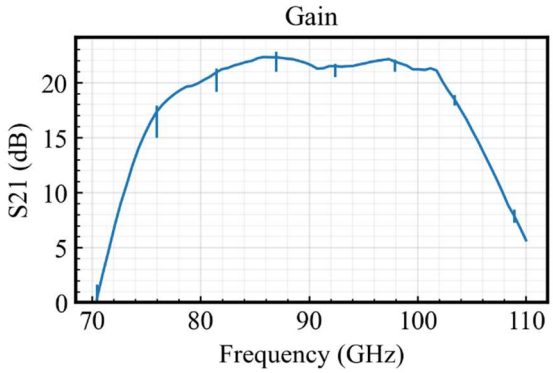
Product Features

- Frequency: 80-100 GHz
- Minimum Gain across band: 20 dB
- Psat: 23 dBm
- PAE: 8 %
- Dimensions: 2.275 x 2.175 x 0.05 mm
- Nominal Operating Bias: $Vd_{12,34}$=12 V at Id_{12}=30 mA and Id_{34}=90 mA

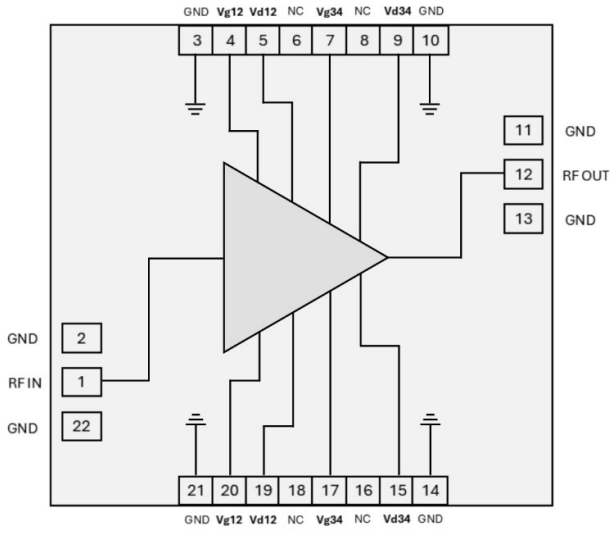


Primary Applications

- Radar systems
- High-resolution imaging
- E/W-band datalinks
- General W-band front-end modules

General Description

The BAL-WPA-T3L is a bare die W-band power amplifier (80–100 GHz) fabricated in HRL's MRL-6 T3L GaN-on-SiC process. This four-stage, balanced design delivers 23 dBm output power with 20 dB linear gain, making it ideal for radar, imaging, E/W-band datalinks, and general W-band front-end integration. The amplifier achieves excellent input and output impedance matching across the band, minimizing external tuning requirements.



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Electrical Specifications

Performance ratings at backside temperature +25C, nominal bias

Parameter	Min	Typical	Max	Unit
Frequency Range	80		100	GHz
Gain	18	20	24	dB
Psat at 9dBm		23		dBm
P1dB		20		dBm
PAE at 9dBm		8		%
Input Return Loss	15	20	25	dB
Output Return Loss	15	20	25	dB
Nominal Bias	$Vd_{12,34}$=12 V at Id_{12}=30 mA and Id_{34}=90 mA			

Absolute max ratings

Parameter	Rating	Unit
Input Power (Pin)	10	dBm
Drain Voltage (Vd)	16	V
Gate Voltage range (Vg)	-4.0 to –1.0	V
Drain Current (Id)	Id_{12}=50 & Id_{34}=150	mA

Biasing procedure

Turn on:

Pinch off Vg_{12}, Vg_{34} = -5V → Apply Vd_{12}, Vd_{34}=12V → Adjust Vg_{12}, Vg_{34} towards Vg=-2 (typ.) to obtain Id_{12}=90mA and Id_{34}=90mA → Apply RF

Turn off:

