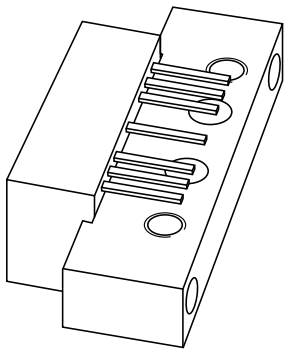


DATA SHEET



CGD914; CGD914MI 860 MHz, 20 dB gain power doubler amplifier

Product specification
Supersedes data of 2000 Jul 25

2001 Nov 01



860 MHz, 20 dB gain power doubler amplifier

CGD914; CGD914MI

FEATURES

- Excellent linearity
- Extremely low noise
- Excellent return loss properties
- Rugged construction
- Gold metallization ensures excellent reliability.

APPLICATIONS

- CATV systems operating in the 40 to 870 MHz frequency range.

DESCRIPTION

Hybrid amplifier module in a SOT115J package operating at a voltage supply of 24 V (DC), employing both GaAs and Si dies. Both modules are electrically identical, only the pinning is different.

PINNING - SOT115J

PIN	DESCRIPTION	
	CGD914	CGD914MI
1	input	output
2 and 3	common	common
5	+V _B	+V _B
7 and 8	common	common
9	output	input

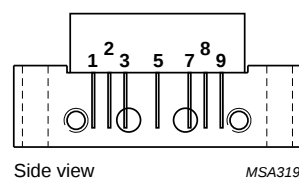


Fig.1 Simplified outline.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
G _p	power gain	f = 45 MHz	19.75	20.25	dB
		f = 870 MHz	20.2	21.5	dB
I _{tot}	total current consumption (DC)	V _B = 24 V	345	375	mA

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V _B	supply voltage	–	30	V
V _i	RF input voltage	–	–	
	single tone	–	70	dBmV
	132 channels flat	–	45	dBmV
T _{stg}	storage temperature	–40	+100	°C
T _{mb}	operating mounting base temperature	–20	+100	°C

860 MHz, 20 dB gain power doubler amplifier

CGD914; CGD914MI

CHARACTERISTICS

Bandwidth 45 to 870 MHz; $V_B = 24\text{ V}$; $T_{mb} = 35\text{ °C}$; $Z_S = Z_L = 75\text{ }\Omega$.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
G_p	power gain	$f = 45\text{ MHz}$	19.75	20	20.25	dB
		$f = 870\text{ MHz}$	20.2	21	21.5	dB
SL	slope straight line	$f = 45\text{ to }870\text{ MHz}$	0.2	1	1.5	dB
FL	flatness straight line	$f = 45\text{ to }100\text{ MHz}$	-0.25	—	+0.25	dB
		$f = 100\text{ to }800\text{ MHz}$	-0.6	—	+0.4	dB
		$f = 800\text{ to }870\text{ MHz}$	-0.45	—	+0.2	dB
	flatness narrow band	in each 6 MHz segment	—	—	± 0.1	dB
S_{11}	input return losses	$f = 40\text{ to }80\text{ MHz}$	20	—	—	dB
		$f = 80\text{ to }160\text{ MHz}$	20	—	—	dB
		$f = 160\text{ to }320\text{ MHz}$	18	—	—	dB
		$f = 320\text{ to }550\text{ MHz}$	16	—	—	dB
		$f = 550\text{ to }650\text{ MHz}$	15	—	—	dB
		$f = 650\text{ to }750\text{ MHz}$	14	—	—	dB
		$f = 750\text{ to }870\text{ MHz}$	14	—	—	dB
		$f = 870\text{ to }914\text{ MHz}$	10	—	—	dB
S_{22}	output return losses	$f = 40\text{ to }80\text{ MHz}$	21	—	—	dB
		$f = 80\text{ to }160\text{ MHz}$	21	—	—	dB
		$f = 160\text{ to }320\text{ MHz}$	20	—	—	dB
		$f = 320\text{ to }550\text{ MHz}$	19	—	—	dB
		$f = 550\text{ to }650\text{ MHz}$	18	—	—	dB
		$f = 650\text{ to }750\text{ MHz}$	17	—	—	dB
		$f = 750\text{ to }870\text{ MHz}$	16	—	—	dB
		$f = 870\text{ to }914\text{ MHz}$	14	—	—	dB
S_{21}	phase response	$f = 50\text{ MHz}$	-45	—	+45	deg
S_{12}	reverse isolation	$RF_{out}\text{ to }RF_{in}$	—	—	22	dB
CTB	composite triple beat	79 chs; $f_m = 445.25\text{ MHz}$; note 1	—	—	-76	dB
		112 chs; $f_m = 649.25\text{ MHz}$; note 2	—	—	-64	dB
		132 chs; $f_m = 745.25\text{ MHz}$; note 3	—	—	-55	dB
		79 chs flat; $V_o = 44\text{ dBmV}$; $f_m = 547.25\text{ MHz}$	—	—	-73	dB
		112 chs flat; $V_o = 44\text{ dBmV}$; $f_m = 745.25\text{ MHz}$	—	—	-64	dB
		132 chs flat; $V_o = 44\text{ dBmV}$; $f_m = 745.25\text{ MHz}$	—	—	-60	dB
X_{mod}	cross modulation	79 chs; $f_m = 55.25\text{ MHz}$; note 1	—	—	-70	dB
		112 chs; $f_m = 55.25\text{ MHz}$; note 2	—	—	-62	dB
		132 chs; $f_m = 55.25\text{ MHz}$; note 3	—	—	-57	dB
		79 chs flat; $V_o = 44\text{ dBmV}$; $f_m = 55.25\text{ MHz}$	—	—	-69	dB
		112 chs flat; $V_o = 44\text{ dBmV}$; $f_m = 55.25\text{ MHz}$	—	—	-65	dB
		132 chs flat; $V_o = 44\text{ dBmV}$; $f_m = 55.25\text{ MHz}$	—	—	-63	dB

