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# CGY1041

1 GHz, 21 dB gain GaAs push-pull amplifier

Rev. 1 — 10 February 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 Heterojunction Field Effect Transistor (HFET) GaAs dies.

### 1.2 Features and benefits

- Excellent linearity, stability and reliability
- Extremely low noise
- Excellent return loss properties
- Rugged construction
- Unconditionally stable
- Thermally optimized design
- Superior levels of ESD protection
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)
- Integrated ring wave surge protection
- Power gain is specified for both 870 MHz and 1003 MHz bandwidth

### 1.3 Applications

- CATV systems operating in the 40 MHz to 1003 MHz frequency range

### 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                 | $f = 45$ MHz    | 19.0  | 20.0  | 21.0 | dB   |
|           |                            | $f = 870$ MHz   | 20.4  | 21.4  | 22.4 | dB   |
|           |                            | $f = 1003$ MHz  | 21.0  | 21.75 | 22.5 | dB   |
| CTB       | composite triple beat      | $V_o = 44$ dBmV | [1] - | -62   | -    | dBc  |
| CCN       | carrier-to-composite noise | $V_o = 44$ dBmV | [1] - | 63    | -    | dBc  |
| $I_{tot}$ | total current              |                 | [2] - | 265   | 280  | mA   |

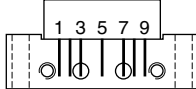
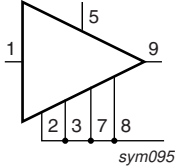
[1] 79 NTSC channels [ $f = 55.25$  MHz to 547.25 MHz] + 75 digital channels [ $f = 547.25$  MHz to 1003 MHz] (-6 dB offset); flat output level.

[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 |
| CGY1041     | -       | 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 |   |
| V <sub>ESD</sub>   | electrostatic discharge voltage | Human Body Model (HBM); According JEDEC standard 22-A114E | [1] | -    | 2000 | V |
|                    |                                 | Biased; According IEC61000-4-2                            |     | -    | 2000 | V |
| T <sub>stg</sub>   | storage temperature             |   | -40 | +100 | °C   |   |
| T <sub>mb</sub>    | mounting base temperature       |   | -20 | +100 | °C   |   |

[1] The value of 2000 V corresponds to a class 2 classification.

## 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 = 45 MHz              | 19.0 | 20.0  | 21.0 | dB   |     |
|   |                                   | f = 870 MHz             | 20.4 | 21.4  | 22.4 | dB   |     |
|   |                                   | f = 1003 MHz            | 21.0 | 21.75 | 22.5 | dB   |     |
| $SL_{sl}$                                     | slope straight line               | f = 45 MHz to 1003 MHz  | [1]  | 1.2   | 1.95 | 2.7  | dB  |
| FL  | flatness of frequency response    | f = 45 MHz to 1003 MHz  | [2]  | -     | -    | 0.9  | dB  |
| $RL_{in}$                                     | input return loss                 | f = 45 MHz to 200 MHz   | 20   | -     | -    | dB   |     |
|   |                                   | f = 200 MHz to 550 MHz  | 19   | -     | -    | dB   |     |
|   |                                   | f = 550 MHz to 870 MHz  | 19   | -     | -    | dB   |     |
|   |                                   | f = 870 MHz to 914 MHz  | 19   | -     | -    | dB   |     |
|   |                                   | f = 914 MHz to 1003 MHz | 16   | -     | -    | dB   |     |
| $RL_{out}$                                    | output return loss                | f = 45 MHz to 200 MHz   | 18   | -     | -    | dB   |     |
|   |                                   | f = 200 MHz to 550 MHz  | 18   | -     | -    | dB   |     |
|   |                                   | f = 550 MHz to 870 MHz  | 18   | -     | -    | dB   |     |
|   |                                   | f = 870 MHz to 914 MHz  | 18   | -     | -    | dB   |     |
|   |                                   | f = 914 MHz to 1003 MHz | 16   | -     | -    | dB   |     |
| NF  | noise figure                      | f = 50 MHz to 870 MHz   | -    | 3.6   | 4.0  | dB   |     |
|   |                                   | f = 870 MHz to 1003 MHz | -    | 4.3   | 4.9  | dB   |     |
| $I_{tot}$                                     | total current                     |                         | [3]  | -     | 265  | 280  | mA  |
| <b>79 NTSC channels + 75 digital channels</b> |                                   |                         |      |       |      |      |     |
| CTB   | composite triple beat             | $V_o = 44$ dBmV         | [4]  | -     | -62  | -    | dBc |
| CSO   | composite second-order distortion | $V_o = 44$ dBmV         | [4]  | -     | -64  | -    | dBc |
| Xmod  | cross modulation                  | $V_o = 44$ dBmV         | [4]  | -     | -58  | -    | dB  |
| CCN   | carrier-to-composite noise        | $V_o = 44$ dBmV         | [4]  | -     | 63   | -    | dBc |
| <b>79 NTSC channels</b>                       |                                   |                         |      |       |      |      |     |
| CTB   | composite triple beat             | $V_o = 44$ dBmV         | [5]  | -     | -    | -62  | dBc |
| CSO   | composite second-order distortion | $V_o = 44$ dBmV         | [5]  | -     | -    | -62  | dBc |
| Xmod  | cross modulation                  | $V_o = 44$ dBmV         | [5]  | -     | -58  | -    | dB  |
| <b>98 PAL channels</b>                        |                                   |                         |      |       |      |      |     |
| CTB   | composite triple beat             | $V_o = 44$ dBmV         | [6]  | -     | -68  | -    | dBc |
| CSO   | composite second-order distortion | $V_o = 44$ dBmV         | [6]  | -     | -66  | -    | dBc |
| Xmod  | cross modulation                  | $V_o = 44$ dBmV         | [6]  | -     | -58  | -    | dB  |

[1]  $G_p$  at 1003 MHz minus  $G_p$  at 45 MHz.