Turn off RF → Pinch off Vg_{12}, Vg_{34} = -5V → Apply Vd_{12}, Vd_{34}=0V → Wait for decoupling capacitors to discharge → Apply Vg_{12}, Vg_{34}=0V

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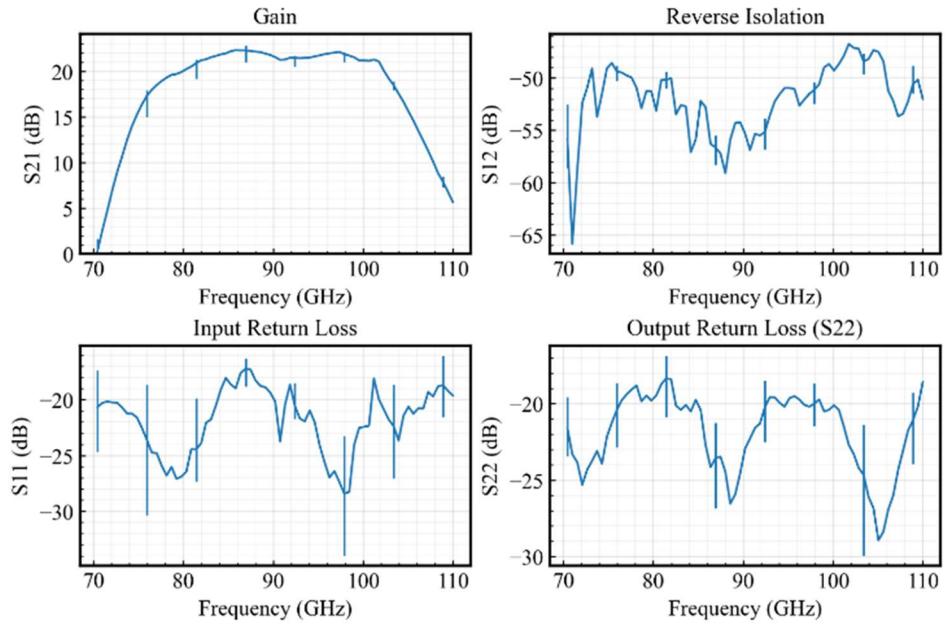
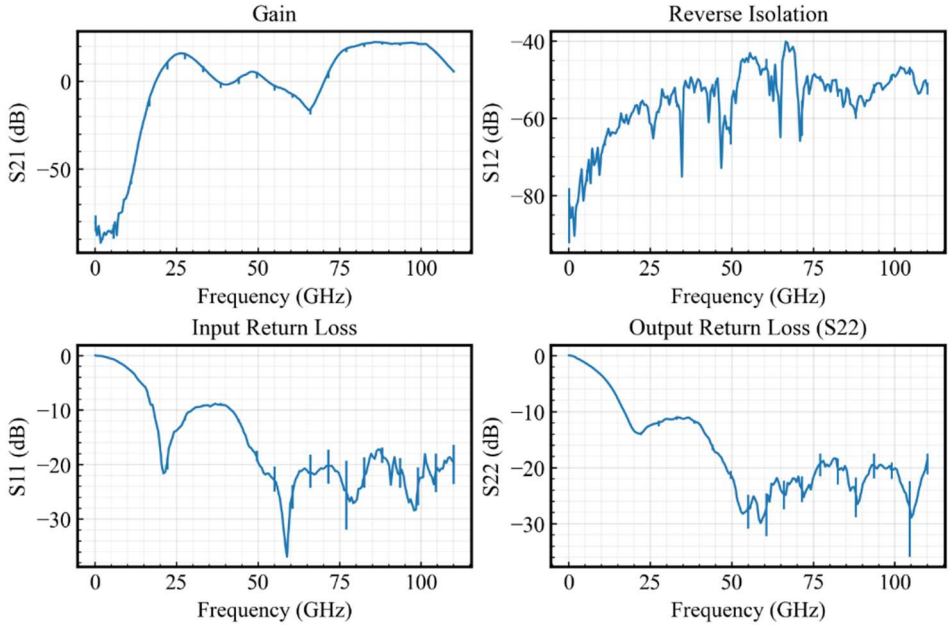
Typical Performance @ +25C, Vd=12V at Id12=30mA and Id34=90mA

