

PRELIMINARY DATASHEET

CGY2870AUH/C1 80-110GHz Detector Diode

DESCRIPTION

The CGY2870AUH/C1 is a high performance GaAs 50 Ohms matched zero bias detector diode operating as high as W-band.

As a detector diode, the CGY2870AUH/C1 has a sensitivity of 8.5 mV / μ W at 100 GHz

The die have been carefully designed to support a connection by bondings.

The die is manufactured using the OMMIC's RITD (Resonant Interband Tunnel Diode) Technology. The MMIC uses gold bonding pads and backside metallization and is fully protected with Silicon Nitride passivation to obtain the highest level of reliability.

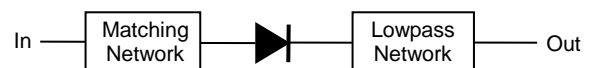
This part is the member of a chipset dedicated to radiometer type of application for passive imaging at very high frequency.

APPLICATIONS

- ▶ Passive and Active radar imaging
- ▶ Radiometer
- ▶ Telecommunication
- ▶ Instrumentation

FEATURES

- ▶ Operating Range 80 to 110 GHz
- ▶ Sensitivity : 8.5mV/ μ W
- ▶ NEP : 11pW/ $\sqrt{\text{Hz}}$
- ▶ Input power < 0 dBm
- ▶ Input matching : -15dB @ 100GHz
- ▶ Chip size = 900 x 770 x 100 μ m
- ▶ Device Availability :
 - Tested, Inspected Known Good Die (KGD)



CGY2870AUH/C1 Block Diagram



LIMITING VALUES

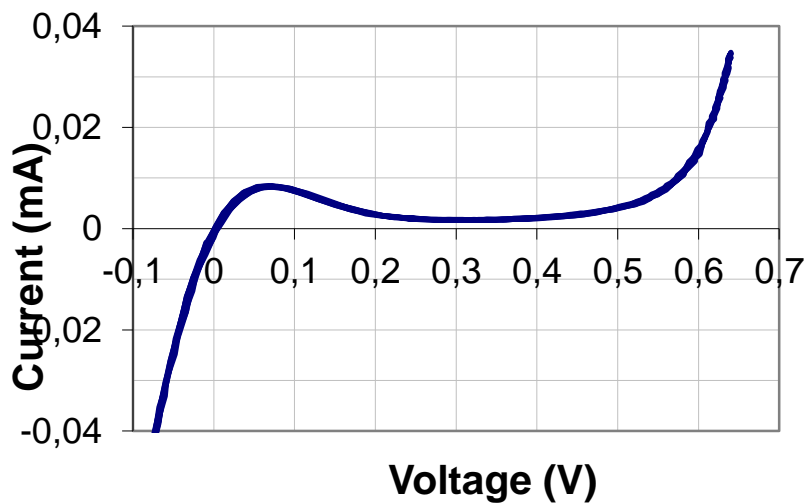
$T_{amb} = 25\text{ °C}$ unless otherwise specified

| Symbol | Parameter | Conditions | MIN. | MAX. | UNIT |
|-----------|----------------------|------------|------|------|------|
| PinMax | Maximum Input power | | | 5 | dBm |
| T_{stg} | Storage temperature | | -55 | +150 | °C |
| T_j | Junction temperature | | | +150 | °C |
| T_{amb} | Ambient temperature | | -10 | +85 | °C |

