# 12-40GHz Wide Band Detector

Preliminary

## GaAs Monolithic Microwave IC

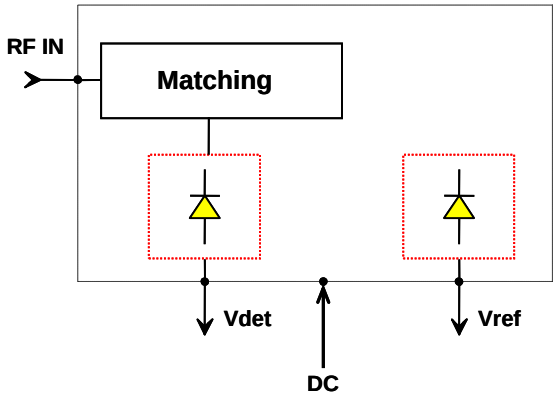
## Description

The CHE1270a is a detector that integrates a matched detection diode (Vdet). A reference diode is also available to be used in differential mode (Vref).

It is designed for a wide range of applications where an accurate transmitted power control is required, typically commercial communication systems.

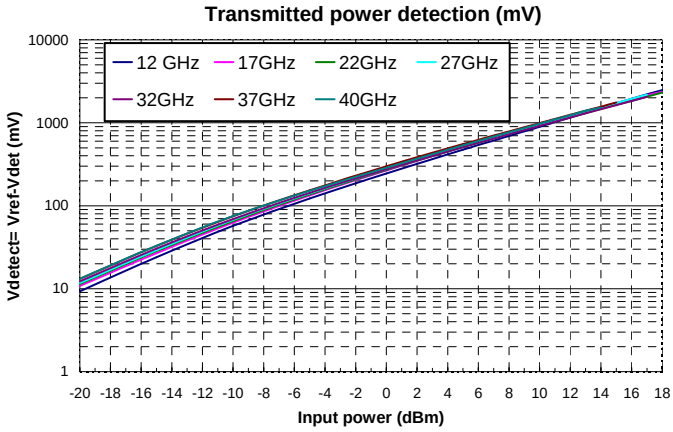
The circuit is manufactured with a Schottky diode MMIC process, 1µm gate length, via holes through the substrate and air bridges.

It is available in chip form.




## Main Features

- Wide frequency range 12-40GHz
- 30dB dynamic range
- ESD protected
- Chip size: 1.41 x 0.89 x 0.1mm
- BCB layer protection




## Main Characteristics

Tamb = +25℃, Vdc = +4.5V

| Symbol | Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| F | Frequency range | 12 | | 40 | GHz |
| Dr | Dynamic range | | 30 | | dB |
| RL | Return Loss | | -10 | | dB |

ESD Protection: Electrostatic discharge sensitive device. Observe handling precautions!



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## Electrical Characteristics (1)

Tamb = +25℃, Vdc = +4.5V

Preliminary

| Symbol | Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| F | Frequency range | 12 | | 40 | GHz |
| Dr | Dynamic range (for Input Power detection) | | 30 | | dB |
| IPd | Input Power detection | -15 | | 15 | dBm |
| Vdetect | Voltage detection Vref – Vdet<br>from IPd_min to IPd_max | | 10<br>to<br>2000 | | mV |
| RL | Return Loss (12 – 14.5GHz)<br>Return Loss (15 – 40GHz) | | -8<br>-10 | | dB<br>dB |
| Vdc | Bias voltage | | 4.5 | | V |
| Idc | Bias current | | 70 | | µA |

(1) These values are representative of on-wafer measurements that are made without bonding wires at the RF ports but with 27kΩ resistor in parallel on pads Vdet and Vref.

## Absolute Maximum Ratings (1)

Tamb = +25℃

| Symbol | Parameter | Values | Unit |
|---|---|---|---|
| Vdc | Bias voltage | 6 | V |
| IPd_max | Maximum Input power | 18 | dBm |
| Top | Operating temperature range | -40 to +85 | ℃ |
| Tstg | Storage temperature range | -55 to +125 | ℃ |

(1) Operation of this device above anyone of these paramaters may cause permanent damage.