860 MHz, 20 dB gain power doubler amplifier

CGD914; CGD914MI

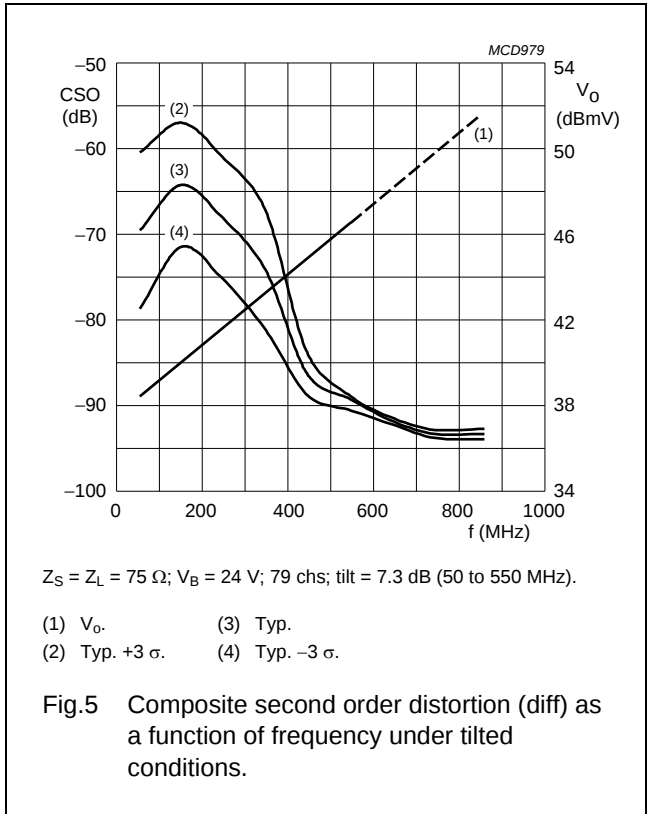
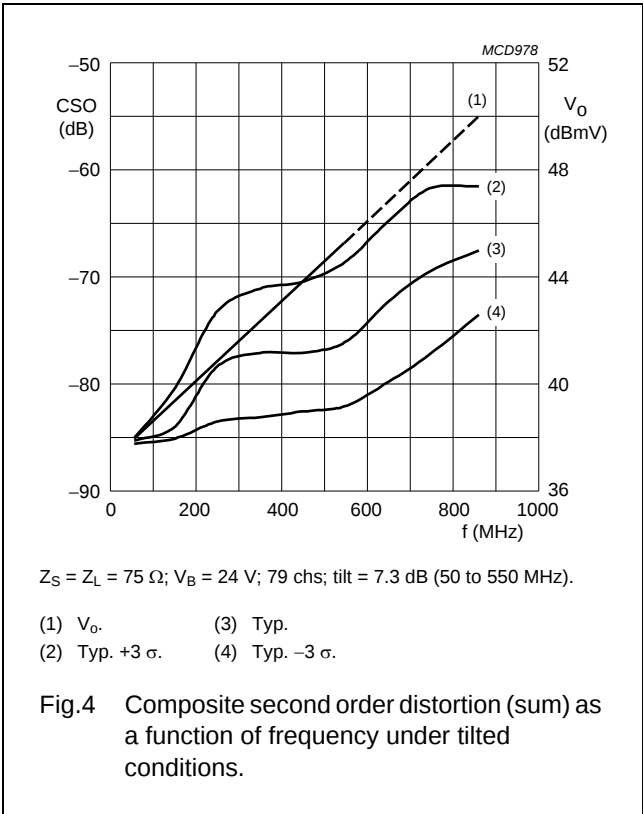
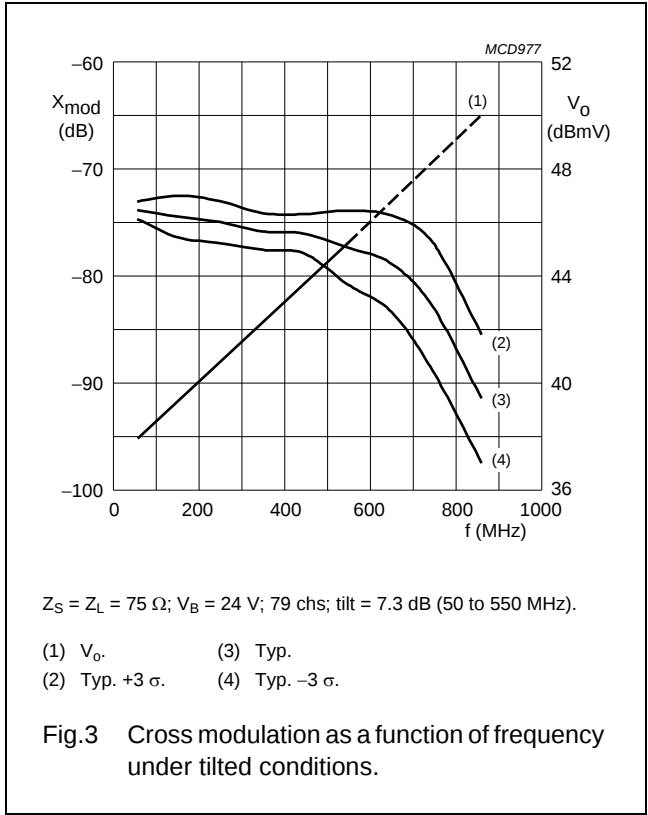
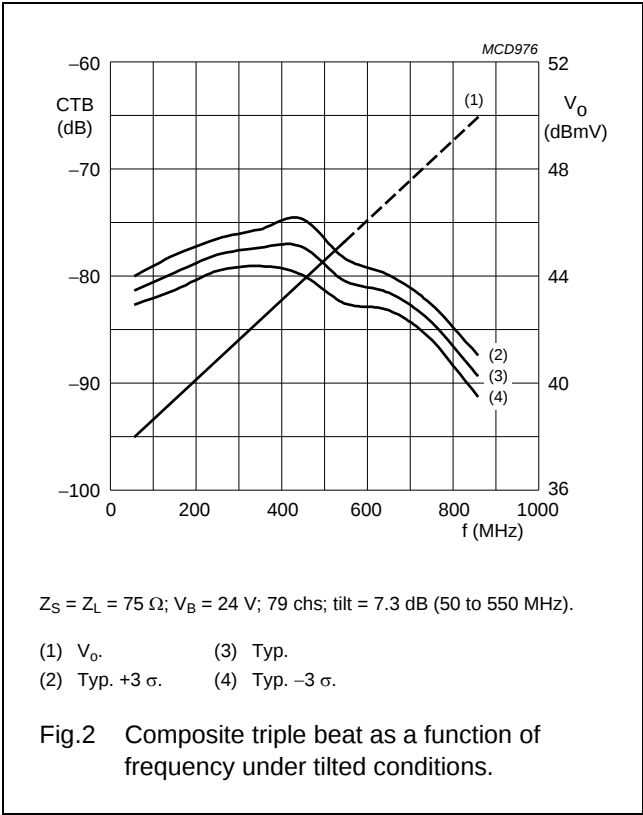
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
CSO Sum	composite second order distortion (sum)	79 chs; $f_m = 446.5$ MHz; note 1	–	–	–71	dB
		112 chs; $f_m = 746.5$ MHz; note 2	–	–	–60	dB
		132 chs; $f_m = 860.5$ MHz; note 3	–	–	–56	dB
		79 chs flat; $V_o = 44$ dBmV; $f_m = 548.5$ MHz	–	–	–63	dB
		112 chs flat; $V_o = 44$ dBmV; $f_m = 746.5$ MHz	–	–	–54	dB
		132 chs flat; $V_o = 44$ dBmV; $f_m = 860.5$ MHz	–	–	–49	dB
CSO Diff	composite second order distortion (diff)	79 chs; $f_m = 150$ MHz; note 1	–	–	–59	dB
		112 chs; $f_m = 150$ MHz; note 2	–	–	–53	dB
		132 chs; $f_m = 150$ MHz; note 3	–	–	–48	dB
		79 chs flat; $V_o = 44$ dBmV; $f_m = 150$ MHz	–	–	–60	dB
		112 chs flat; $V_o = 44$ dBmV; $f_m = 150$ MHz	–	–	–59	dB
		132 chs flat; $V_o = 44$ dBmV; $f_m = 150$ MHz	–	–	–57	dB
NF	noise figure	$f = 50$ MHz	–	2.5	3	dB
		$f = 550$ MHz	–	2.5	3	dB
		$f = 750$ MHz	–	2.6	3.5	dB
		$f = 870$ MHz	–	3	3.5	dB
d_2	second order distortion	note 4	–	–	–60	dB
		note 5	–	–	–54	dB
		note 6	–	–	–50	dB
V_o	output voltage	$d_{im} = -60$ dB; note 7	69	–	–	dBmV
		$d_{im} = -60$ dB; note 8	66	–	–	dBmV
		$d_{im} = -60$ dB; note 9	63	–	–	dBmV
I_{tot}	total current consumption (DC)	note 10	345	360	375	mA

