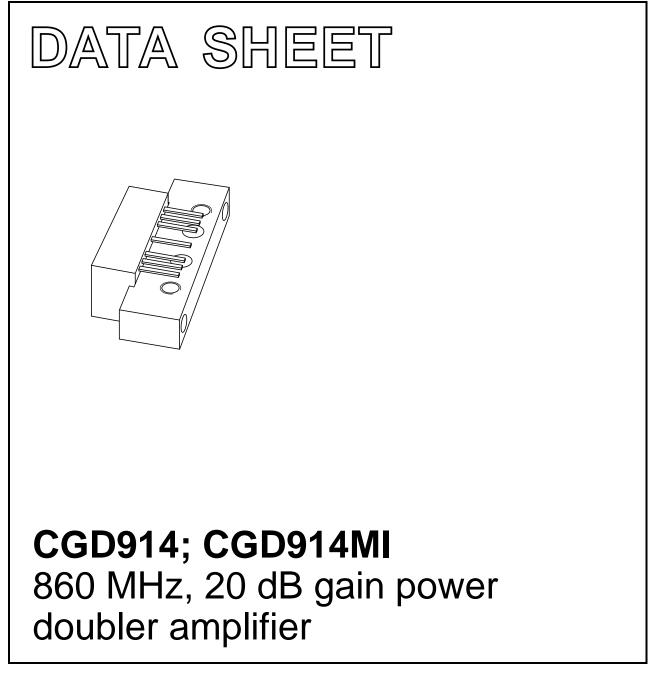
## DISCRETE SEMICONDUCTORS



Product specification Supersedes data of 2000 Jul 25 2001 Nov 01



## 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 <sub>B</sub>	+V <sub>B</sub>	
7 and 8	common	common	
9	output	input	

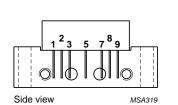


Fig.1 Simplified outline.

### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
G <sub>p</sub>	power gain	f = 45 MHz	19.75	20.25	dB
		f = 870 MHz	20.2	21.5	dB
I <sub>tot</sub>	total current consumption (DC)	V <sub>B</sub> = 24 V	345	375	mA

#### LIMITING VALUES

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

SYMBOL	PARAMETER		MAX.	UNIT
V <sub>B</sub>	supply voltage		30	V
Vi	RF input voltage		-	
	single tone		70	dBmV
	132 channels flat	_	45	dBmV
T <sub>stg</sub>	storage temperature		+100	°C
T <sub>mb</sub>	operating mounting base temperature		+100	°C

## CGD914; CGD914MI

### CHARACTERISTICS

Bandwidth 45 to 870 MHz; V\_B = 24 V; T\_mb = 35 °C; Z\_S = Z\_L = 75  $\Omega.$ 

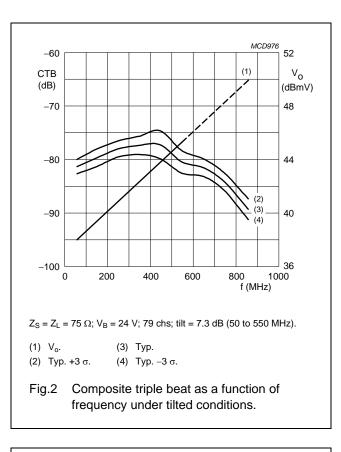
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
G <sub>p</sub>	power gain	f = 45 MHz	19.75	20	20.25	dB
		f = 870 MHz	20.2	21	21.5	dB
SL	slope straight line	f = 45 to 870 MHz	0.2	1	1.5	dB
FL	flatness straight line	f = 45 to 100 MHz	-0.25	_	+0.25	dB
		f = 100 to 800 MHz	-0.6	_	+0.4	dB
		f = 800 to 870 MHz	-0.45	_	+0.2	dB
	flatness narrow band	in each 6 MHz segment	-	-	±0.1	dB
S <sub>11</sub>	input return losses	f = 40 to 80 MHz	20	_	_	dB
		f = 80 to 160 MHz	20	-	-	dB
		f = 160 to 320 MHz	18	-	-	dB
		f = 320 to 550 MHz	16	-	-	dB
		f = 550 to 650 MHz	15	-	-	dB
		f = 650 to 750 MHz	14	-	-	dB
		f = 750 to 870 MHz	14	-	-	dB
		f = 870 to 914 MHz	10	-	-	dB
S <sub>22</sub>	output return losses	f = 40 to 80 MHz	21	-	-	dB
		f = 80 to 160 MHz	21	_	_	dB
		f = 160 to 320 MHz	20	-	-	dB
		f = 320 to 550 MHz	19	-	-	dB
		f = 550 to 650 MHz	18	-	-	dB
		f = 650 to 750 MHz	17	-	-	dB
		f = 750 to 870 MHz	16	-	-	dB
		f = 870 to 914 MHz	14	-	-	dB
s <sub>21</sub>	phase response	f = 50 MHz	-45	-	+45	deg
s <sub>12</sub>	reverse isolation	RF <sub>out</sub> to RF <sub>in</sub>	_	-	22	dB
CTB	composite triple beat	79 chs; f <sub>m</sub> = 445.25 MHz; note 1	_	-	-76	dB
		112 chs; f <sub>m</sub> = 649.25 MHz; note 2	_	-	-64	dB
		132 chs; f <sub>m</sub> = 745.25 MHz; note 3	-	-	-55	dB
		79 chs flat; $V_o = 44 \text{ dBmV}$ ; $f_m = 547.25 \text{ MHz}$	_	-	-73	dB
		112 chs flat; $V_0 = 44 \text{ dBmV}$ ; $f_m = 745.25 \text{ MHz}$	_	-	-64	dB
		132 chs flat; $V_0$ = 44 dBmV; $f_m$ = 745.25 MHz	_	-	-60	dB
X <sub>mod</sub>	cross modulation	79 chs; f <sub>m</sub> = 55.25 MHz; note 1	-	-	-70	dB
		112 chs; f <sub>m</sub> = 55.25 MHz; note 2	_	-	-62	dB
		132 chs; f <sub>m</sub> = 55.25 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