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## Typical on-wafer measurements results

Tamb = +25℃, Vdc = +4.5V, 27kΩ resistor in parallel on pads Vdet and Vref

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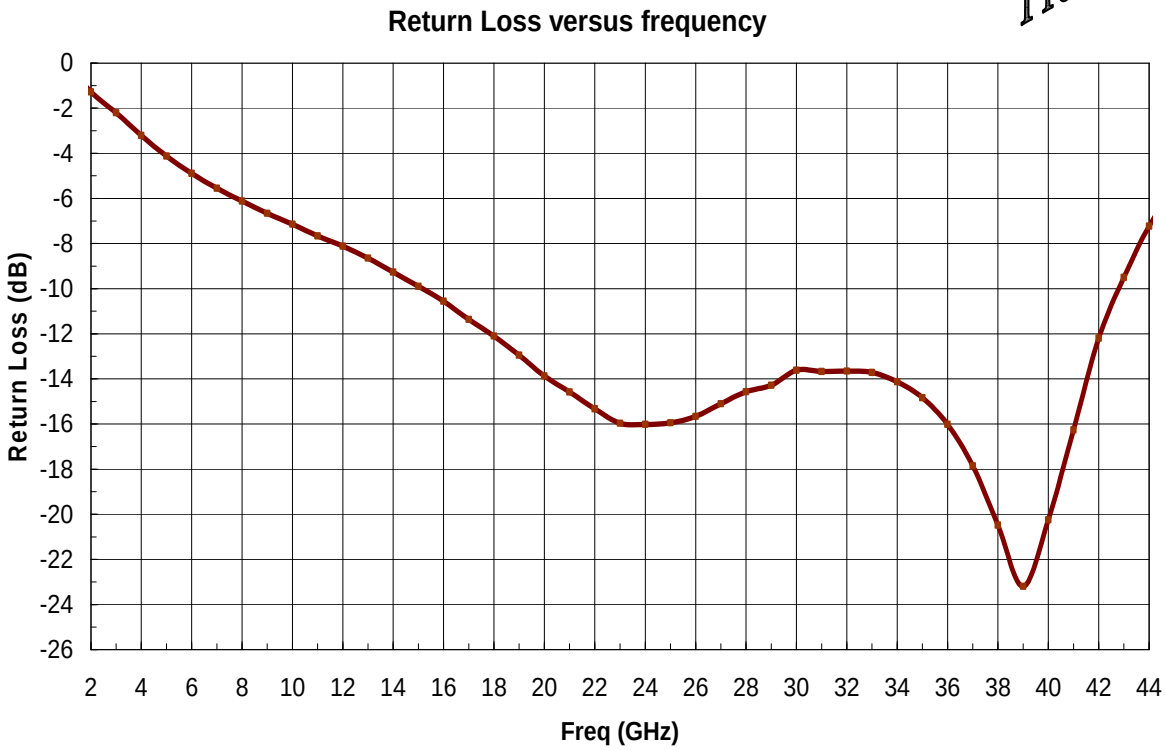