Notes

- $V_o = 38$ dBmV at 54 MHz; Tilt = 7.3 dB (55 to 547 MHz) extrapolated to 12 dB at 870 MHz.
- $V_o = 38$ dBmV at 54 MHz; Tilt = 10.2 dB (55 to 745 MHz) extrapolated to 12 dB at 870 MHz.
- $V_o = 38$ dBmV at 54 MHz; Tilt = 12 dB (55 to 865 MHz).
- $f_p = 55.25$ MHz; $V_p = 60$ dBmV; $f_q = 493.25$ MHz; $V_q = 60$ dBmV; measured at $f_p + f_q = 548.5$ MHz.
- $f_p = 55.25$ MHz; $V_p = 60$ dBmV; $f_q = 691.25$ MHz; $V_q = 60$ dBmV; measured at $f_p + f_q = 746.5$ MHz.
- $f_p = 55.25$ MHz; $V_p = 60$ dBmV; $f_q = 805.25$ MHz; $V_q = 60$ dBmV; measured at $f_p + f_q = 860.5$ MHz.
- Measured according to DIN45004B: $f_p = 540.25$ MHz; $V_p = V_o$; $f_q = 547.25$ MHz; $V_q = V_o - 6$ dB; $f_r = 549.25$ MHz; $V_r = V_o - 6$ dB; measured at $f_p + f_q - f_r = 538.25$ MHz.
- Measured according to DIN45004B: $f_p = 740.25$ MHz; $V_p = V_o$; $f_q = 747.25$ MHz; $V_q = V_o - 6$ dB; $f_r = 749.25$ MHz; $V_r = V_o - 6$ dB; measured at $f_p + f_q - f_r = 738.25$ MHz.
- Measured according to DIN45004B: $f_p = 851.25$ MHz; $V_p = V_o$; $f_q = 858.25$ MHz; $V_q = V_o - 6$ dB; $f_r = 860.25$ MHz; $V_r = V_o - 6$ dB; measured at $f_p + f_q - f_r = 849.25$ MHz.
- The module normally operates at $V_B = 24$ V, but is able to withstand supply transients up to 30 V.