In band: Small signal gain, reverse isolation, input return loss, output return loss



Typical Performance @ +25C, Vd=12V at Id12=30mA and Id34=90mA

Full band: Small signal gain, reverse isolation, input return loss, output return loss



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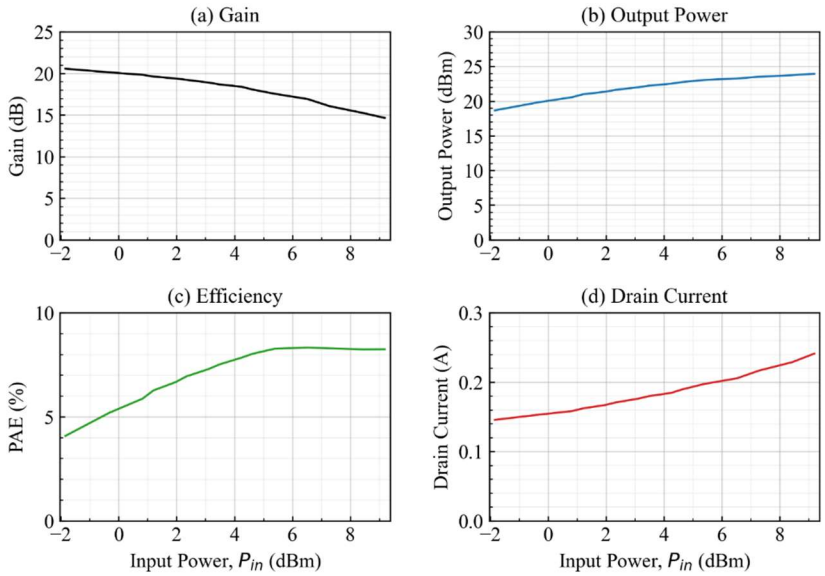
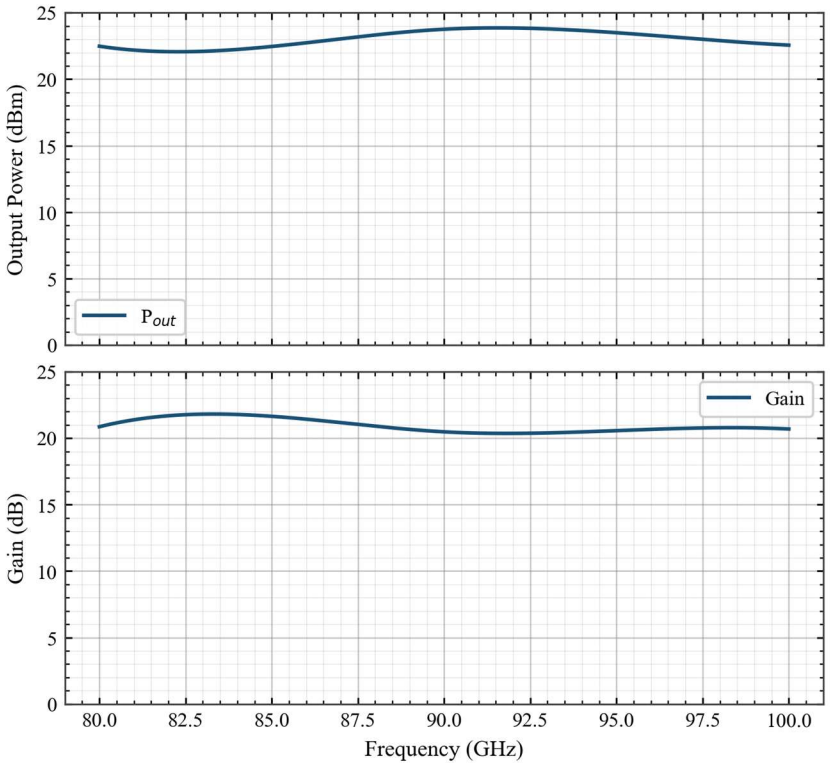
Typical Performance @ +25C, Vd=12V at Id12=30mA and Id34=90mA