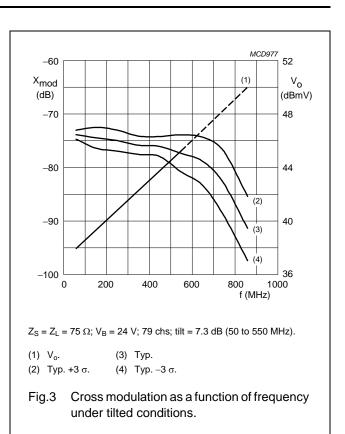
### CGD914; CGD914MI

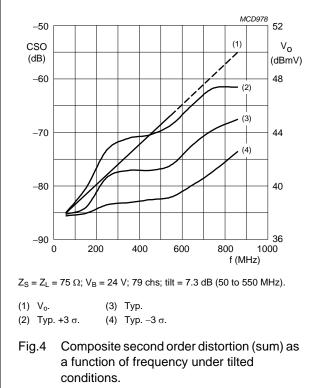
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
	composite second order distortion (sum)	79 chs; f <sub>m</sub> = 446.5 MHz; note 1	-	-	-71	dB
		112 chs; f <sub>m</sub> = 746.5 MHz; note 2	_	_	-60	dB
		132 chs; f <sub>m</sub> = 860.5 MHz; note 3	_	-	-56	dB
		79 chs flat; $V_0 = 44 \text{ dBmV}$ ; $f_m = 548.5 \text{ MHz}$	-	-	-63	dB
		112 chs flat; $V_o = 44 \text{ dBmV}$ ; $f_m = 746.5 \text{ MHz}$	-	-	-54	dB
		132 chs flat; $V_o = 44 \text{ dBmV}$ ; $f_m = 860.5 \text{ MHz}$	-	-	-49	dB
CSO Diff	composite second	79 chs; f <sub>m</sub> = 150 MHz; note 1	-	-	-59	dB
	order distortion (diff)	112 chs; f <sub>m</sub> = 150 MHz; note 2	_	-	-53	dB
		132 chs; f <sub>m</sub> = 150 MHz; note 3	_	_	-48	dB
		79 chs flat; $V_o = 44 \text{ dBmV}$ ; $f_m = 150 \text{ MHz}$	_	_	-60	dB
		112 chs flat; $V_o = 44 \text{ dBmV}$ ; $f_m = 150 \text{ MHz}$	_	_	-59	dB
		132 chs flat; $V_o = 44 \text{ dBmV}$ ; $f_m = 150 \text{ MHz}$	_	_	-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 <sub>2</sub>	second order distortion	note 4	_	_	-60	dB
		note 5	_	-	-54	dB
		note 6	-	-	-50	dB
Vo	output voltage	d <sub>im</sub> = -60 dB; note 7	69	_	_	dBmV
		d <sub>im</sub> = -60 dB; note 8	66	_	_	dBmV
		d <sub>im</sub> = -60 dB; note 9	63	-	-	dBmV
I <sub>tot</sub>	total current consumption (DC)	note 10	345	360	375	mA