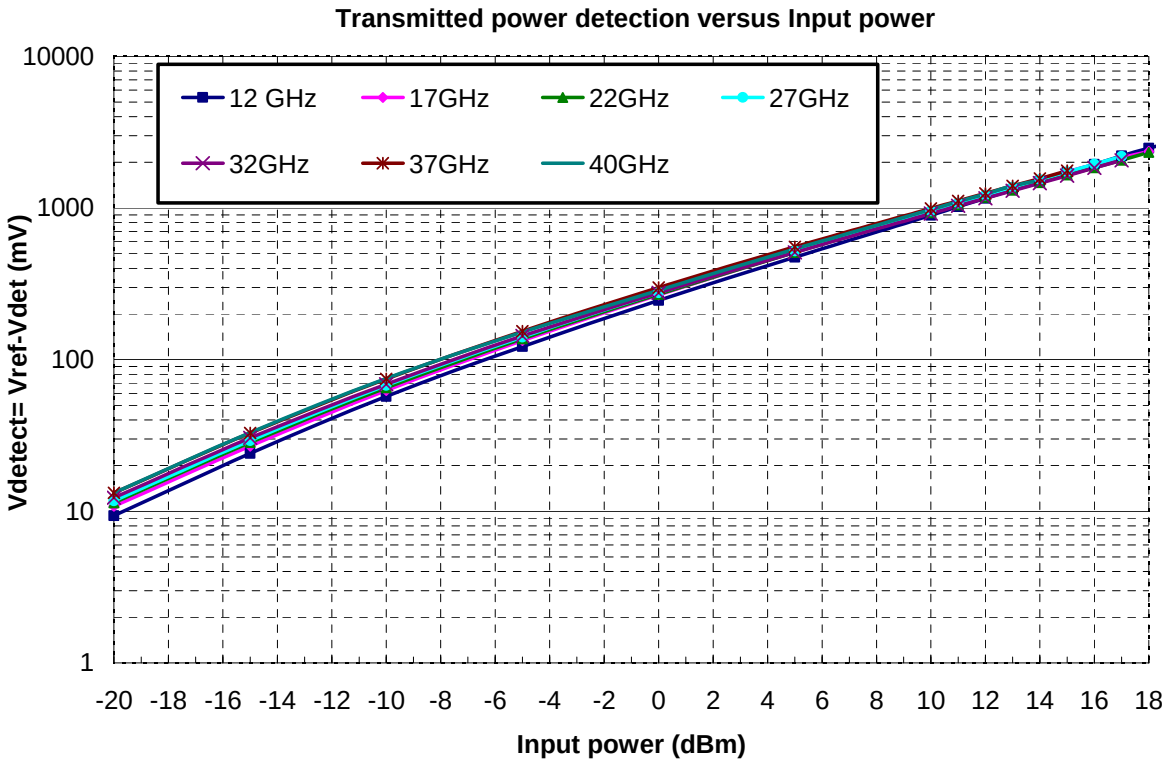




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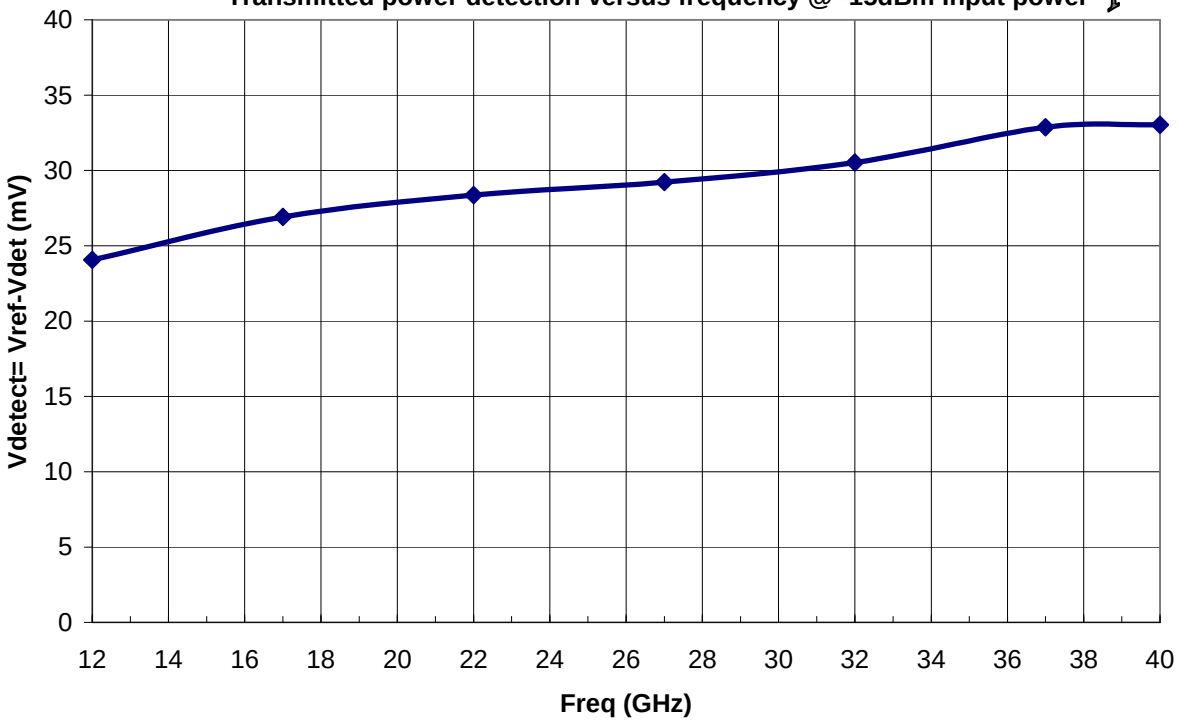
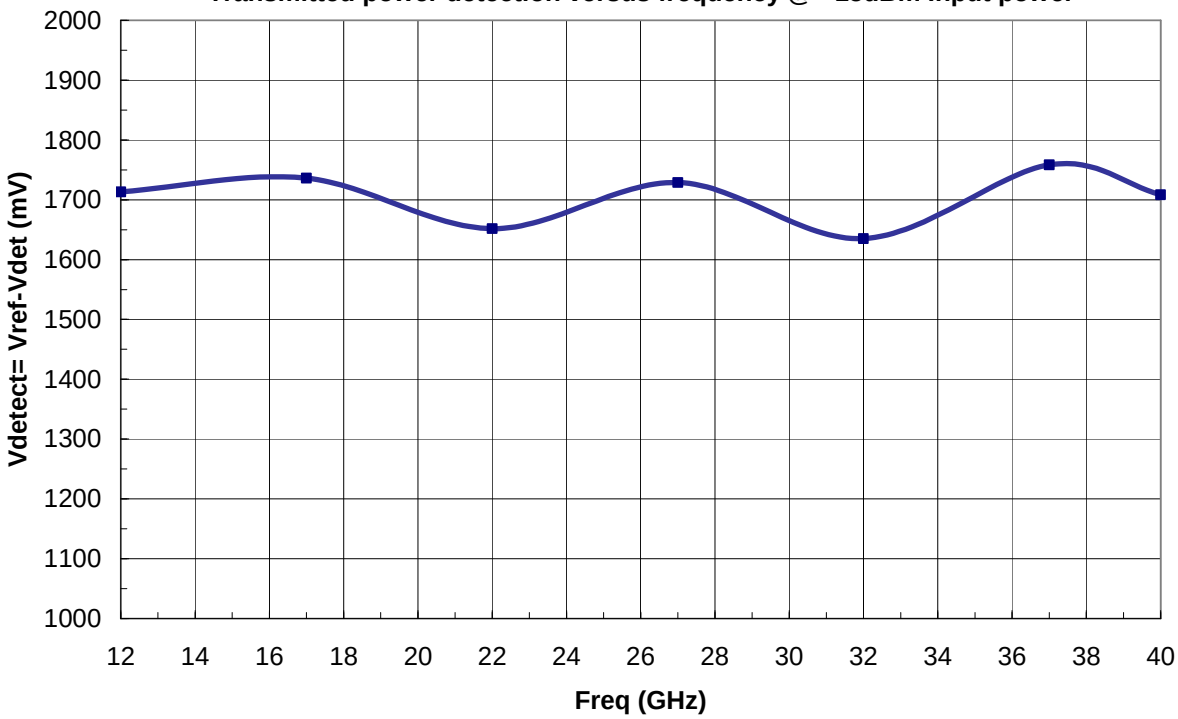
**Transmitted power detection versus frequency @ -15dBm Input power**




**Transmitted power detection versus frequency @ +15dBm Input power**



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## Chip Assembly and Mechanical Data