RF Power @ 90GHz: Gain, Pout, PAE, Drain Current



RF Power across 80GHz to 100GHz: Gain, Pout, PAE



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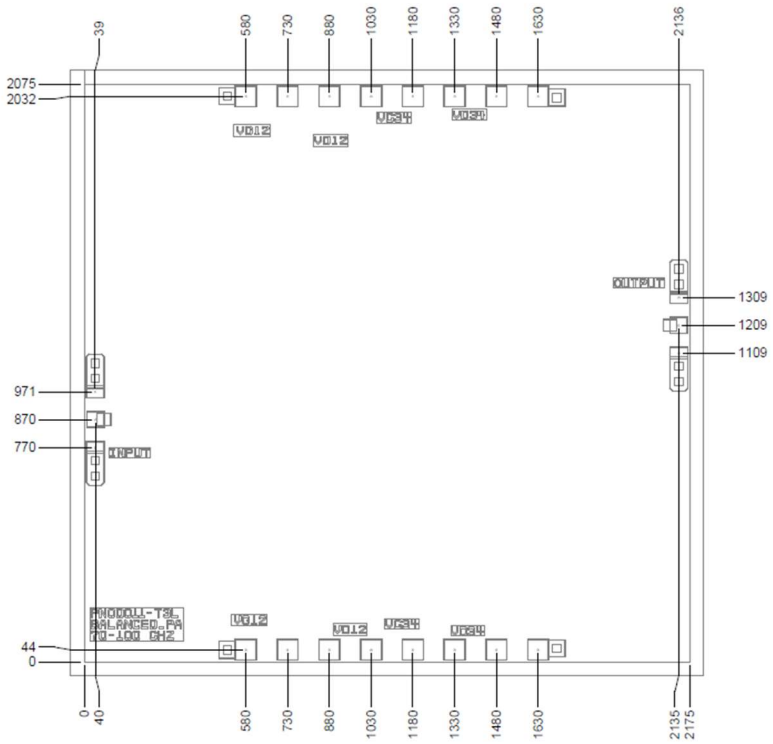
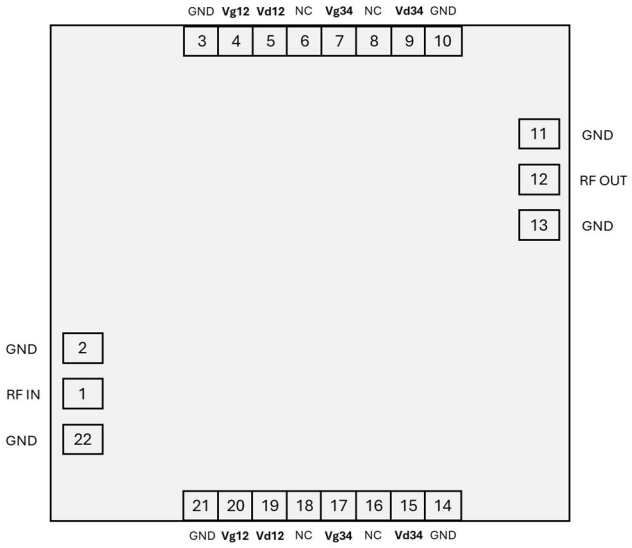
Outline Drawing

All dimensions shown are µm, with tolerance of ±5µm. Die thickness is 50µm ±1µm. Bond pad on backside metallization is Gold.





PAD #	Function
1	RF IN
2, 3, 10, 11, 13, 14, 21, 22	Ground
6, 8, 16, 18	Not connected
4, 20	Vg12
5, 19	Vd12
7, 17	Vg34
9, 15	Vd34
12	RF OUT

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