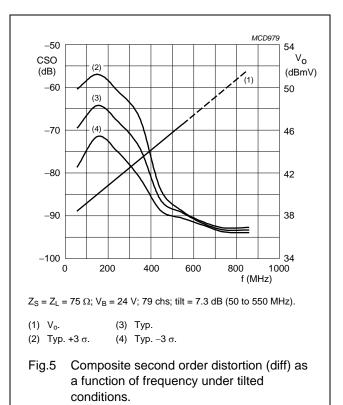
#### Notes

- 1.  $V_0 = 38 \text{ dBmV}$  at 54 MHz; Tilt = 7.3 dB (55 to 547 MHz) extrapolated to 12 dB at 870 MHz.
- 2.  $V_0 = 38$  dBmV at 54 MHz; Tilt = 10.2 dB (55 to 745 MHz) extrapolated to 12 dB at 870 MHz.
- 3.  $V_0 = 38 \text{ dBmV}$  at 54 MHz; Tilt = 12 dB (55 to 865 MHz).
- 4.  $f_p = 55.25 \text{ MHz}$ ;  $V_p = 60 \text{ dBmV}$ ;  $f_q = 493.25 \text{ MHz}$ ;  $V_q = 60 \text{ dBmV}$ ; measured at  $f_p + f_q = 548.5 \text{ MHz}$ .
- 5.  $f_p = 55.25 \text{ MHz}$ ;  $V_p = 60 \text{ dBmV}$ ;  $f_q = 691.25 \text{ MHz}$ ;  $V_q = 60 \text{ dBmV}$ ; measured at  $f_p + f_q = 746.5 \text{ MHz}$ .
- 6.  $f_p = 55.25 \text{ MHz}$ ;  $V_p = 60 \text{ dBmV}$ ;  $f_q = 805.25 \text{ MHz}$ ;  $V_q = 60 \text{ dBmV}$ ; measured at  $f_p + f_q = 860.5 \text{ MHz}$ .
- 7. 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.
- 8. 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.
- 9. 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.
- 10. The module normally operates at  $V_B = 24$  V, but is able to withstand supply transients up to 30 V.









-60

СТВ

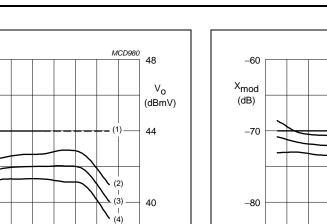
(dB)

-70

-80

CGD914; CGD914MI

### 860 MHz, 20 dB gain power doubler amplifier



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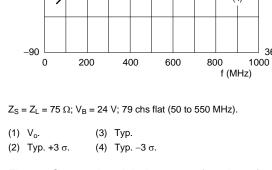
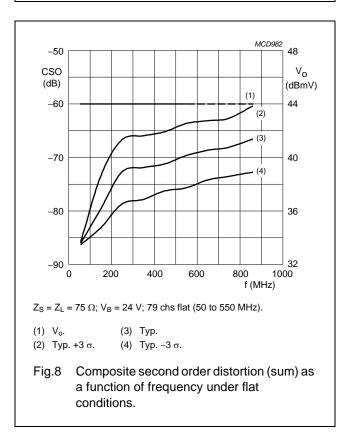
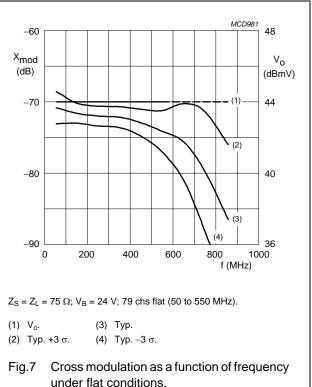
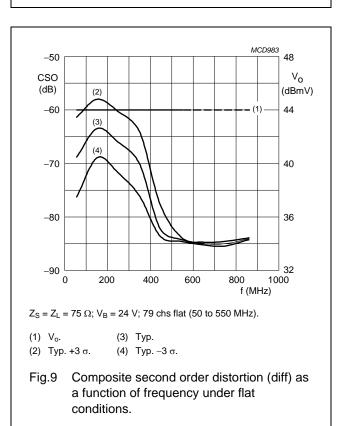
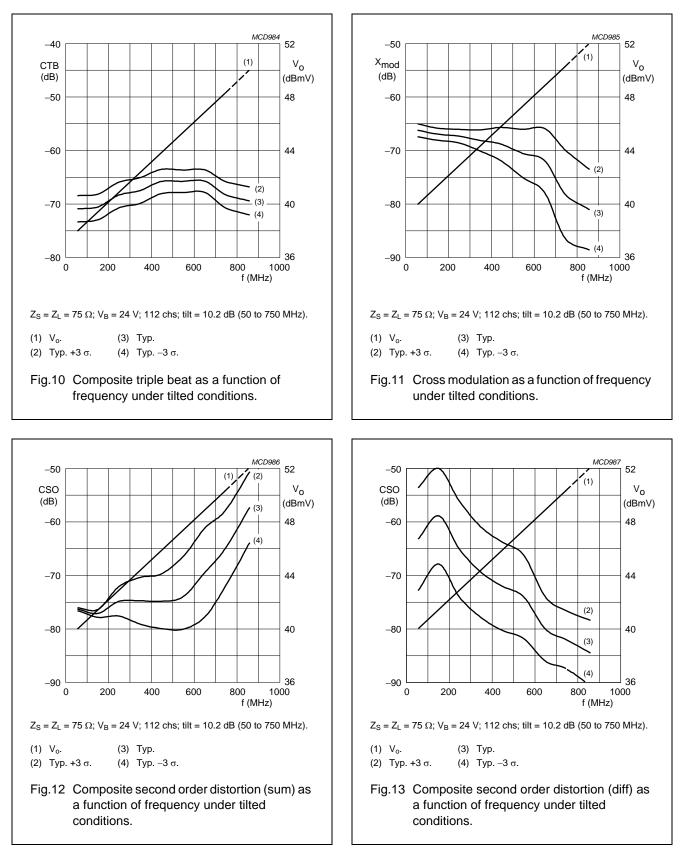