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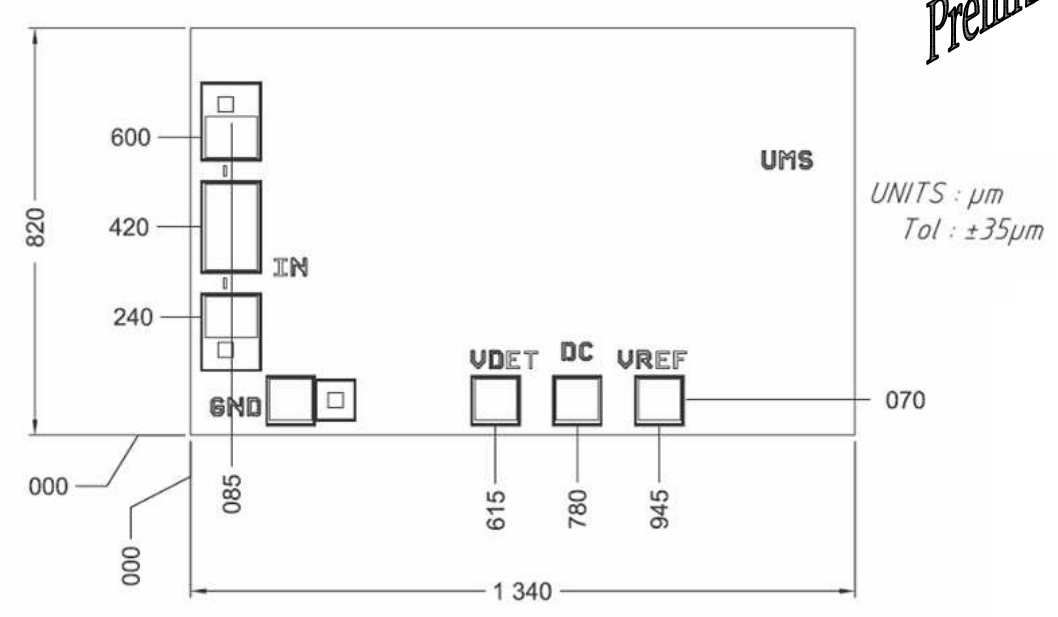


DC Pads Size: 100/100 µm, Chip thickness: 100 µm

Note: Supply feed might be capacitively bypassed. 25µm diameter gold wire is to be prefered.



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## Notes

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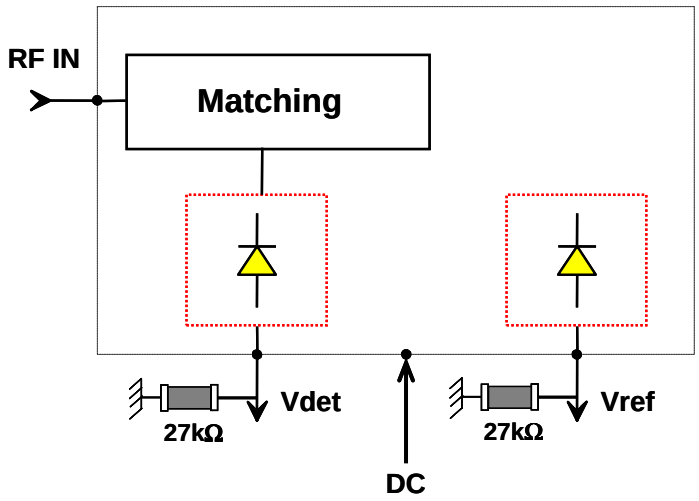


Recommended external resistors assembly

27kΩ resistors in parallel with Vdet and Vref pads are recommended to provide the best behaviour in the whole operating temperature range.

As the voltage detection is the difference between Vref and Vdet, the external resistor value should be identical on these two ports.
For information, a variation of 3% leads around 1mV variation of detected voltage.

Due to ESD protection circuits on RF input, an external capacitance might be requested to isolate the product from external voltage that could be present on the RF access.
ESD protections are also implemented on Vdet and Vref accesses.

Due to the BCB coating on the chip, qualification domain implies the chip must be glued.

## Ordering Information

Chip form: CHE1270a-98F/00





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