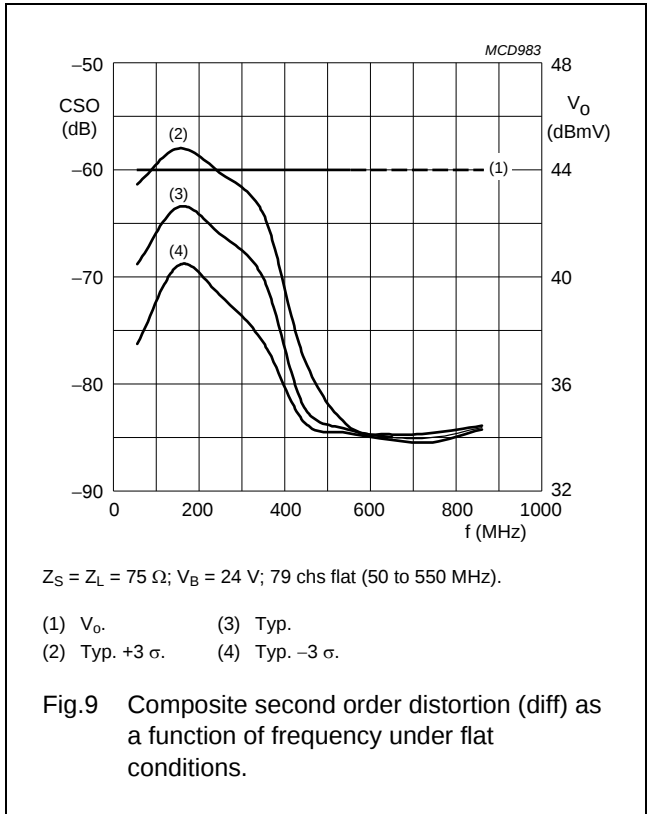
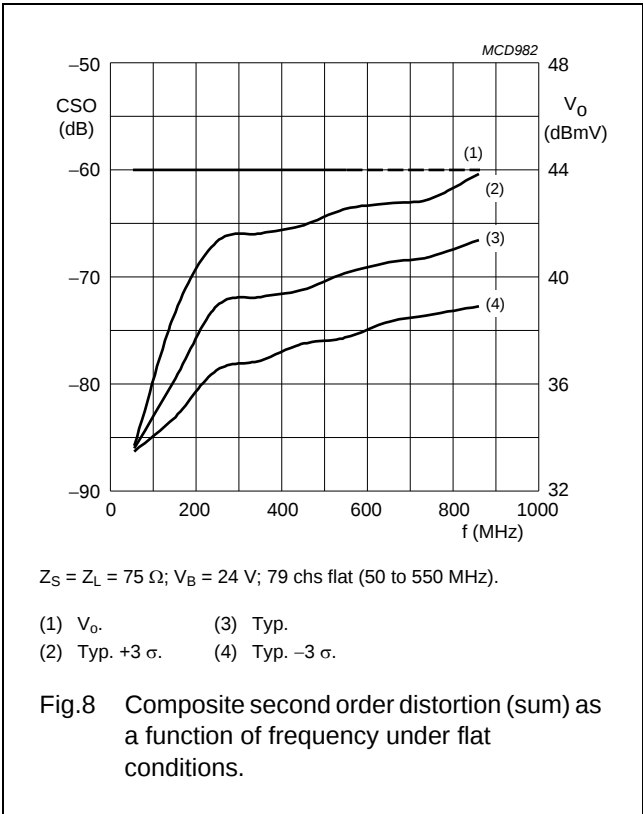
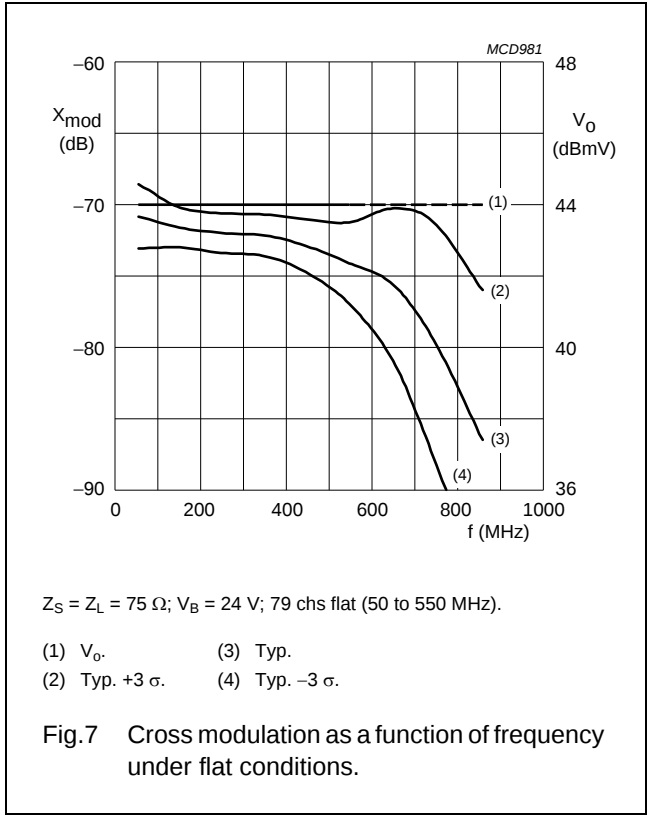
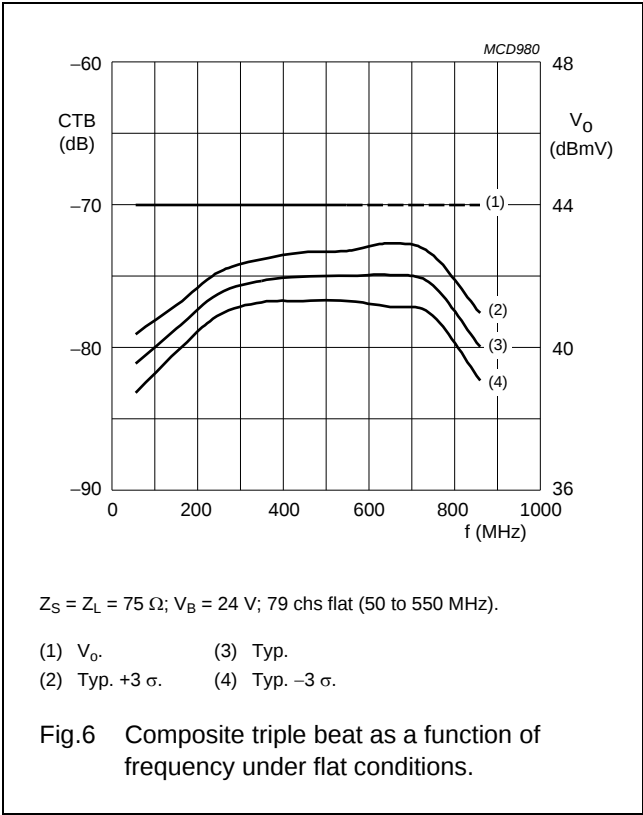
860 MHz, 20 dB gain power doubler amplifier

CGD914; CGD914MI



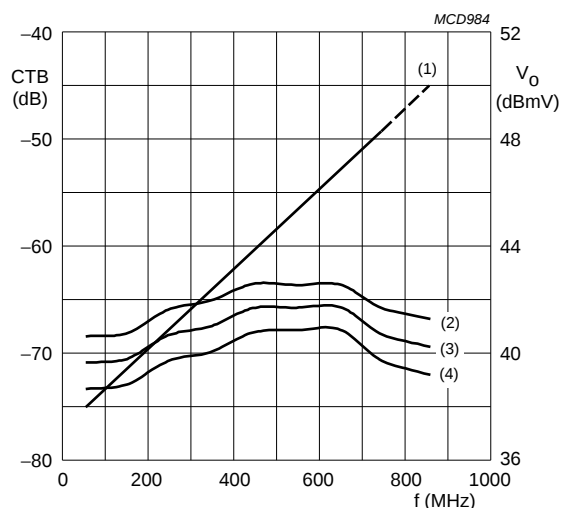
860 MHz, 20 dB gain power doubler
amplifier

CGD914; CGD914MI



860 MHz, 20 dB gain power doubler amplifier

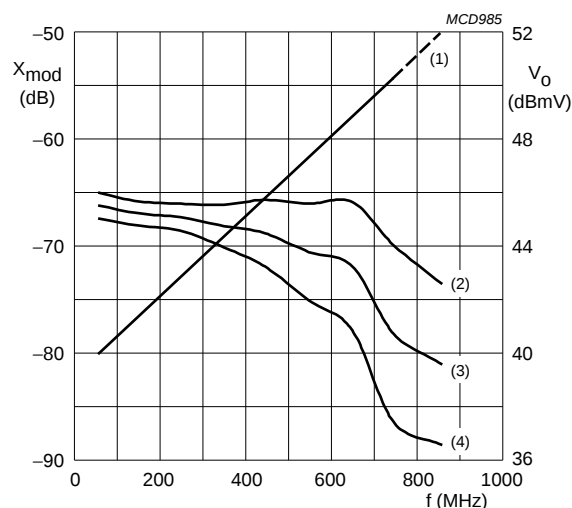
CGD914; CGD914MI



$Z_S = Z_L = 75 \Omega$; $V_B = 24 \text{ V}$; 112 chs; tilt = 10.2 dB (50 to 750 MHz).

