

CGD987HCI

1 GHz, 27 dB gain GaAs high output power doubler

Rev. 1 — 29 June 2011

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
- Superior levels of ESD protection
- 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)
- Integrated ring wave surge protection

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 | - | 25.5 | - | dB |
| | | $f = 1003$ MHz | 26 | 27 | 28 | dB |
| CTB | composite triple beat | $V_o = 48$ dBmV at 862 MHz | [1] | - | -66 | -62 dBc |
| CSO | composite second-order distortion | $V_o = 48$ dBmV at 862 MHz | [1] | - | -66 | -60 dBc |
| I_{tot} | total current | | [2] | - | 440 | 460 mA |

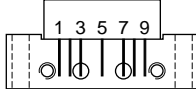
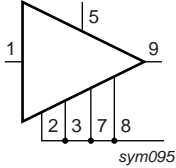
[1] 98 PAL D channels with 8 MHz bandwidth per channel; [$f = 47$ MHz to 862 MHz]; flat V_o till 862 MHz.

[2] Direct Current (DC).



2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|------|-----------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1 | input |  |  |
| 2, 3 | common | | |
| 5 | +V _B | | |
| 7, 8 | common | | |
| 9 | output | | |

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| | Name | Description | Version |
| CGD987HCl | - | 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 _B | supply voltage | | - | 30 | V | |
| V _{i(RF)} | RF input voltage | single tone | - | 75 | dBmV | |
| V _{ESD} | electrostatic discharge voltage | Human Body Model (HBM); According JEDEC standard 22-A114E | [1] | - | 2000 | V |
| | | Biased; According IEC61000-4-2 | | - | 1500 | V |
| T _{stg} | storage temperature | | -40 | +100 | °C | |
| T _{mb} | mounting base temperature | | -20 | +100 | °C | |

[1] The ESD pulse of 2000 V corresponds to a class 2 sensitivity level.

5. Characteristics

Table 5. 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 |
|------------|--------------------------------|-------------------------|-----|------|-----|--------|
| G_p | power gain | f = 50 MHz | - | 25.5 | - | dB |
| | | f = 870 MHz | - | 26.5 | - | dB |
| | | f = 1003 MHz | 26 | 27 | 28 | dB |
| SL_{sl} | slope straight line | f = 40 MHz to 1003 MHz | [1] | 0.7 | - | 2.2 dB |
| FL | flatness of frequency response | f = 40 MHz to 1003 MHz | [2] | - | - | 1 dB |
| RL_{in} | input return loss | f = 40 MHz to 160 MHz | 20 | - | - | dB |
| | | f = 160 MHz to 320 MHz | 19 | - | - | dB |
| | | f = 320 MHz to 640 MHz | 18 | - | - | dB |
| | | f = 640 MHz to 870 MHz | 17 | - | - | dB |
| | | f = 870 MHz to 1003 MHz | 16 | - | - | dB |
| RL_{out} | output return loss | f = 40 MHz to 160 MHz | 20 | - | - | dB |
| | | f = 160 MHz to 320 MHz | 18 | - | - | dB |
| | | f = 320 MHz to 640 MHz | 17 | - | - | dB |
| | | f = 640 MHz to 870 MHz | 16 | - | - | dB |
| | | f = 870 MHz to 1003 MHz | 16 | - | - | dB |
| NF | noise figure | f = 50 MHz | - | 4.5 | 5.5 | dB |
| | | f = 1003 MHz | - | 5 | 6 | dB |
| I_{tot} | total current | | [3] | - | 440 | 460 mA |

[1] G_p at 1003 MHz minus G_p 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 |
|-----------------------------------------------|-----------------------------------|-------------------------------|-----|-----|-----|---------|
| 98 PAL D channels | | | | | | |
| CTB | composite triple beat | $V_o = 48$ dBmV at 862 MHz | [1] | - | -66 | -62 dBc |
| | | $V_o = 50$ dBmV at 862 MHz | [1] | - | -62 | - dBc |
| CSO | composite second-order distortion | $V_o = 48$ dBmV at 862 MHz | [1] | - | -66 | -60 dBc |
| | | $V_o = 50$ dBmV at 862 MHz | [1] | - | -63 | - dBc |
| Xmod | cross modulation | $V_o = 48$ dBmV at 862 MHz | [1] | - | -68 | - dB |
| | | $V_o = 50$ dBmV at 862 MHz | [1] | - | -60 | - dB |
| 112 NTSC channels | | | | | | |
| CTB | composite triple beat | $V_o = 48$ dBmV at 750 MHz | [2] | - | -63 | - dBc |
| CSO | composite second-order distortion | $V_o = 48$ dBmV at 750 MHz | [2] | - | -64 | - dBc |
| Xmod | cross modulation | $V_o = 48$ dBmV at 750 MHz | [2] | - | -66 | - dB |
| 79 NTSC channels + 75 digital channels | | | | | | |
| CTB | composite triple beat | $V_o = 56.4$ dBmV at 1003 MHz | [3] | - | -75 | - dBc |
| CSO | composite second-order distortion | $V_o = 56.4$ dBmV at 1003 MHz | [3] | - | -70 | - dBc |
| Xmod | cross modulation | $V_o = 56.4$ dBmV at 1003 MHz | [3] | - | -68 | - dB |
| CCN | carrier-to-composite noise | $V_o = 56.4$ 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_o till 862 MHz.

