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# CGD1042L

1 GHz, 23 dB gain GaAs low current power doubler

Rev. 1 — 10 March 2014

Product data sheet

## 1. Product profile

### 1.1 General description

Hybrid amplifier module in a SOT115AE 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

- Low power consumption
- Excellent linearity
- Extremely low noise
- Excellent return loss properties
- Gain compensation over temperature
- Rugged construction
- Unconditionally stable
- Thermally optimized design
- Adjustable supply current
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

### 1.3 Applications

- CATV systems operating in the 40 MHz to 1 GHz frequency range.

### 1.4 Quick reference data

**Table 1. Quick reference data**

Bandwidth 40 MHz to 1006 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	20.5	21.5	22.5	dB
		f = 1006 MHz	22	23	24	dB
CTB	composite triple beat	$V_o = 51$ dBmV at 550 MHz [1][2]	-	-61	-56	dBc
CSO	composite second-order distortion	$V_o = 51$ dBmV at 550 MHz [1][2]	-	-68	-64	dBc
$I_{tot}$	total current	pin 4 not connected [3]	355	375	395	mA
		pin 4 connected to ground [3]	-	330	-	mA

[1] 77 NTSC; [f = 54 MHz to 550 MHz]; flat  $V_o$  till 550 MHz.

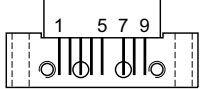
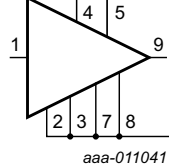
[2] pin 4 not connected.

[3] Direct Current (DC).



## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	input		
2, 3	common		
4	I <sub>CC</sub> adjust <a href="#">[1]</a>		
5	+V <sub>B</sub>		
7, 8	common		
9	output		

[1] The total supply current can be adjusted by pin 4. Grounding of pin 4 gives the lowest supply current while floating of pin 4 gives the maximum supply current.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
CGD1042L	-	rectangular single-ended package; aluminium flange; 2 vertical mounting holes; 2 × 6-32 UNC and 2 extra horizontal mounting holes; 8 gold-plated in-line leads	SOT115AE

## 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
I <sub>I</sub>	input current	on I <sub>CC</sub> adjust (pin 4)	-10	0	mA
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 1006 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	20.5	21.5	22.5	dB
		f = 1006 MHz	22	23	24	dB
$SL_{sl}$	slope straight line	f = 40 MHz to 1006 MHz <a href="#">[1]</a>	0.5	-	2	dB
FL	flatness of frequency response	f = 40 MHz to 1006 MHz <a href="#">[2]</a>	-	-	0.8	dB
$RL_{in}$	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	18	-	-	dB
		f = 640 MHz to 870 MHz	16	-	-	dB
		f = 870 MHz to 1006 MHz	14	-	-	dB
$RL_{out}$	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	17	-	-	dB
		f = 870 MHz to 1006 MHz	16	-	-	dB
NF	noise figure	f = 50 MHz	-	5.2	6.0	dB
		f = 1006 MHz	-	5.7	6.5	dB
<b>Pin 4 not connected</b>						
$I_{tot}$	total current	<a href="#">[3]</a>	355	375	395	mA
<b>77 NTSC channels</b>						
CTB	composite triple beat	$V_o = 51$ dBmV at 550 MHz <a href="#">[4]</a>	-	-61	-56	dBc
CSO	composite second-order distortion	$V_o = 51$ dBmV at 550 MHz <a href="#">[4]</a>	-	-68	-64	dBc
		$V_o = 51$ dBmV at 550 MHz <a href="#">[4][8]</a>	-	-71	-67	dBc
Xmod	cross modulation	$V_o = 51$ dBmV at 550 MHz <a href="#">[4][5]</a>	-	-60	-	dB
<b>79 NTSC channels + 75 digital channels</b>						
CTB	composite triple beat	$V_o = 54$ dBmV at 1006 MHz <a href="#">[6]</a>	-	-75	-	dBc
CSO	composite second-order distortion	$V_o = 54$ dBmV at 1006 MHz <a href="#">[6]</a>	-	-77	-	dBc
Xmod	cross modulation	$V_o = 54$ dBmV at 1006 MHz <a href="#">[5][6]</a>	-	-68	-	dB
CCN	carrier-to-composite noise	$V_o = 54$ dBmV at 1006 MHz <a href="#">[6]</a>	-	62	-	dBc
<b>74 NTSC channels + 36 digital channels</b>						
CTB	composite triple beat	$V_o = 51$ dBmV at 770 MHz <a href="#">[7]</a>	-	-65	-	dBc
CSO	composite second-order distortion	$V_o = 51$ dBmV at 770 MHz <a href="#">[7]</a>	-	-73	-	dBc
Xmod	cross modulation	$V_o = 51$ dBmV at 770 MHz <a href="#">[5][7]</a>	-	-54	-	dB



**Table 5. Characteristics ...continued**Bandwidth 40 MHz to 1006 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>Pin 4 connected to ground</b>						
$I_{tot}$	total current		[3]	-	330	- mA
<b>77 NTSC channels</b>						
CTB	composite triple beat	$V_o = 51$ dBmV at 550 MHz	[4]	-	-53	- dBc
CSO	composite second-order distortion	$V_o = 51$ dBmV at 550 MHz	[4]	-	-68	- dBc
<b>79 NTSC channels + 75 digital channels</b>						
CTB	composite triple beat	$V_o = 54$ dBmV at 1006 MHz	[6]	-	-66	- dBc
CSO	composite second-order distortion	$V_o = 54$ dBmV at 1006 MHz	[6]	-	-77	- dBc
CCN	carrier-to-composite noise	$V_o = 54$ dBmV at 1006 MHz	[6]	-	59	- dBc
<b>74 NTSC channels + 36 digital channels</b>						
CTB	composite triple beat	$V_o = 51$ dBmV at 770 MHz	[7]	-	-59	- dBc
CSO	composite second-order distortion	$V_o = 51$ dBmV at 770 MHz	[7]	-	-73	- dBc

[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).

