

# CGD1040HI

1 GHz, 20 dB gain GaAs high output power doubler

Rev. 01 — 22 September 2009

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

- Excellent linearity
- 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 the use of certain Hazardous Substances (RoHS)
- Integrated ring wave surge protection

### 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;  $V_B = 24\text{ V (DC)}$ ;  $Z_S = Z_L = 75\ \Omega$ ;  $T_{mb} = 35\text{ }^\circ\text{C}$ ; unless otherwise specified.

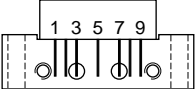
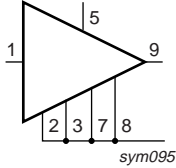
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$G_p$	power gain	$f = 50\text{ MHz}$	-	20	-	dB	
		$f = 1003\text{ MHz}$	19.5	20.8	22.0	dB	
CTB	composite triple beat	$V_o = 56.4\text{ dBmV}$ at 1003 MHz	[1]	-	-74	-64	dBc
CCN	carrier-to-composite noise	$V_o = 56.4\text{ dBmV}$ at 1003 MHz	[1]	57	63	-	dBc
$I_{tot}$	total current		[2]	-	440	460	mA

[1] 79 NTSC channels [ $f = 54\text{ MHz}$  to  $550\text{ MHz}$ ] + 75 digital channels [ $f = 550\text{ MHz}$  to  $1003\text{ MHz}$ ] (-6 dB offset); tilt extrapolated to 13.5 dB at 1003 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
CGD1040HI	-	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;  $V_B = 24\text{ V (DC)}$ ;  $Z_S = Z_L = 75\ \Omega$ ;  $T_{mb} = 35\text{ }^\circ\text{C}$ ; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$f = 50\text{ MHz}$	-	20	-	dB
		$f = 1003\text{ MHz}$	19.5	20.8	22.0	dB
$SL_{sl}$	slope straight line	$f = 40\text{ MHz to }1003\text{ MHz}$	[1] 0.5	-	2	dB
FL	flatness of frequency response	$f = 40\text{ MHz to }1003\text{ MHz}$	[2] -	-	1	dB
$RL_{in}$	input return loss	$f = 40\text{ MHz to }160\text{ MHz}$	20	-	-	dB
		$f = 160\text{ MHz to }320\text{ MHz}$	20	-	-	dB
		$f = 320\text{ MHz to }640\text{ MHz}$	18	-	-	dB
		$f = 640\text{ MHz to }870\text{ MHz}$	16	-	-	dB
		$f = 870\text{ MHz to }1003\text{ MHz}$	16	-	-	dB
$RL_{out}$	output return loss	$f = 40\text{ MHz to }160\text{ MHz}$	20	-	-	dB
		$f = 160\text{ MHz to }320\text{ MHz}$	20	-	-	dB
		$f = 320\text{ MHz to }640\text{ MHz}$	18	-	-	dB
		$f = 640\text{ MHz to }870\text{ MHz}$	16	-	-	dB
		$f = 870\text{ MHz to }1003\text{ MHz}$	16	-	-	dB
NF	noise figure	$f = 50\text{ MHz}$	-	5	6	dB
		$f = 1003\text{ MHz}$	-	5.5	6.5	dB
$I_{tot}$	total current		[3] -	440	460	mA
<b>79 NTSC channels + 75 digital channels</b>						
CTB	composite triple beat	$V_o = 56.4\text{ dBmV at }1003\text{ MHz}$	[4] -	-74	-64	dBc
CSO	composite second-order distortion	$V_o = 56.4\text{ dBmV at }1003\text{ MHz}$	[4] -	-78	-65	dBc
Xmod	cross modulation	$V_o = 56.4\text{ dBmV at }1003\text{ MHz}$	[4] -	-68	-	dB
CCN	carrier-to-composite noise	$V_o = 56.4\text{ dBmV at }1003\text{ MHz}$	[4] 57	63	-	dBc
<b>79 NTSC channels</b>						
CTB	composite triple beat	$V_o = 58.4\text{ dBmV at }1003\text{ MHz}$	[5] -	-70	-	dBc
CSO	composite second-order distortion	$V_o = 58.4\text{ dBmV at }1003\text{ MHz}$	[5] -	-76	-	dBc
Xmod	cross modulation	$V_o = 58.4\text{ dBmV at }1003\text{ MHz}$	[5] -	-66	-	dB

[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).

