direct Current (DC).

**Table 6. Distortion characteristics**

Bandwidth 40 MHz to 1003 MHz;  $V_B = 24$  V (DC);  $Z_S = Z_L = 75 \Omega$ ;  $T_{mb} = 35$  °C; unless otherwise specified.

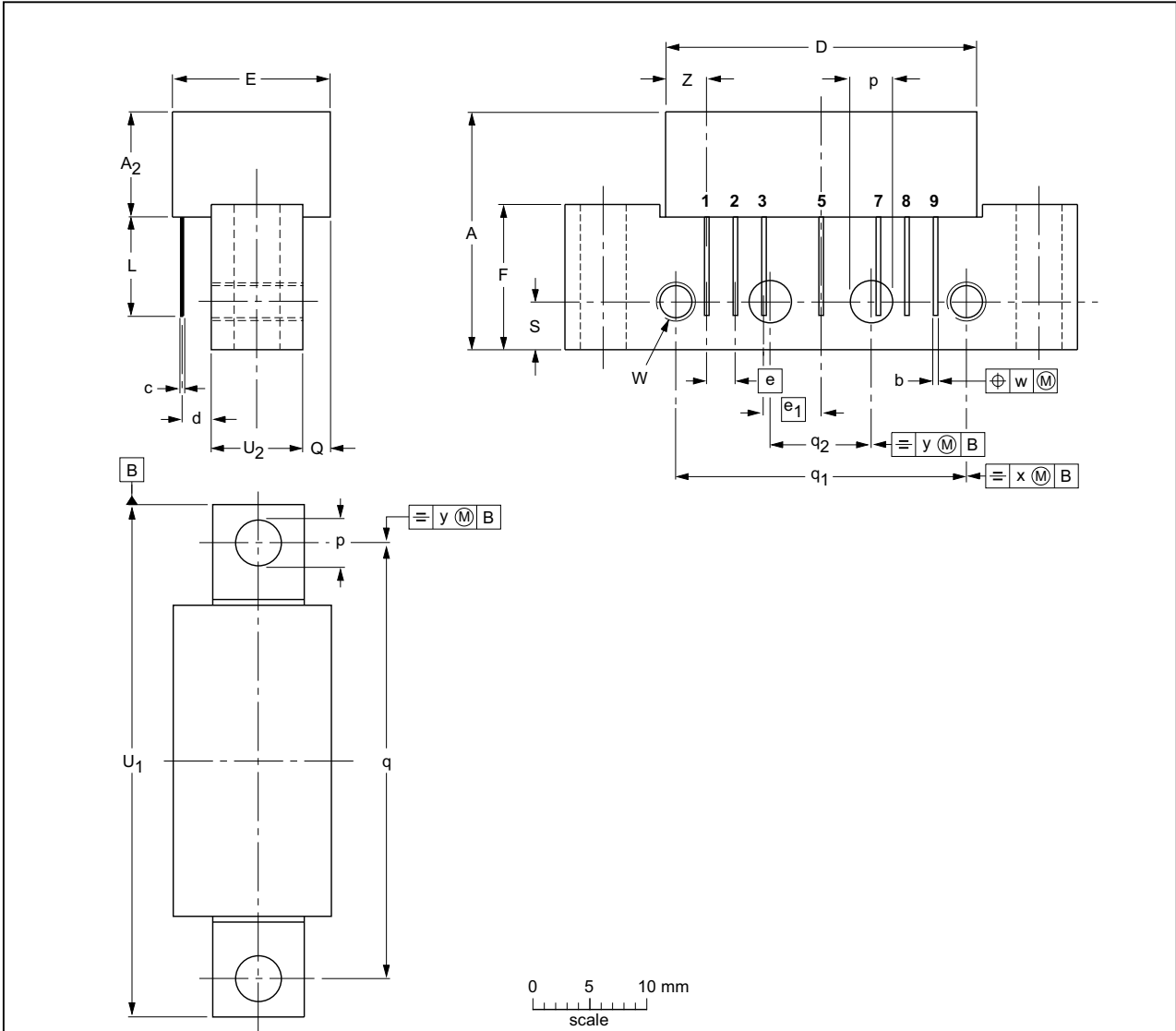
| Symbol  | Parameter                         | Conditions                             | Min | Typ | Max | Unit |     |
|---|-----------------------------------|--|-----|-----|-----|------|-----|
| <b>98 PAL D channels</b>                      |                                   |  |     |     |     |      |     |
| CTB   | composite triple beat             | V <sub>o</sub> = 48 dBmV at 862 MHz    | [1] | -   | -66 | -62  | dBc |
|   |                                   | V <sub>o</sub> = 50 dBmV at 862 MHz    | [1] | -   | -62 | -    | dBc |
| CSO   | composite second-order distortion | V <sub>o</sub> = 48 dBmV at 862 MHz    | [1] | -   | -69 | -62  | dBc |
|   |                                   | V <sub>o</sub> = 50 dBmV at 862 MHz    | [1] | -   | -65 | -    | dBc |
| Xmod  | cross modulation                  | V <sub>o</sub> = 48 dBmV at 862 MHz    | [1] | -   | -68 | -    | dB  |
|   |                                   | V <sub>o</sub> = 50 dBmV at 862 MHz    | [1] | -   | -60 | -    | dB  |
| <b>112 NTSC channels</b>                      |                                   |  |     |     |     |      |     |
| CTB   | composite triple beat             | V <sub>o</sub> = 48 dBmV at 750 MHz    | [2] | -   | -63 | -    | dBc |
| CSO   | composite second-order distortion | V <sub>o</sub> = 48 dBmV at 750 MHz    | [2] | -   | -66 | -    | dBc |
| Xmod  | cross modulation                  | V <sub>o</sub> = 48 dBmV at 750 MHz    | [2] | -   | -66 | -    | dB  |
| <b>79 NTSC channels + 75 digital channels</b> |                                   |  |     |     |     |      |     |
| CTB   | composite triple beat             | V <sub>o</sub> = 56.4 dBmV at 1003 MHz | [3] | -   | -75 | -    | dBc |
| CSO   | composite second-order distortion | V <sub>o</sub> = 56.4 dBmV at 1003 MHz | [3] | -   | -77 | -    | dBc |
| Xmod  | cross modulation                  | V <sub>o</sub> = 56.4 dBmV at 1003 MHz | [3] | -   | -68 | -    | dB  |
| CCN   | carrier-to-composite noise        | V <sub>o</sub> = 56.4 dBmV at 1003 MHz | [3] | -   | 57  | -    | dBc |

