

# 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

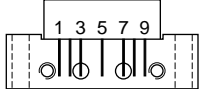
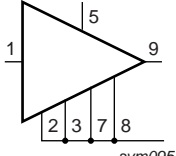
[1] 98 PAL D channels with 8 MHz bandwidth per channel; [ $f = 47$  MHz to 862 MHz]; flat  $V_o$  till 862 MHz.

[2] Direct Current (DC).



## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	input		
2, 3	common		
5	+V <sub>B</sub>		
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 <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		-	1500	V
T <sub>stg</sub>	storage temperature		-40	+100	°C	
T <sub>mb</sub>	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
<b>98 PAL D channels</b>						
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
<b>112 NTSC channels</b>						
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
<b>79 NTSC channels + 75 digital channels</b>						
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.

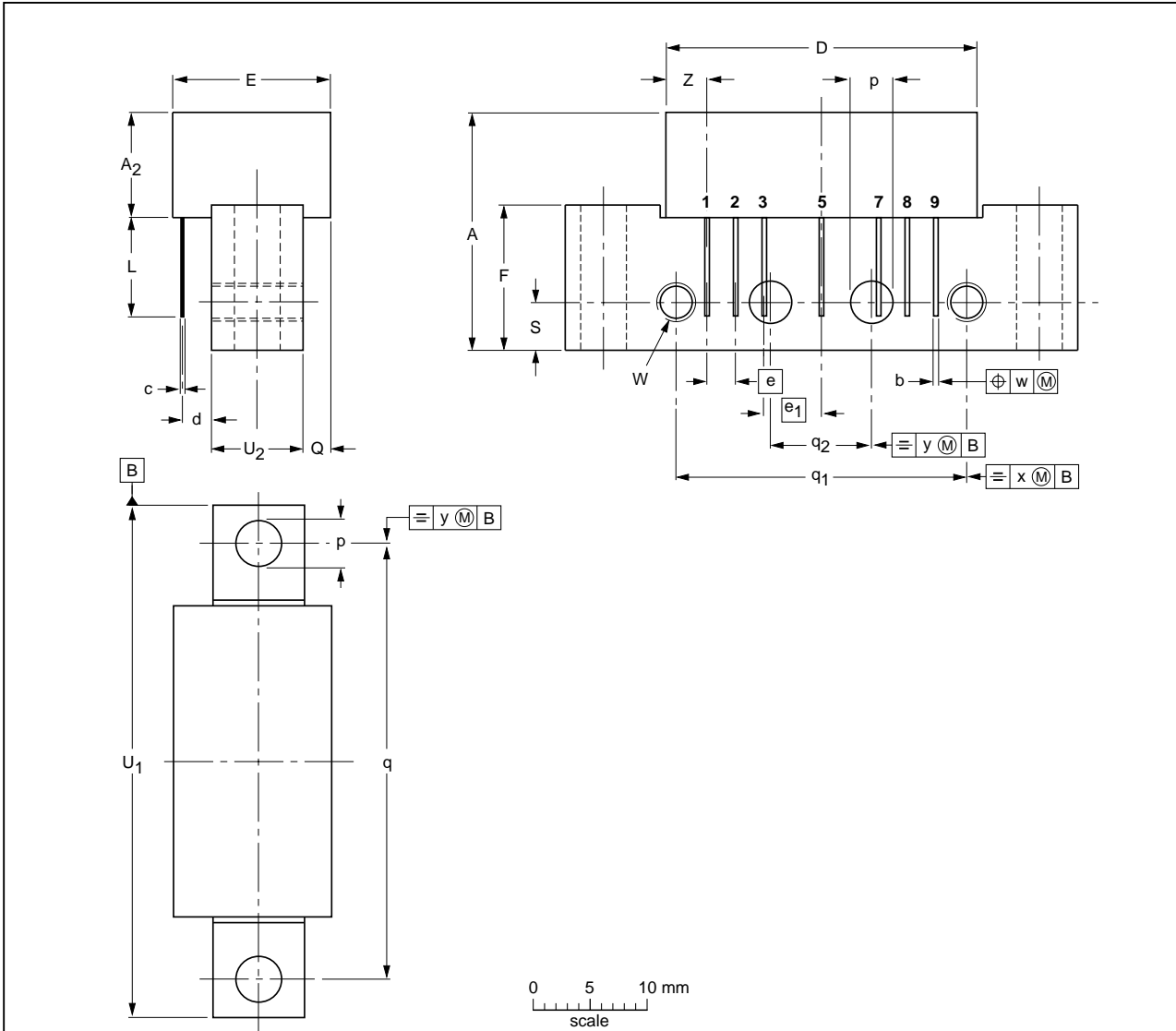
[2] 112 NTSC channels; [f = 45 MHz to 750 MHz]; flat  $V_o$  till 750 MHz.

[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 <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 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 <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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[2] The term 'short data sheet' is explained in section "Definitions".

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