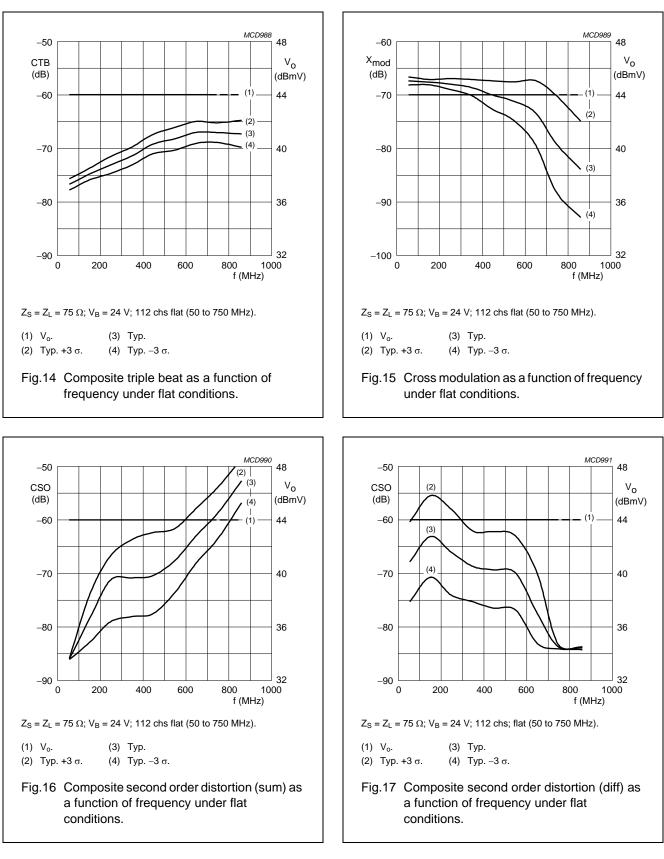
Fig.6 Composite triple beat as a function of frequency under flat conditions.