- [1] 98 PAL D channels with 8 MHz bandwidth per channel; [f = 47 MHz to 862 MHz]; flat V<sub>o</sub> till 862 MHz.
- [2] 112 NTSC channels; [f = 45 MHz to 750 MHz]; flat V<sub>o</sub> till 750 MHz.
- [3] 79 NTSC channels [f = 54 MHz to 550 MHz] + 75 digital channels [f = 550 MHz to 1003 MHz] (-6 dB offset); tilt extrapolated to 13.5 dB at 1003 MHz.

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 <sub>2</sub> max. | b            | c    | D max. | d            | E max. | e    | e <sub>1</sub> | F    | L min. | p            | Q max. | q    | q <sub>1</sub> | q <sub>2</sub> | S   | U <sub>1</sub> | U <sub>2</sub> | W           | w    | x   | y   | Z max. |
|------|--------|---------------------|--------------|------|--------|--------------|--------|------|----------------|------|--------|--------------|--------|------|----------------|----------------|-----|----------------|----------------|-------------|------|-----|-----|--------|
| mm   | 20.8   | 9.5                 | 0.51<br>0.38 | 0.25 | 27.2   | 2.04<br>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         |            |       |       |  |                     | 04-02-04<br>10-06-18 |

Fig 1. Package outline SOT115J

## 7. Abbreviations

Table 7. Abbreviations

| Acronym | Description                            |
|---------|--|
| CATV    | Community Antenna TeleVision           |
| GaAs    | Gallium-Arsenide                       |
| NTSC    | National Television Standard Committee |
| PAL D   | Phase Alternate Line standard D        |
| UNC     | UNified Coarse                         |

## 8. Revision history

Table 8. Revision history

| Document ID  | Release date | Data sheet status  | Change notice | Supersedes |
|--------------|--------------|--------------------|---------------|------------|
| CGD982HC v.1 | 20140526     | Product data sheet | -             | -          |

## 9. Legal information

### 9.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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.                                     |

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