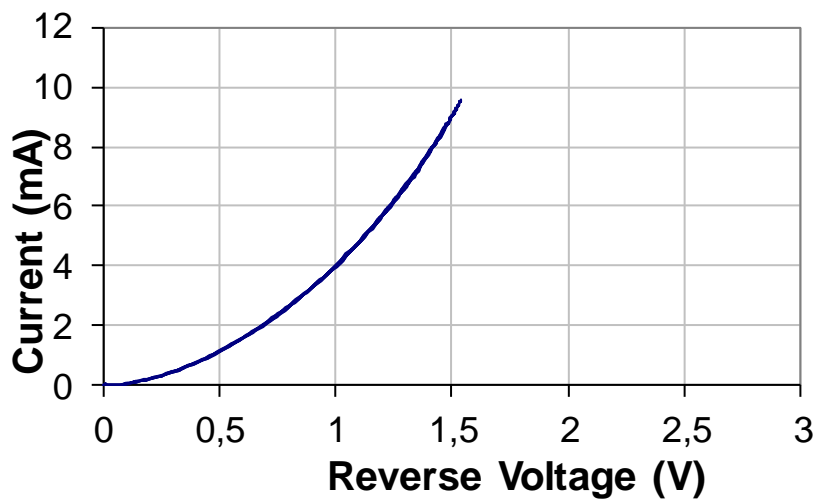
DC CHARACTERISTICS

$T_{amb} = 25\text{ °C}$ unless otherwise specified

Forward Voltage-Current meas



Reverse Breakdown Voltage meas

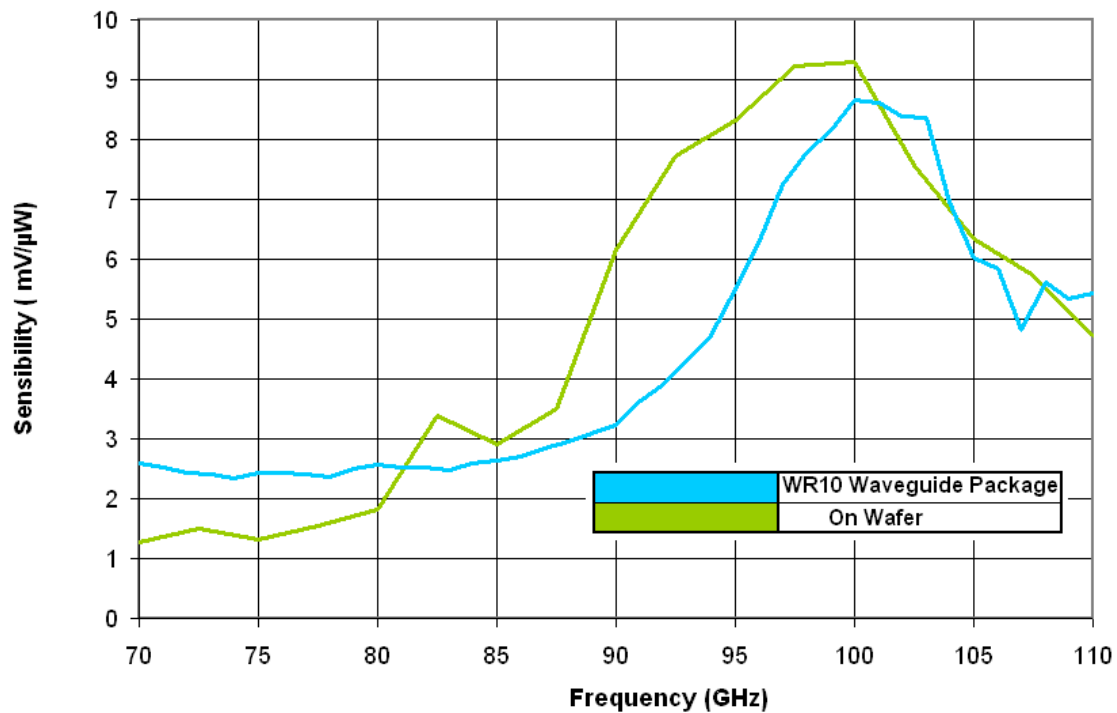


RF MEASUREMENTS

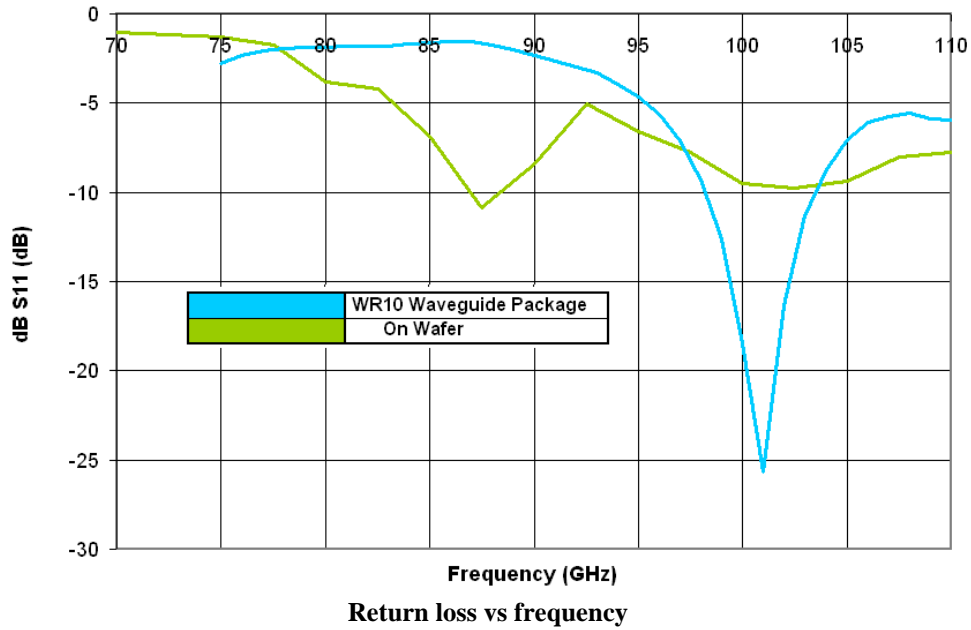
$T_{amb} = 25\text{ }^{\circ}\text{C}$, On-wafer and in-package measurements using $50\ \Omega$ RF probes. Unless otherwise specified.

