# GaN Wideband PA

### Product Features

- Frequency Range: 0.1-40 GHz
- 10 GHz characteristics
  - Gain: 10 dB
  - Psat: 29 dBm
  - P1dB: 24 dBm
  - PAE: 14%
  - NF: 3 dB
- Quiescent Bias:
  Vds = 14V, Id = 50 mA
- Chip dimensions:
  2.7 x 1.5 x 0.05 mm

### Primary Applications

- Instrumentation and test equipment
- Commercial communication systems

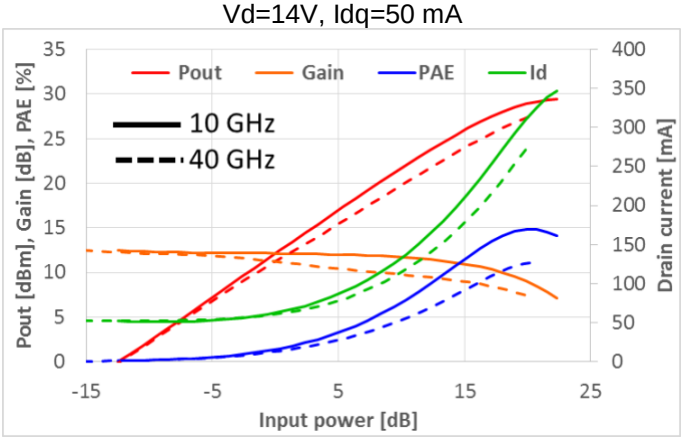
### Product Description

The HRL GAN-TWA is a broadband power amplifier fabricated using HRL's T-gate GaN HEMT process (GaN-on-SiC). Front-side bond pads (RF and DC) and backside metallization are Ti/Au, which is compatible with conventional wire and ribbon bonding techniques, and die attach processes.

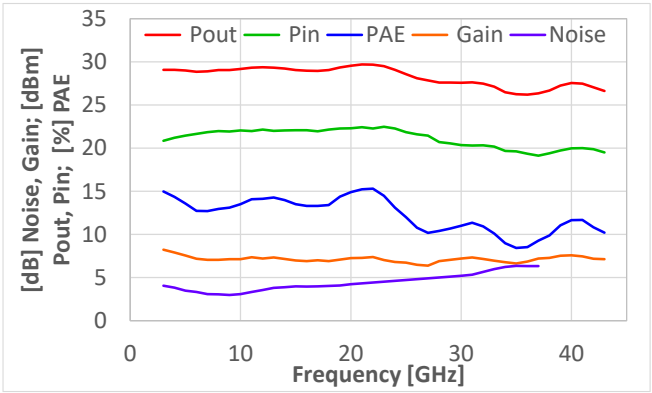
The GAN-TWA typically provides 29 dBm output power with 8 dB associated gain and a PAE of 14% at 10 GHz. At 40 GHz the corresponding values are 27 dBm, 7 dB and 10% respectively.

### Measured Performance

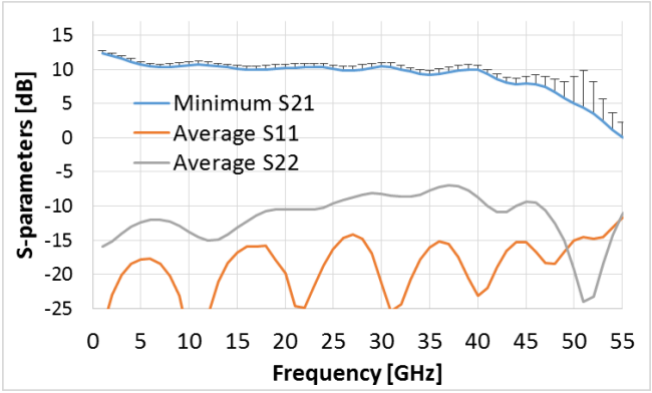
Vd=14V, Idq=50 mA




Gain compression data at 10 & 40 GHz




5 dB gain compressed & noise data




Small signal data at Vds = 14 & Id = 50 mA

## Electrical Specifications

Vd=14V, Id=50 mA

| Specification | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Frequency | 0.1 | | 40 | GHz |
| Linear Gain | | 10 | | dB |
| Input Return Loss | | 14 | | dB |
| Output Return Loss | | 7 | | dB |
| Saturated output power (10 GHz) | | 29 | | dBm |
| Noise figure (10 GHz) | | 3 | | dB |

