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 Ω; 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

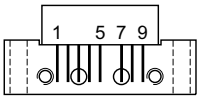
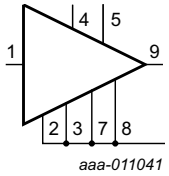
[1] 77 NTSC; [f = 54 MHz to 550 MHz]; flat V_o till 550 MHz.

[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_{CC} adjust [1]		
5	$+V_B$		
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_B	supply voltage		-	30	V
$V_{i(RF)}$	RF input voltage	single tone	-	75	dBmV
I_I	input current	on I_{CC} adjust (pin 4)	−10	0	mA
T_{stg}	storage temperature		−40	+100	°C
T_{mb}	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 Ω; 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 [1]	0.5	-	2	dB
FL	flatness of frequency response	f = 40 MHz to 1006 MHz [2]	-	-	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
Pin 4 not connected						
I_{tot}	total current	[3]	355	375	395	mA
77 NTSC channels						
CTB	composite triple beat	V_o = 51 dBmV at 550 MHz [4]	-	–61	–56	dBc
CSO	composite second-order distortion	V_o = 51 dBmV at 550 MHz [4]	-	–68	–64	dBc
		V_o = 51 dBmV at 550 MHz [4][8]	-	–71	–67	dBc
Xmod	cross modulation	V_o = 51 dBmV at 550 MHz [4][5]	-	–60	-	dB
79 NTSC channels + 75 digital channels						
CTB	composite triple beat	V_o = 54 dBmV at 1006 MHz [6]	-	–75	-	dBc
CSO	composite second-order distortion	V_o = 54 dBmV at 1006 MHz [6]	-	–77	-	dBc
Xmod	cross modulation	V_o = 54 dBmV at 1006 MHz [5][6]	-	–68	-	dB
CCN	carrier-to-composite noise	V_o = 54 dBmV at 1006 MHz [6]	-	62	-	dBc
74 NTSC channels + 36 digital channels						
CTB	composite triple beat	V_o = 51 dBmV at 770 MHz [7]	-	–65	-	dBc
CSO	composite second-order distortion	V_o = 51 dBmV at 770 MHz [7]	-	–73	-	dBc
Xmod	cross modulation	V_o = 51 dBmV at 770 MHz [5][7]	-	–54	-	dB

Table 5. Characteristics *…continued*

Bandwidth 40 MHz to 1006 MHz; V_B = 24 V (DC); $Z_S = Z_L$ = 75 Ω; T_{mb} = 35 °C; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Pin 4 connected to ground						
I_{tot}	total current	[3]	-	330	-	mA
77 NTSC channels						
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
79 NTSC channels + 75 digital channels						
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
74 NTSC channels + 36 digital channels						
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.

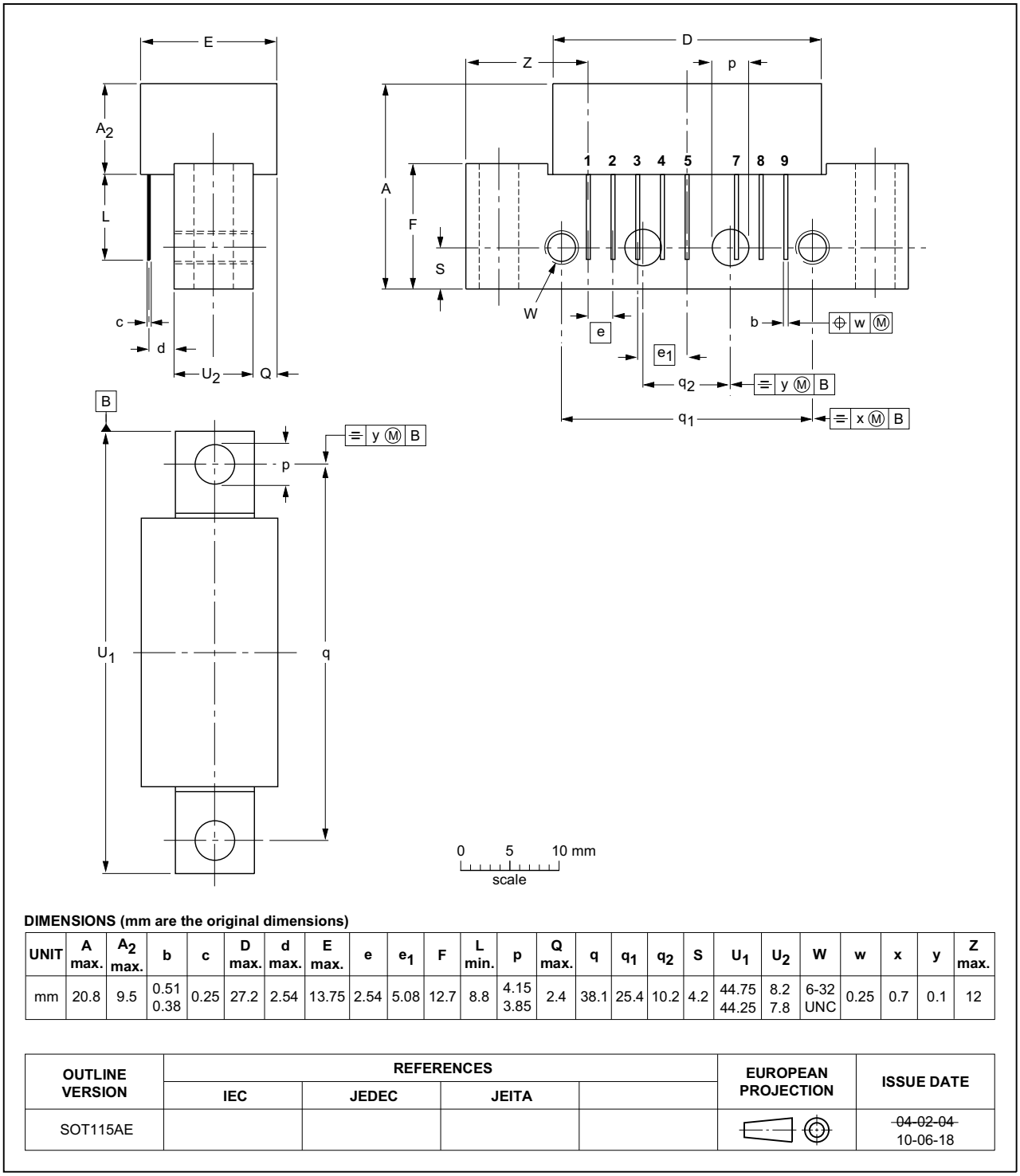
[6] 79 NTSC channels [f = 54 MHz to 550 MHz] + 75 digital channels [f = 550 MHz to 1006 MHz] (−6 dB offset); tilt extrapolated to 13.5 dB at 1006 MHz.

[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_2 max.	b	c	D max.	d max.	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	2.54	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[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.

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

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11. Contents

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