- (1) V_0 . (3) Typ.
(2) Typ. +3 σ . (4) Typ. -3 σ .

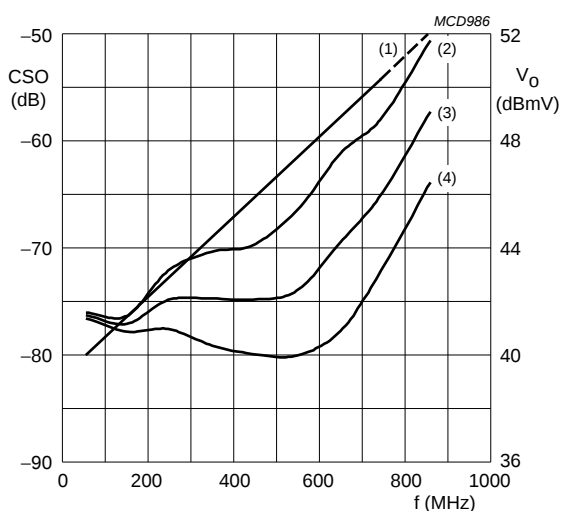
Fig.10 Composite triple beat as a function of frequency under tilted conditions.



$Z_S = Z_L = 75 \Omega$; $V_B = 24 \text{ V}$; 112 chs; tilt = 10.2 dB (50 to 750 MHz).

- (1) V_0 . (3) Typ.
(2) Typ. +3 σ . (4) Typ. -3 σ .

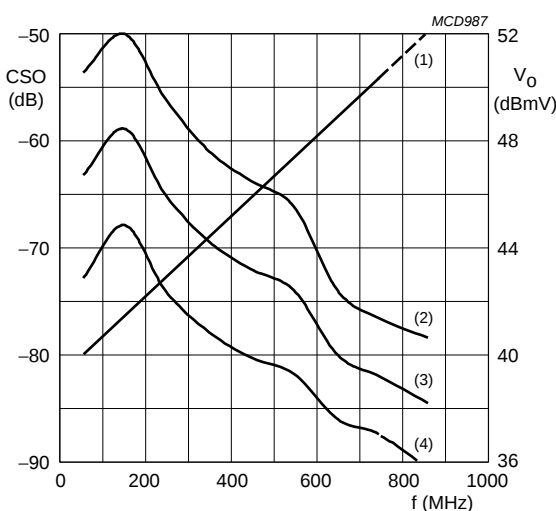
Fig.11 Cross modulation as a function of frequency under tilted conditions.



$Z_S = Z_L = 75 \Omega$; $V_B = 24 \text{ V}$; 112 chs; tilt = 10.2 dB (50 to 750 MHz).

- (1) V_0 . (3) Typ.
(2) Typ. +3 σ . (4) Typ. -3 σ .

Fig.12 Composite second order distortion (sum) as a function of frequency under tilted conditions.



