

# CGD1044HI

1 GHz, 25 dB gain GaAs high output power doubler

Rev. 2 — 29 September 2010

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 (DC), employing Hetero junction Field Effect Transistor (HFET) GaAs dies.

### 1.2 Features and benefits

- 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 with 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;  $V_B = 24$  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	-	23.2	-	dB
		$f = 1003$ MHz	23.5	24.4	25.5	dB
CTB	composite triple beat	$V_o = 56.4$ dBmV at 1003 MHz	[1]	-	-75	-69 dBc
CCN	carrier-to-composite noise	$V_o = 56.4$ dBmV at 1003 MHz	[1]	57	63	- dBc
$I_{tot}$	total current		[2]	-	440	460 mA

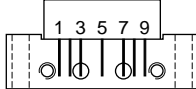
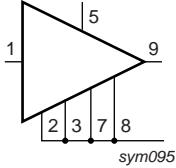
[1] 79 NTSC channels [ $f = 54$  MHz to 550 MHz] + 75 digital channels [ $f = 550$  MHz to 1003 MHz] (-6 dB offset); tilt extrapolated to 13.5 dB at 1003 MHz.

[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
CGD1044HI	-	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	-	23.2	-	dB
		$f = 1003$ MHz	23.5	24.4	25.5	dB
$SL_{sl}$	slope straight line	$f = 40$ MHz to 1003 MHz	[1] 0.5	-	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	20	-	-	dB
		$f = 320$ MHz to 640 MHz	19	-	-	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	20	-	-	dB
		$f = 320$ MHz to 640 MHz	19	-	-	dB
		$f = 640$ MHz to 870 MHz	18	-	-	dB
		$f = 870$ MHz to 1003 MHz	17	-	-	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
<b>79 NTSC channels + 75 digital channels</b>						
CTB	composite triple beat	$V_o = 56.4$ dBmV at 1003 MHz	[4] -	-75	-69	dBc
CSO	composite second-order distortion	$V_o = 56.4$ dBmV at 1003 MHz	[4] -	-77	-65	dBc
Xmod	cross modulation	$V_o = 56.4$ dBmV at 1003 MHz	[4] -	-68	-	dB
CCN	carrier-to-composite noise	$V_o = 56.4$ dBmV at 1003 MHz	[4] 57	63	-	dBc
<b>79 NTSC channels</b>						
CTB	composite triple beat	$V_o = 58.4$ dBmV at 1003 MHz	[5] -	-70	-	dBc
CSO	composite second-order distortion	$V_o = 58.4$ dBmV at 1003 MHz	[5] -	-75	-	dBc
Xmod	cross modulation	$V_o = 58.4$ dBmV at 1003 MHz	[5] -	-64	-	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).

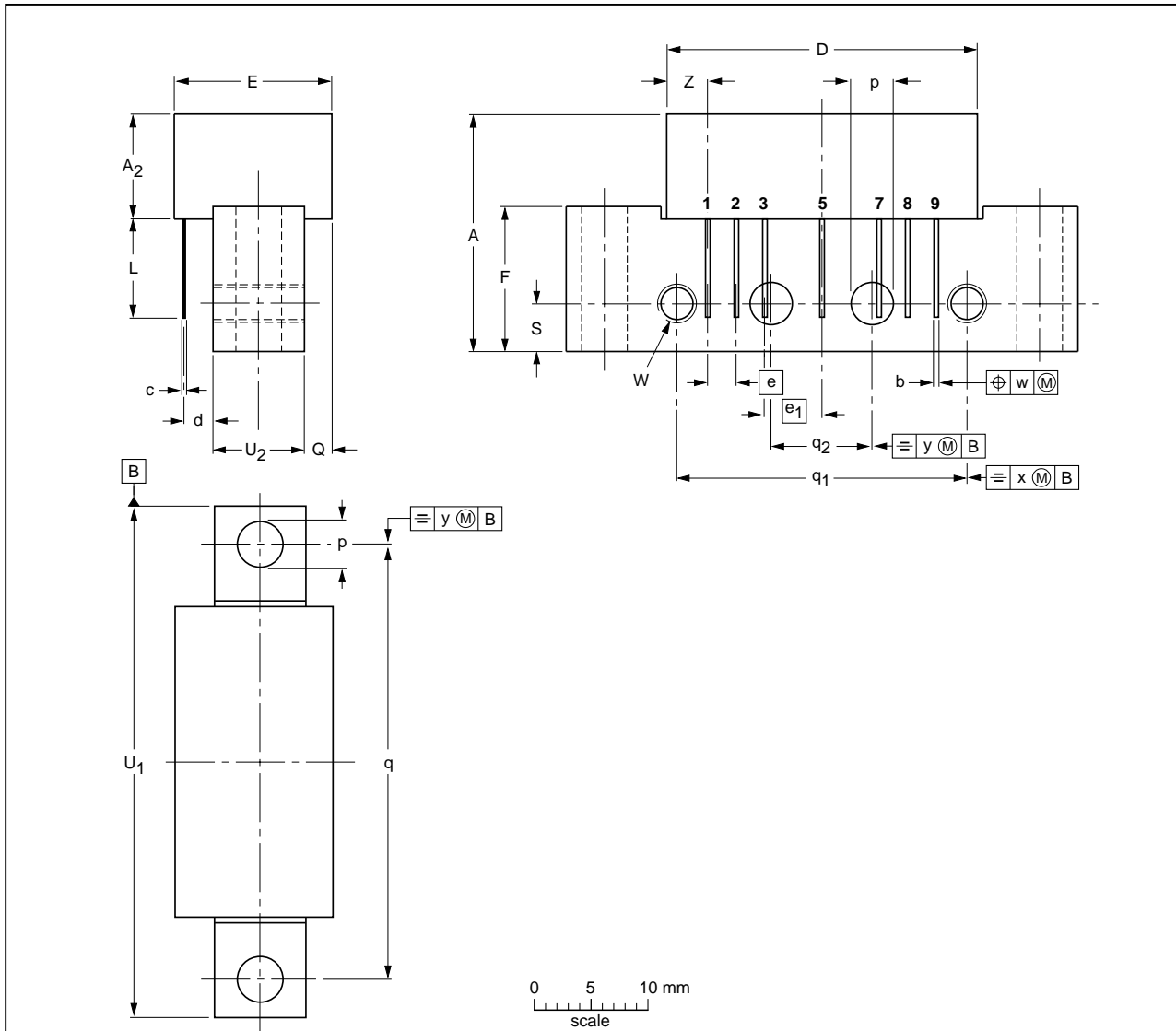
[4] 79 NTSC channels [ $f = 54$  MHz to 550 MHz] + 75 digital channels [ $f = 550$  MHz to 1003 MHz] (-6 dB offset); tilt extrapolated to 13.5 dB at 1003 MHz.

[5] 79 NTSC channels [ $f = 54$  MHz to 550 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	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 6. Abbreviations**

Acronym	Description
CATV	Community Antenna TeleVision
DC	Direct Current
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
CGD1044HI v.2	20100929	Product data sheet	-	CGD1044HI v.1
Modifications:	<ul style="list-style-type: none"><li>• Package outline drawings have been updated to the latest version.</li><li>• Legal texts have been updated.</li></ul>			
CGD1044HI v.1	20090921	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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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