## Absolute Maximum Ratings

CW Operation

| Parameter | Rating | Unit |
|---|---|---|
| Input Power [Pin] | 23 | dBm |
| Drain Voltage [Vd] | 14 | V |
| Gate Voltage Range [Vg] | -15 to -5 | V |
| Quiescent Drain Current [Id] | 50 | mA |
| Operation Drain Current [Id] | 370 | mA |
| Baseplate temperature[1] | 50 | °C |
| Die Attach Temperature [30 sec] | 290 | °C |

Exceeding any one or combination of the Absolute Maximum Ratings may result in permanent damage to the device. Application of Absolute Maximum Ratings on the device for an extended period of time may negatively affect the reliability of the device.

## Biasing Procedure

**Turn on**

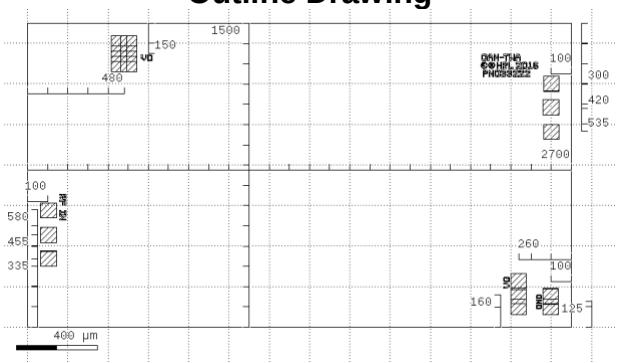
1) Vgs = - 15 V
2) Vds = 14 V
3) Adjust Vgs to obtain Id = 50 mA

**Turn off**

1) Vds = 0V
2) Vgs = 0V

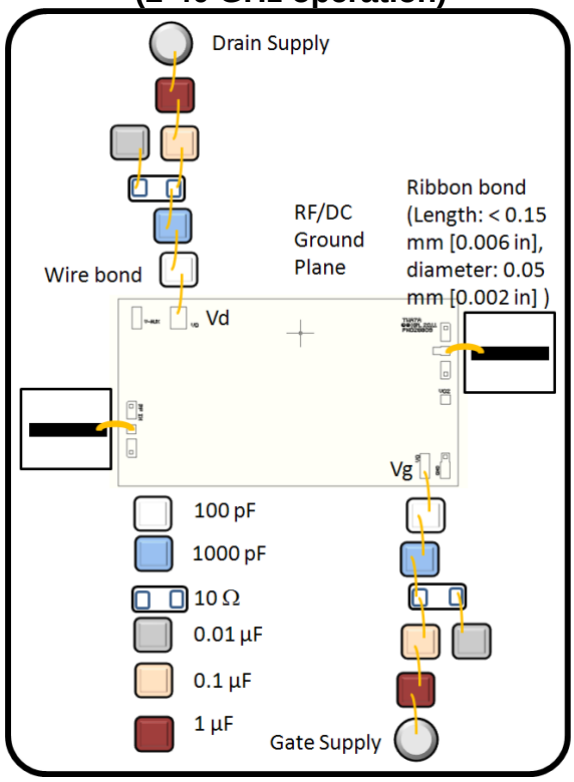
[1]HRL recommends mounting the die on CuW heat spreader using AuSn eutectic solder. Maximum baseplate temperature is based on this recommendation.

## Outline Drawing




DC Bond Pads are 0.2x0.075 mm; Bond pad locations shown from die edge to pad center.

## Recommended Assembly Diagram (2-40 GHz operation)




**Caution:** ESD sensitive device.

Note: Circuit is DC-coupled for low frequency application, and may require DC blocking capacitors at the RF input & output.