| Symbol | Parameter | Conditions | MIN. | TYP. | MAX. | UNIT |
|----------|------------------------|--------------------------|------|------|------|------------------------|
| Sensiv_1 | Sensitivity | From 98 to 103 GHz | | 7 | | mV/ μW |
| Sensiv_2 | Sensitivity | From 94 to 110 GHz | | 4 | | mV/ μW |
| Rj | Junction Resistance | | | 5 | | k Ω |
| NEP | Noise Equivalent Power | From 94 to 110GHz | 1.1 | 1.3 | 1.6 | pW/ $\sqrt{\text{Hz}}$ |
| IRL_1 | Input return loss | From 97 to 104 GHz | | -10 | | dB |
| IRL_2 | Input return loss | From 95 to 110 GHz | | -5 | | dB |
| MIP | Maximum Input Power | CW mode - No degradation | | | 0 | dBm |

Sensibility meas on wafer wrt in waveguide package

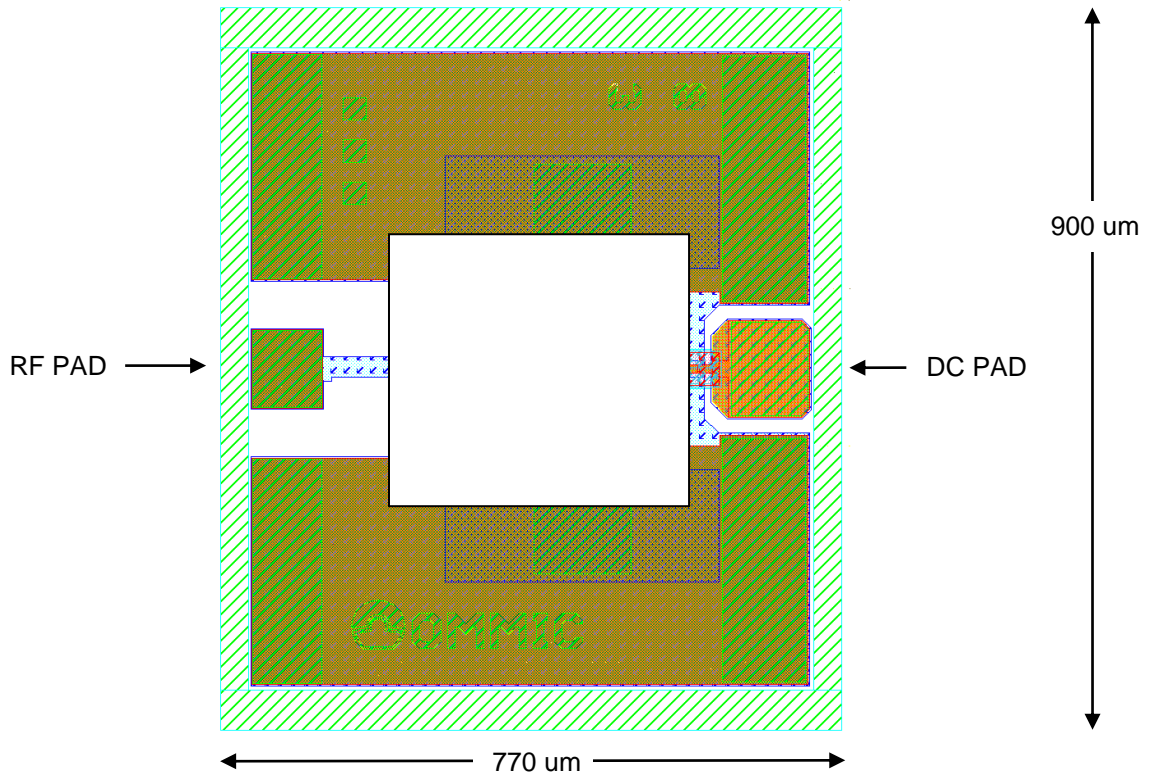


Sensitivity vs frequency @ $P_{in} = -25\text{dBm}$



MECANICAL INFORMATION

Here below is a top view of the device



APPLICATION INFORMATION

Recommended application scheme

A recommended typical module layout is proposed below. In this figure, the RF input of detector diode is connected to the output of a OMMIC LNA CGY2190UH/C2.