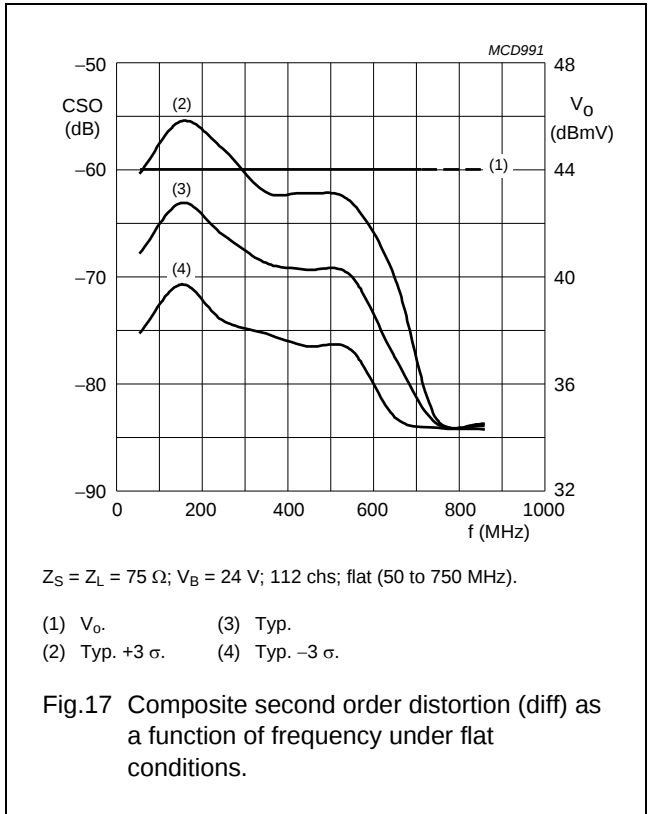
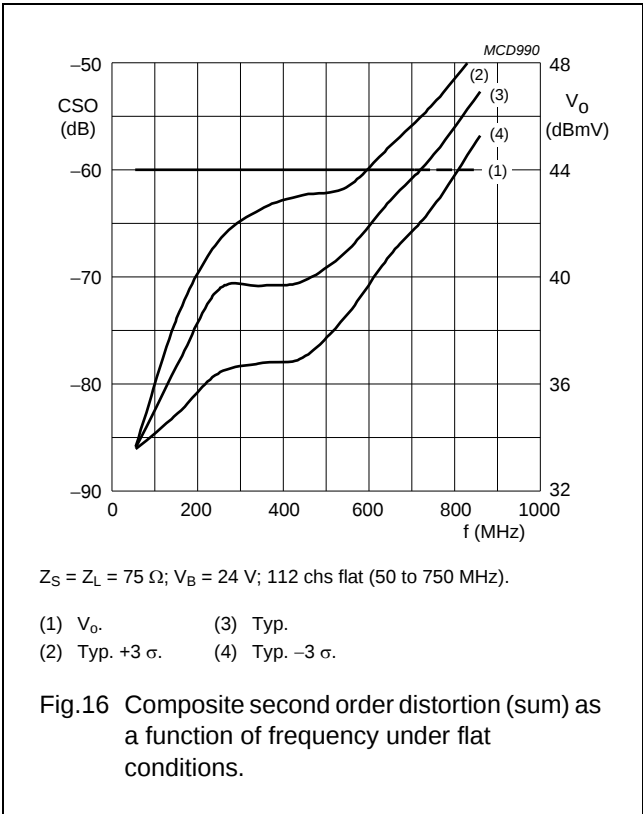
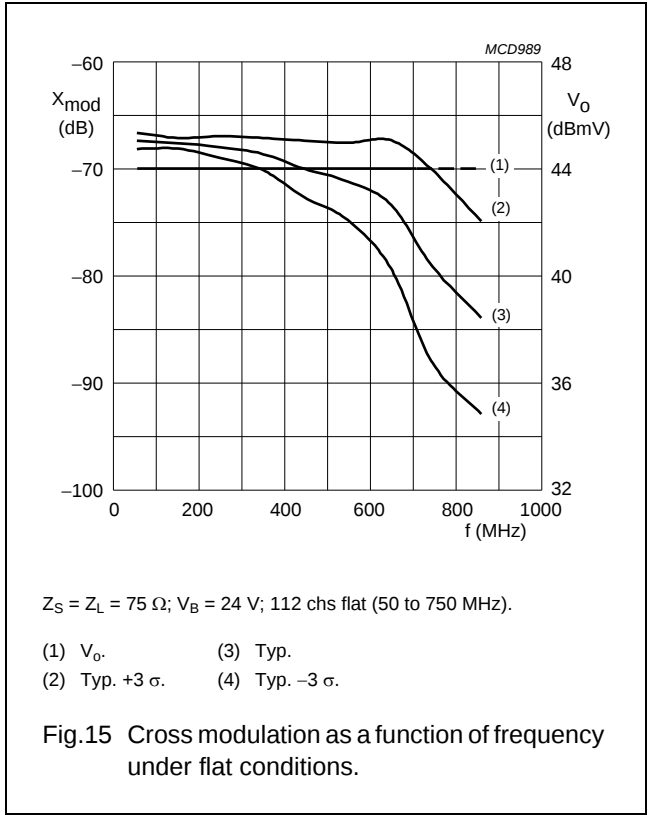
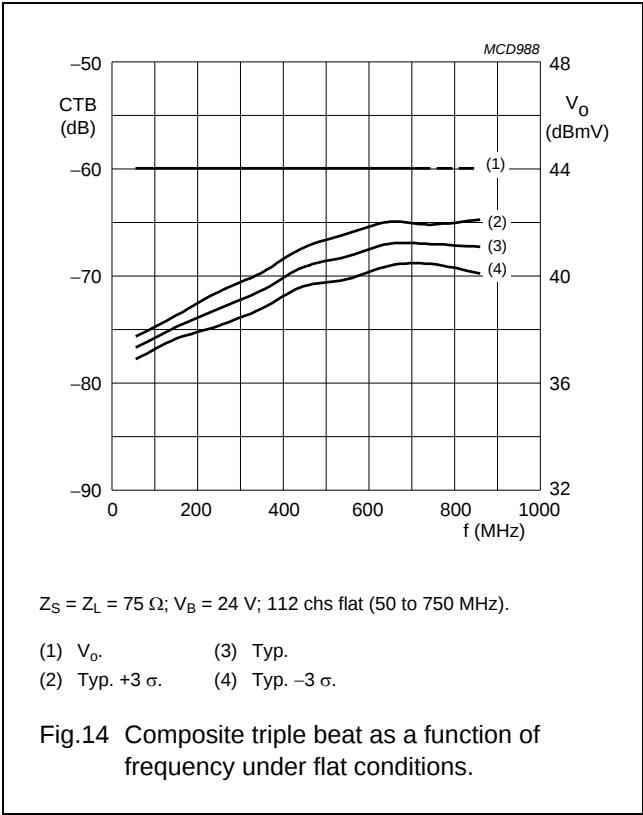
$Z_S = Z_L = 75 \Omega$; $V_B = 24 \text{ V}$; 112 chs; tilt = 10.2 dB (50 to 750 MHz).

- (1) V_0 . (3) Typ.
(2) Typ. +3 σ . (4) Typ. -3 σ .

Fig.13 Composite second order distortion (diff) as a function of frequency under tilted conditions.

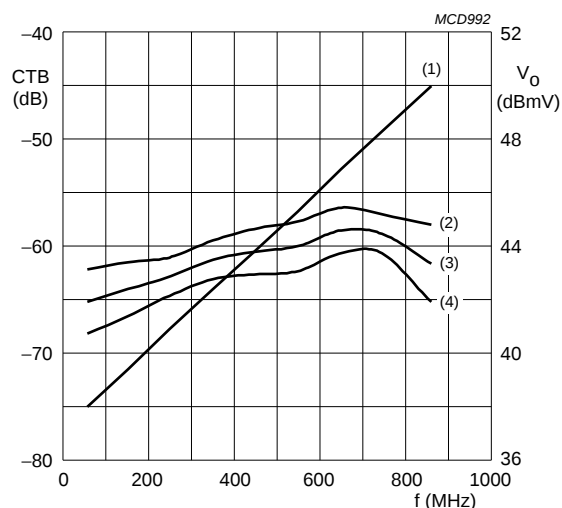
860 MHz, 20 dB gain power doubler
amplifier

CGD914; CGD914MI



860 MHz, 20 dB gain power doubler amplifier

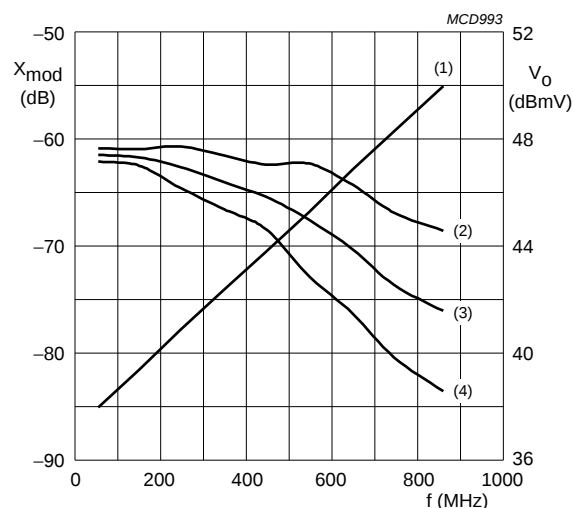
CGD914; CGD914MI



$Z_S = Z_L = 75 \Omega$; $V_B = 24 \text{ V}$; 132 chs; tilt = 12 dB (50 to 870 MHz).