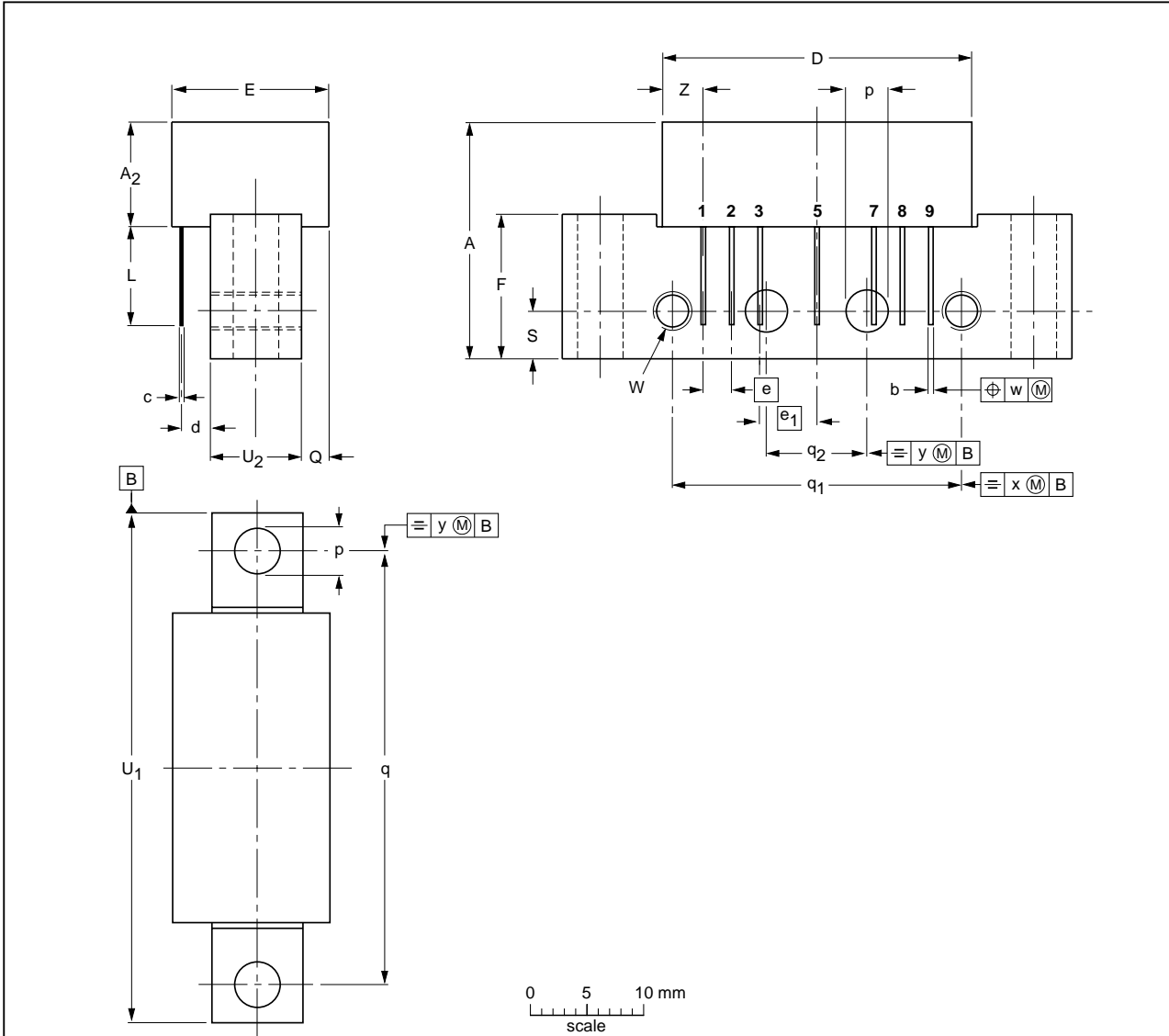
[4] 79 NTSC channels [ $f = 54\text{ MHz to }550\text{ MHz}$ ] + 75 digital channels [ $f = 550\text{ MHz to }1003\text{ MHz}$ ] (-6 dB offset); tilt extrapolated to 13.5 dB at 1003 MHz.

[5] 79 NTSC channels [ $f = 54\text{ MHz to }550\text{ MHz}$ ]; 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 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	9.1	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	3.8

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT115J						99-02-06 04-02-04

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
RF	Radio Frequency
UNC	UNified Coarse

## 8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
CGD1040HI_1	20090922	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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## 11. Contents

<b>1</b>	<b>Product profile</b> .....	<b>1</b>
1.1	General description .....	1
1.2	Features .....	1
1.3	Applications .....	1
1.4	Quick reference data .....	1
<b>2</b>	<b>Pinning information</b> .....	<b>2</b>
<b>3</b>	<b>Ordering information</b> .....	<b>2</b>
<b>4</b>	<b>Limiting values</b> .....	<b>2</b>
<b>5</b>	<b>Characteristics</b> .....	<b>3</b>
<b>6</b>	<b>Package outline</b> .....	<b>4</b>
<b>7</b>	<b>Abbreviations</b> .....	<b>5</b>
<b>8</b>	<b>Revision history</b> .....	<b>5</b>
<b>9</b>	<b>Legal information</b> .....	<b>6</b>
9.1	Data sheet status .....	6
9.2	Definitions .....	6
9.3	Disclaimers .....	6
9.4	Trademarks .....	6
<b>10</b>	<b>Contact information</b> .....	<b>6</b>
<b>11</b>	<b>Contents</b> .....	<b>7</b>

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