In order to minimize the inductance The output pad of the LNA should be connected to the input pad of the detector diode using 2 wires in parallel with the shortest length possible.

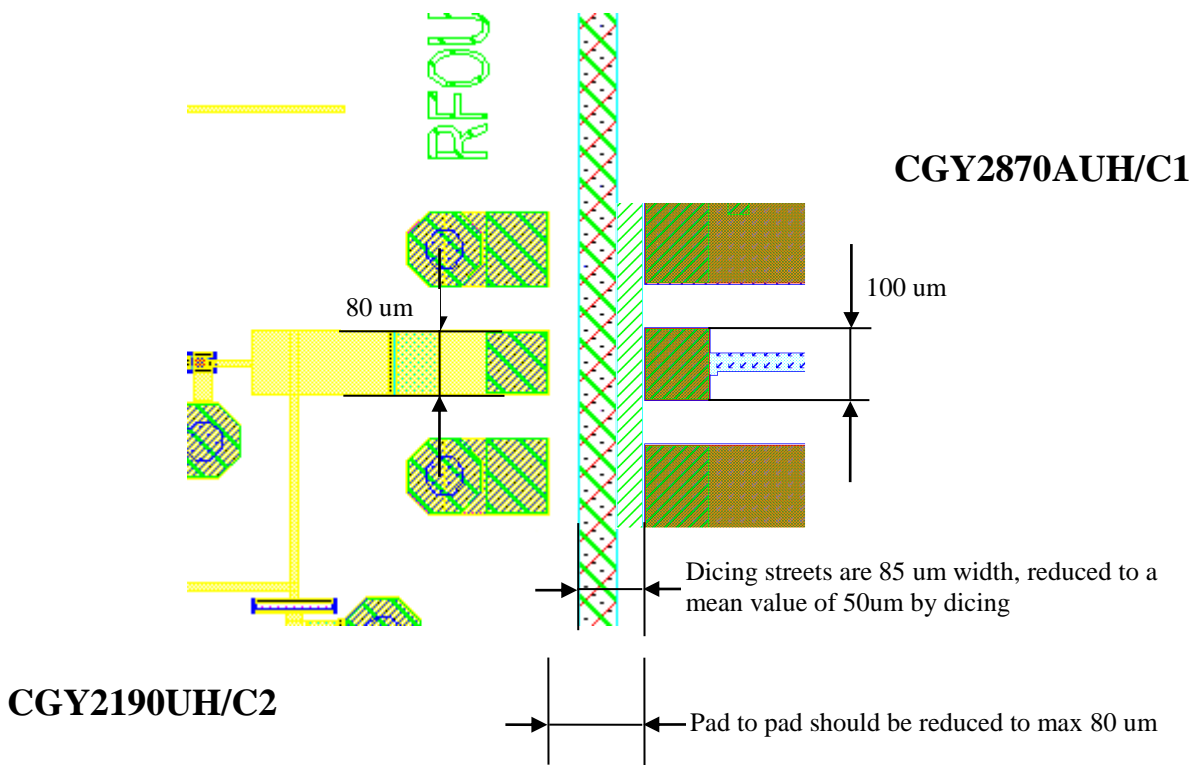
In order to reduce bonding length, both dies have a 100um thickness.

The detector diode have been specially designed and support a dicing street of 35um, 15 um smaller than the standard 50um dicing street.

Additionally, the space separating pad metallization from dicing street have been reduced.

Die can be soldered or glued using the appropriate conductive epoxy

Wedge bonding are recommended, they offer shorter bonding length.



ORDERING INFORMATION

| Generic type | Package type | Version | Description |
|--------------|--------------|---------|--|
| CGY2870AUH | Bare Die | C1 | MHEMT Semi-conductor die. External dimensions : 900 x 770 μm (Tolerance : $\pm 15 \mu\text{m}$ due to dicing). Die thickness: 0.1 mm. Backside material: TiAu |

DEFINITIONS**Limiting values definition**

Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information

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