- (1) V_0 . (3) Typ.
(2) Typ. +3 σ . (4) Typ. -3 σ .

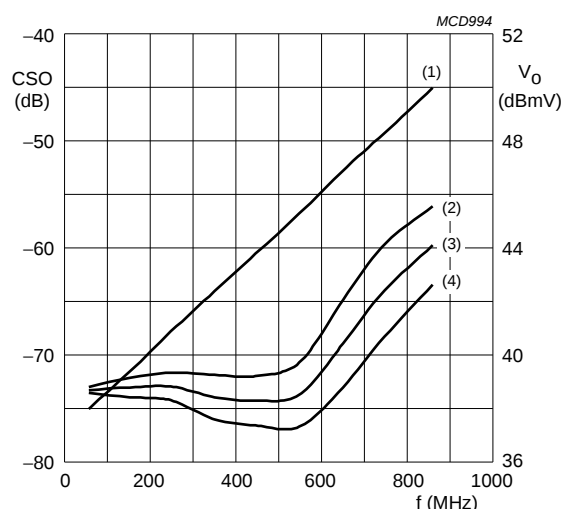
Fig.18 Composite triple beat as a function of frequency under tilted conditions.



$Z_S = Z_L = 75 \Omega$; $V_B = 24 \text{ V}$; 132 chs; tilt = 12 dB (50 to 870 MHz).

- (1) V_0 . (3) Typ.
(2) Typ. +3 σ . (4) Typ. -3 σ .

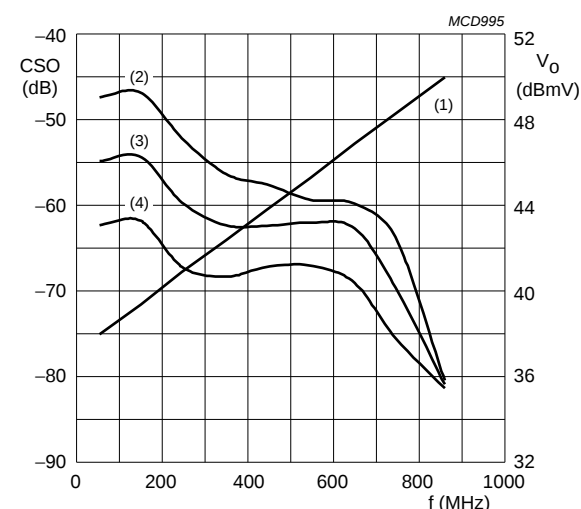
Fig.19 Cross modulation as a function of frequency under tilted conditions.



$Z_S = Z_L = 75 \Omega$; $V_B = 24 \text{ V}$; 132 chs; tilt = 12 dB (50 to 870 MHz).

- (1) V_0 . (3) Typ.
(2) Typ. +3 σ . (4) Typ. -3 σ .

Fig.20 Composite second order distortion (sum) as a function of frequency under tilted conditions.



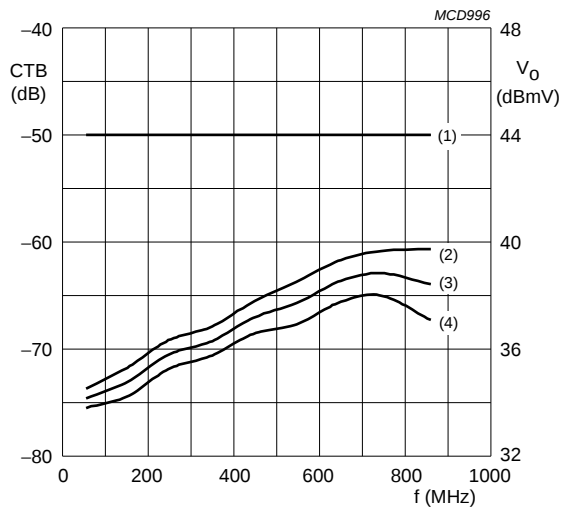
$Z_S = Z_L = 75 \Omega$; $V_B = 24 \text{ V}$; 132 chs; tilt = 12 dB (50 to 870 MHz).

- (1) V_0 . (3) Typ.
(2) Typ. +3 σ . (4) Typ. -3 σ .

Fig.21 Composite second order distortion (diff) as a function of frequency under tilted conditions.

860 MHz, 20 dB gain power doubler
amplifier

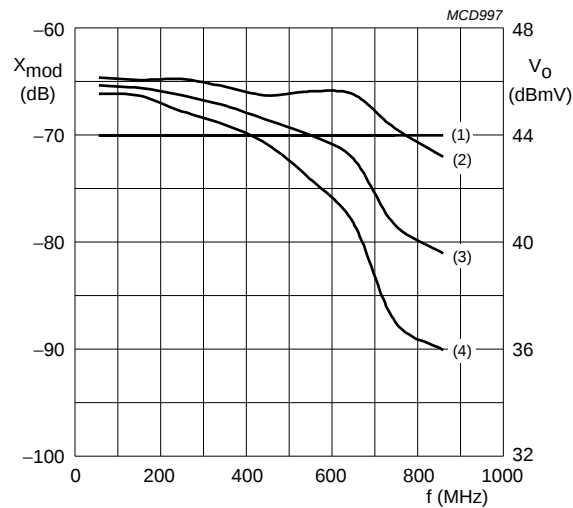
CGD914; CGD914MI



$Z_S = Z_L = 75 \Omega$; $V_B = 24 \text{ V}$; 132 chs flat (50 to 870 MHz).

- (1) V_O . (3) Typ.
(2) Typ. +3 σ . (4) Typ. -3 σ .

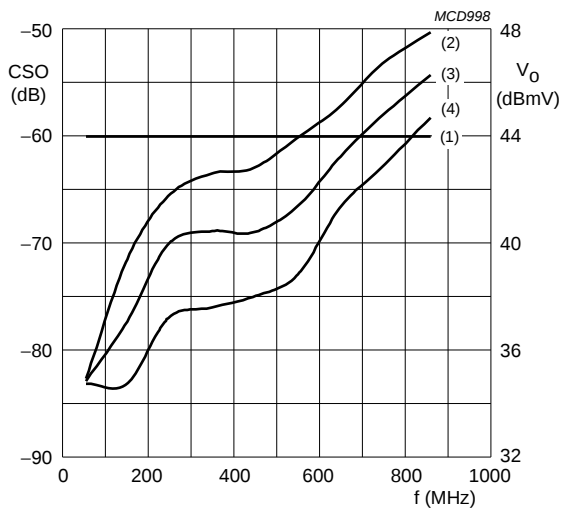
Fig.22 Composite triple beat as a function of frequency under flat conditions.