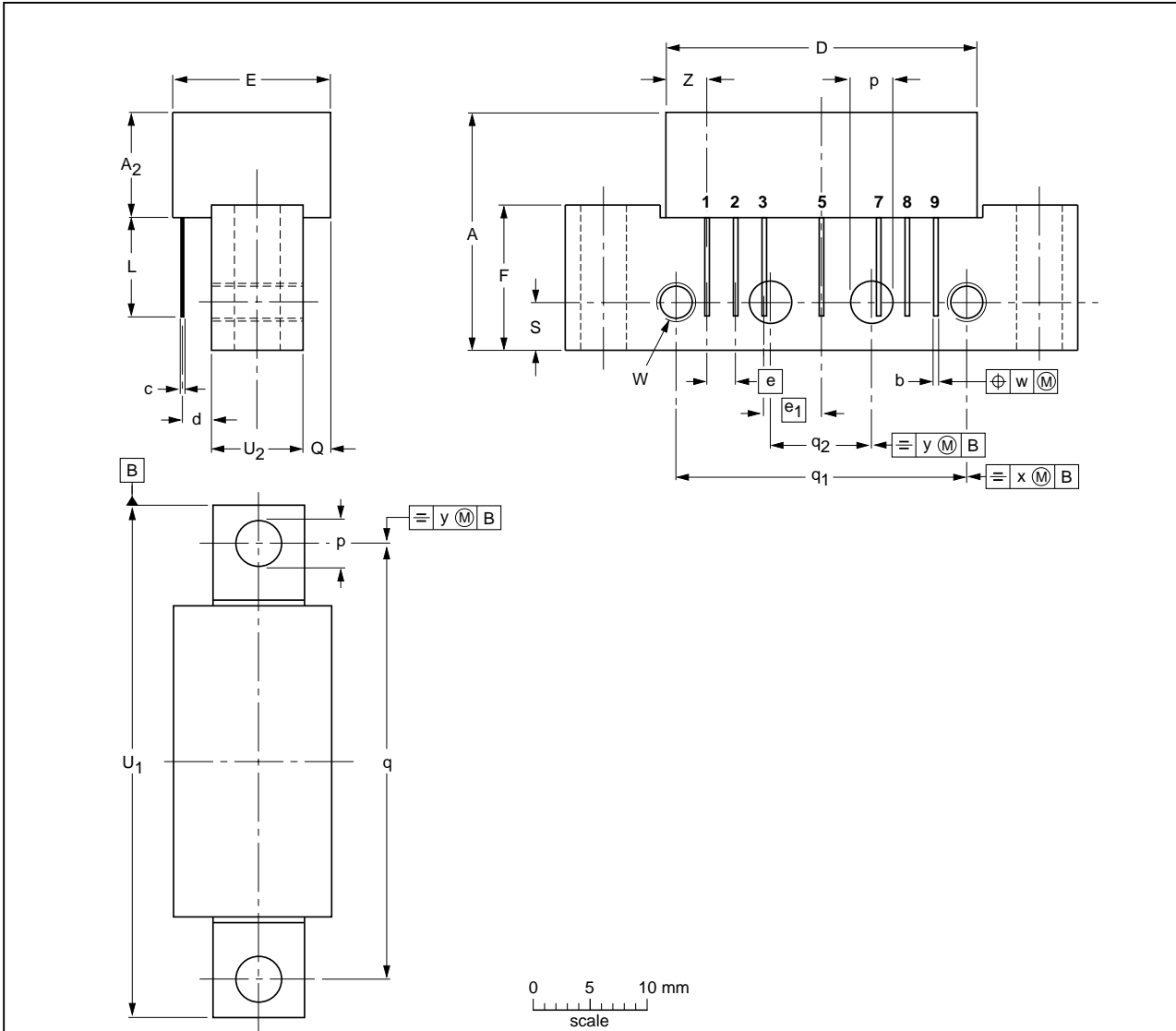
[2] 112 NTSC channels; [f = 45 MHz to 750 MHz]; flat V_o till 750 MHz.

[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 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. Abbreviations

Table 7. Abbreviations

| Acronym | Description |
|---------|----------------------------------------|
| CATV | Community Antenna TeleVision |
| ESD | ElectroStatic Discharge |
| GaAs | Gallium-Arsenide |
| NTSC | National Television Standard Committee |
| PAL | Phase Alternate Line |
| RF | Radio Frequency |
| UNC | UNified Coarse |

8. Revision history

Table 8. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| CGD987HCI v.1 | 20110629 | Product data sheet | - | - |

9. Legal information

9.1 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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