[4] 77 NTSC; [f = 54 MHz to 550 MHz]; flat  $V_o$  till 550 MHz.

[5] Measured at 55.25 MHz.

[6] 79 NTSC channels [f = 54 MHz to 550 MHz] + 75 digital channels [f = 550 MHz to 1006 MHz] (-6 dB offset); tilt extrapolated to 13.5 dB at 1006 MHz.

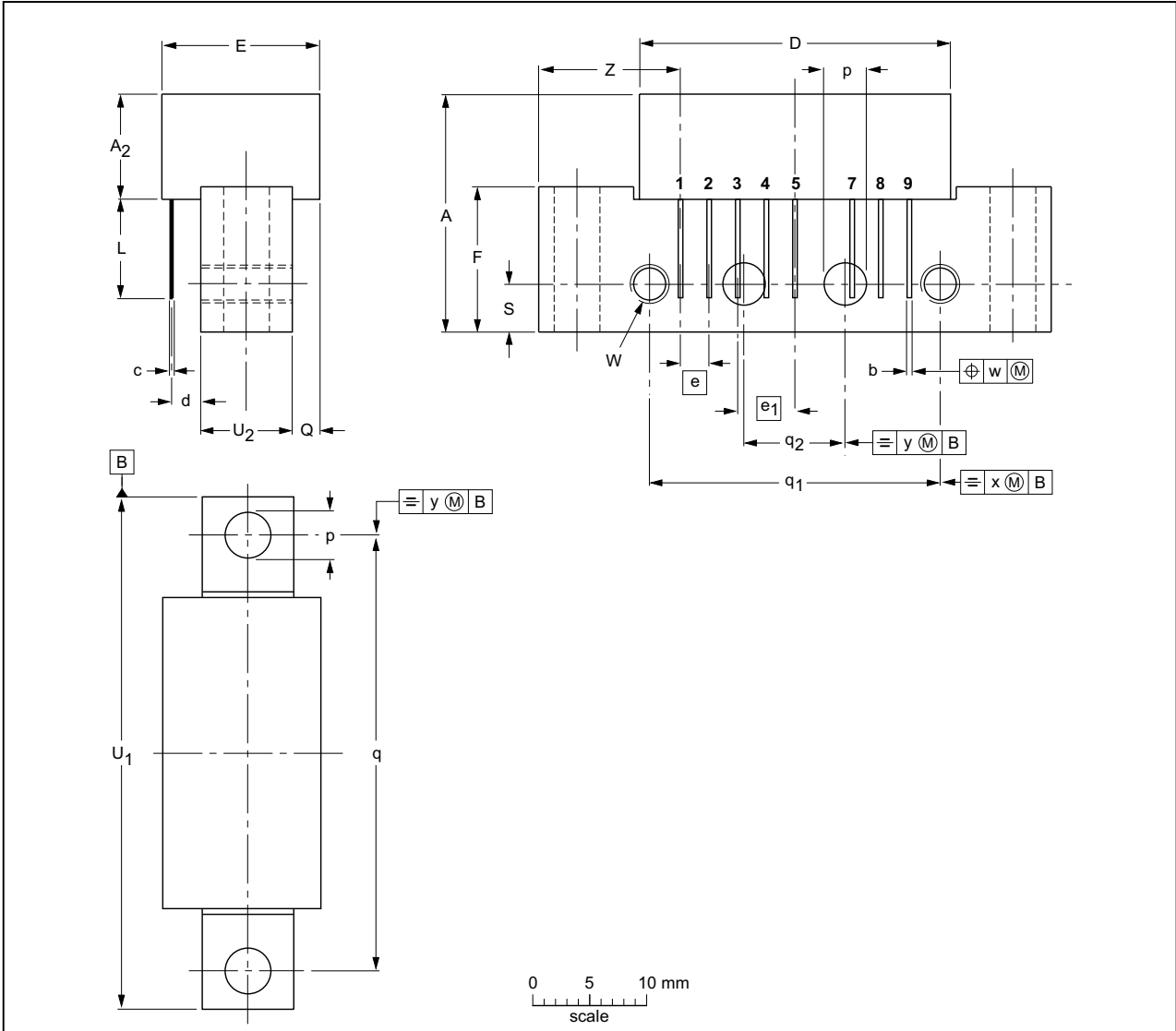
[7] 74 NTSC channels [f = 70 MHz to 550 MHz] + 36 digital channels [f = 550 MHz to 770 MHz] (-10 dB offset); tilt = 0 dB.

[8] Measured at 78 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; 8 gold-plated in-line leads

SOT115AE



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A <sub>2</sub> max.	b	c	D max.	d max.	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	2.54	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	12

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT115AE					-04-02-04 10-06-18

Fig 1. Package outline SOT115AE

## 7. Abbreviations

Table 6. Abbreviations

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

## 8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
CGD1042L v.1	20140310	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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