$Z_S = Z_L = 75 \Omega$; $V_B = 24 \text{ V}$; 132 chs flat (50 to 870 MHz).

- (1) V_O . (3) Typ.
(2) Typ. +3 σ . (4) Typ. -3 σ .

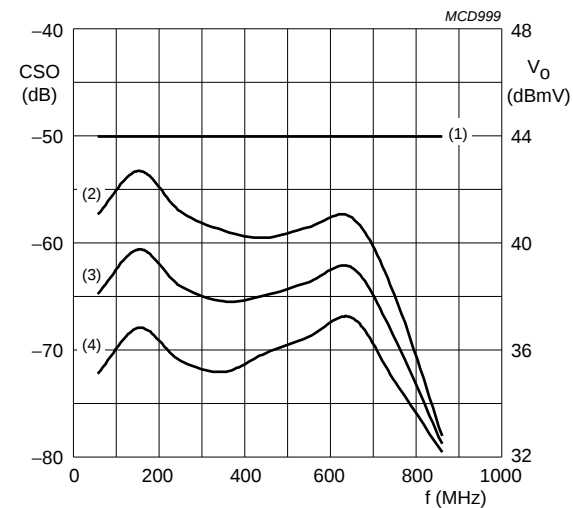
Fig.23 Cross modulation as a function of frequency under flat conditions.



$Z_S = Z_L = 75 \Omega$; $V_B = 24 \text{ V}$; 132 chs flat (50 to 870 MHz).

- (1) V_O . (3) Typ.
(2) Typ. +3 σ . (4) Typ. -3 σ .

Fig.24 Composite second order distortion (sum) as a function of frequency under flat conditions.



$Z_S = Z_L = 75 \Omega$; $V_B = 24 \text{ V}$; 132 chs flat (50 to 870 MHz).

- (1) V_O . (3) Typ.
(2) Typ. +3 σ . (4) Typ. -3 σ .

Fig.25 Composite second order distortion (diff) as a function of frequency under flat conditions.

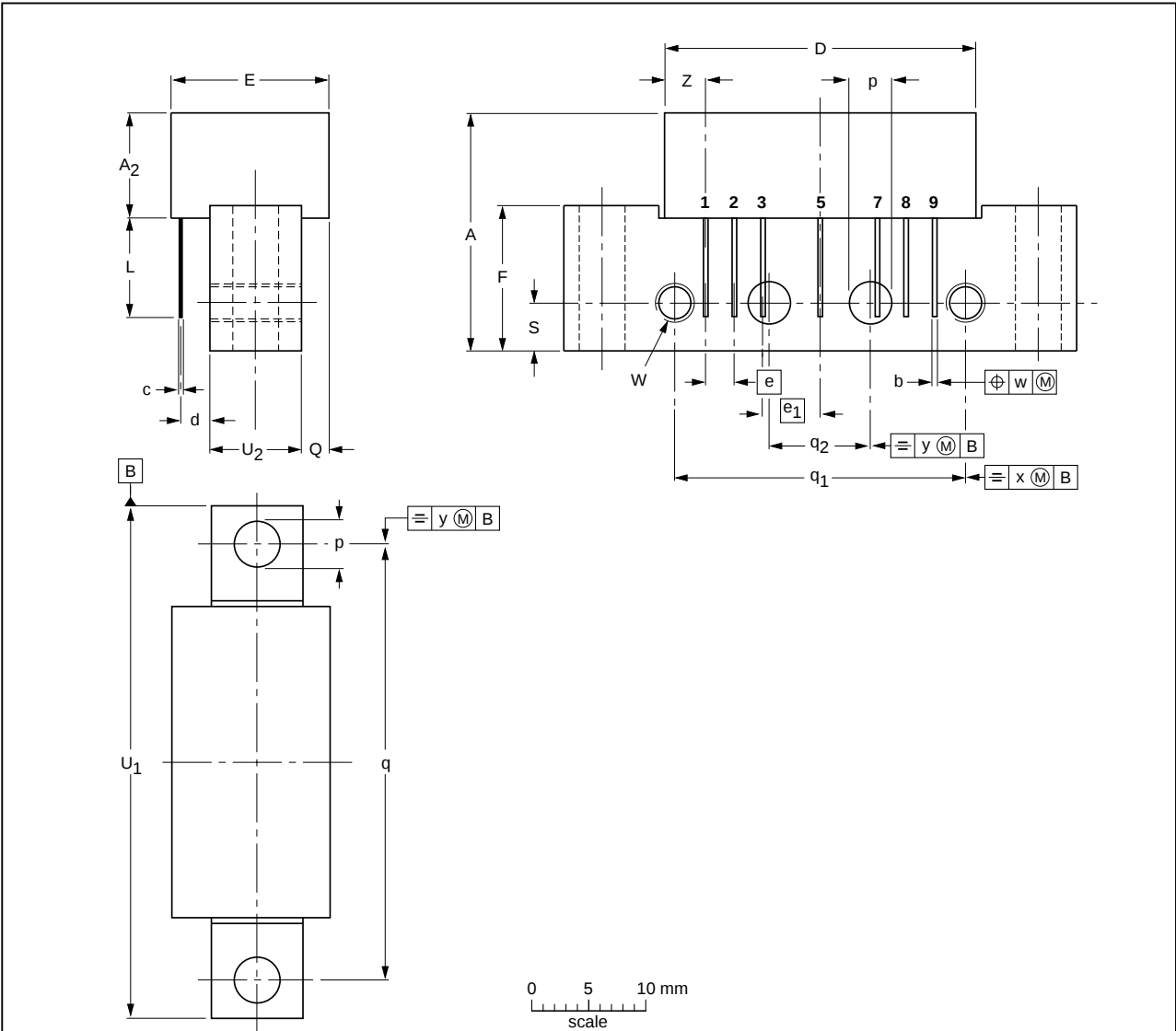
860 MHz, 20 dB gain power doubler
amplifier

CGD914; CGD914MI

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 ₂ max.	b	c	D max.	d	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	2.04 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

860 MHz, 20 dB gain power doubler amplifier

CGD914; CGD914MI

DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

Notes

1. Please consult the most recently issued document before initiating or completing a design.
2. 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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860 MHz, 20 dB gain power doubler amplifier

CGD914; CGD914MI

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Customer notification

This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content, except for package outline drawings which were updated to the latest version.

Contact information

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