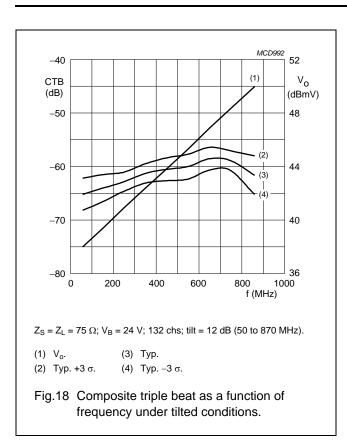


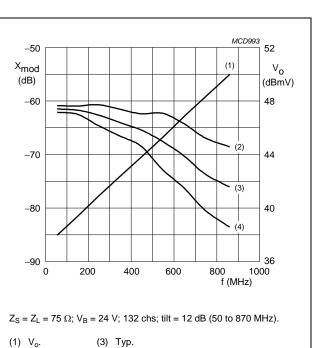






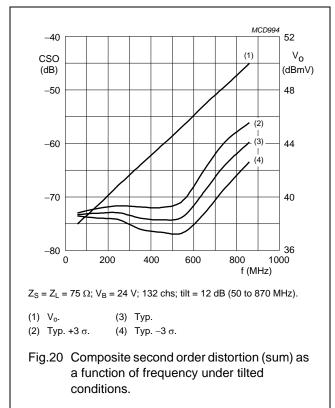
### CGD914; CGD914MI

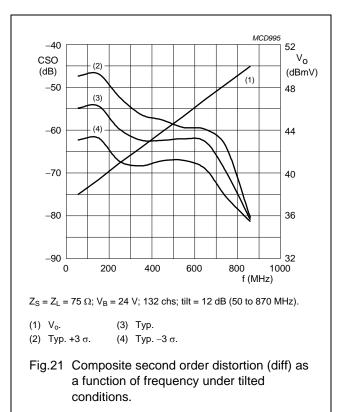


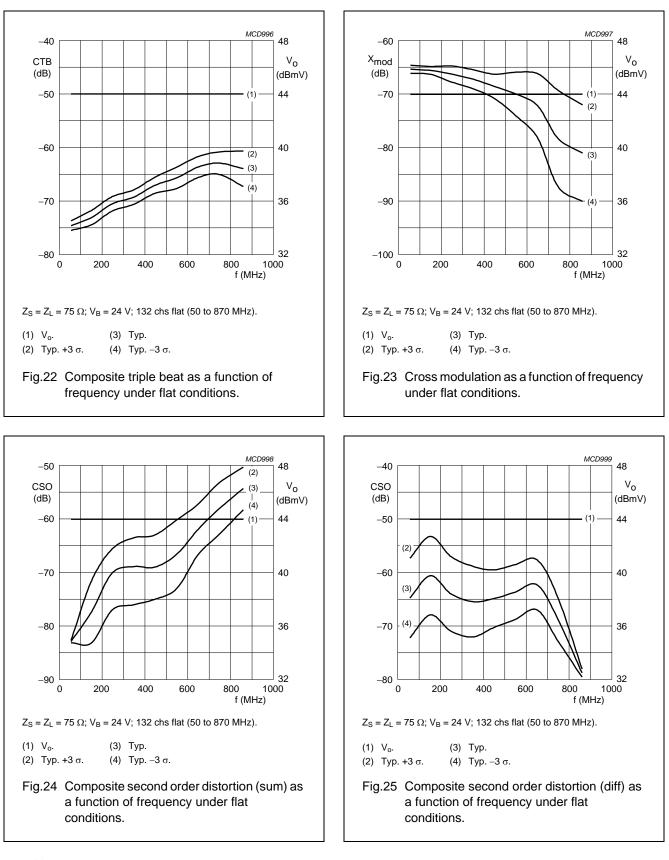


(2) Typ. +3 σ. (4) Typ. -3 σ.

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

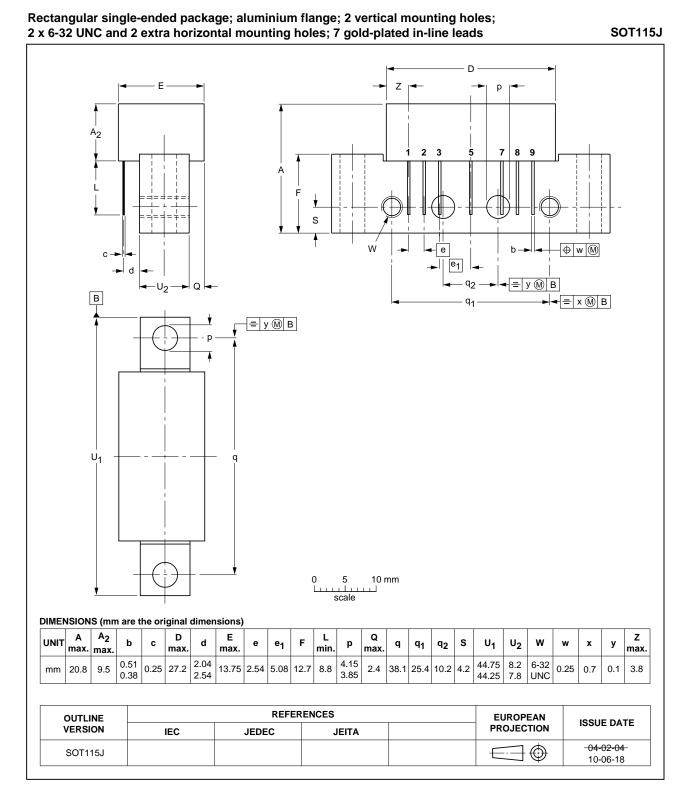






### CGD914; CGD914MI

#### PACKAGE OUTLINE



CGD914; CGD914MI

#### DATA SHEET STATUS

DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	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.

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