[2] Flatness is defined as maximum deviation to straight line.

[3] Direct Current (DC).

[4] 79 NTSC channels [f = 55.25 MHz to 547.25 MHz] + 75 digital channels [f = 547.25 MHz to 1003 MHz] (-6 dB offset); flat output level.

[5] 79 NTSC channels [f = 55.25 MHz to 550 MHz]; flat output level.

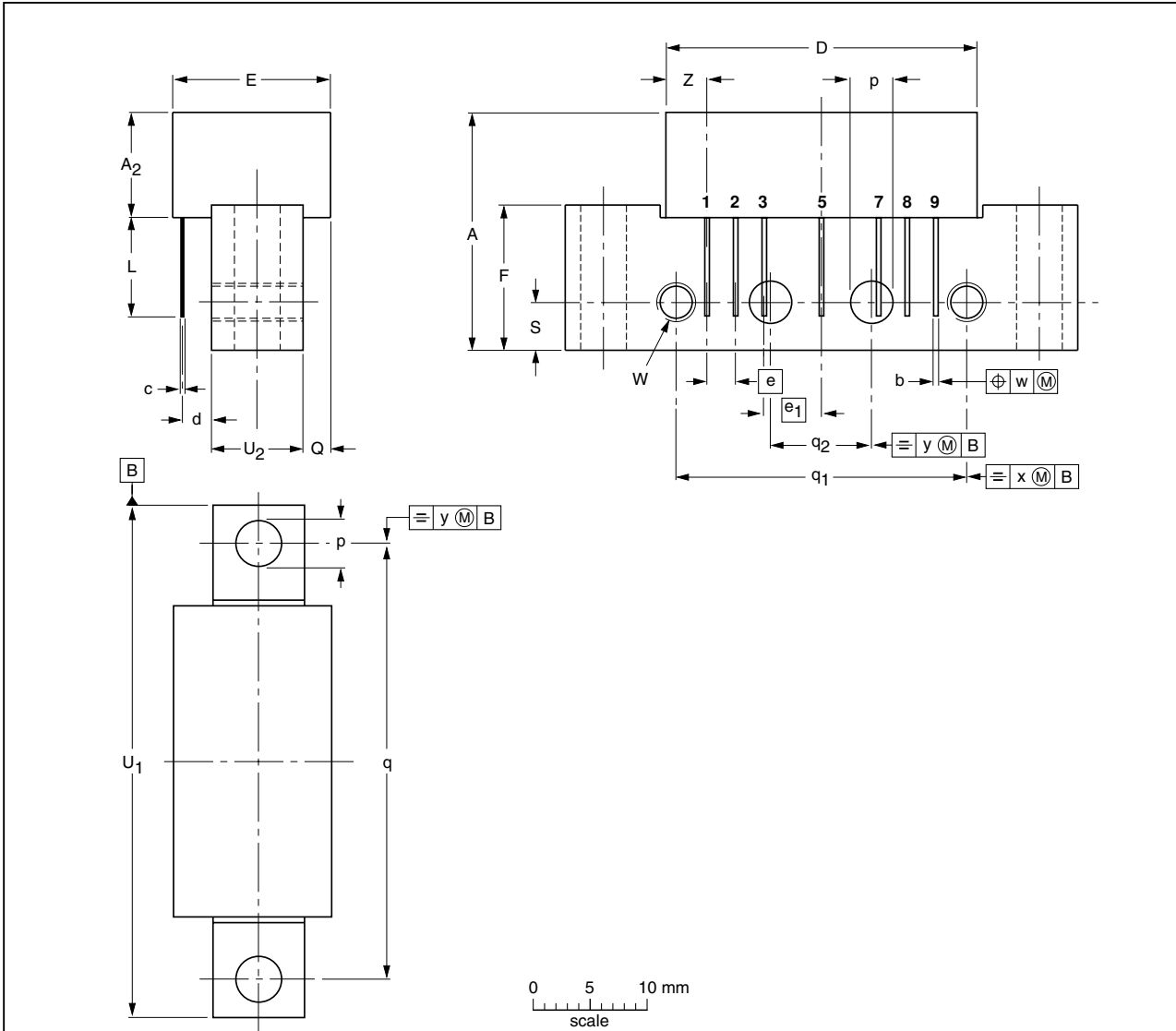
[6] 98 PAL channels [f = 49.75 MHz to 847.25 MHz]; flat output level.



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 6. Abbreviations

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

## 8. Revision history

Table 7. Revision history

| Document ID | Release date | Data sheet status  | Change notice | Supersedes |
|-------------|--------------|--------------------|---------------|------------|
| CGY1041 v.1 | 20110210     | 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.                                     |

[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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