

Low Noise Amplifier, 60-90GHz

Performance characteristics

- Frequency range: 60GHz~90GHz
- Small signal gain: 21dB
- Noise figure: 3.2dB
- P1dB: 10dBm
- DC Supply: $V_d=2.5V@I_d=67mA$ ($V_g=0.35V$)
- Dimensions: 2.37 mm×1.000 mm×0.07 mm

Product Description

GLA-6090 is an E-band broadband low noise amplifier chip with a frequency range of 60GHz~90GHz, small signal gain of 21dB and a typical noise figure of 3.2dB.

Electrical Specifications

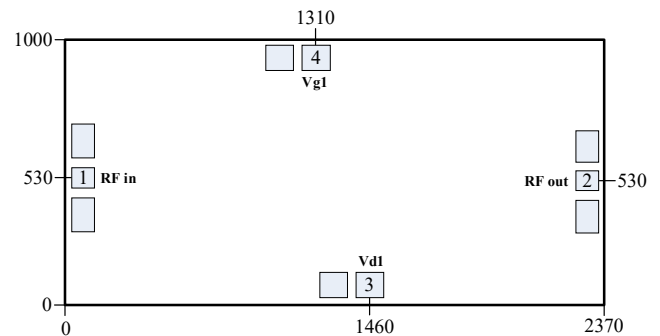
($V_d=2.5V$, $I_d=67mA$, $T_A=+25^{\circ}C$)

Parameter	Min	Typ	Max	Unit
Frequency range	60		90	GHz
Small signal gain	20	21	22	dB
Gain flatness		± 1		dB
Noise figure		4.2		dB
P1dB		10		dBm
Input VSWR		1.6	2	-
Output VSWR		1.8	2.1	-
Quiescent Current		67		mA

Absolute Maximum Ratings

Maximum Negative Gate Voltage	-1V
Maximum Drain Voltage	4V
Maximum Input RF Power	15dBm
Storage Temperature	-65°C~150°C
Operating Temperature	-55°C~85°C

Die Outline Dimensions



Notes: 1) All dimensional units are micrometers (μm).

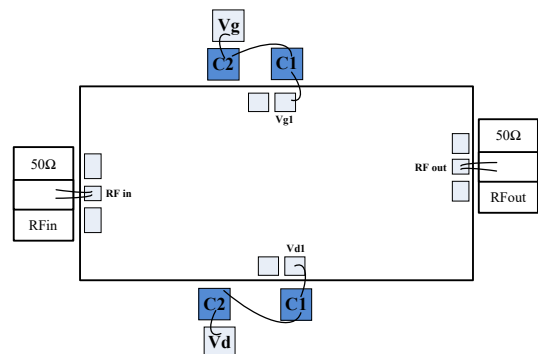
2) Tolerance for die length and width: $\pm 50 \mu m$.

3) Die thickness: 70 μm

Bond Pad Definition

No.	Symbol	Function Description	Pad Size(μm^2)
1	RFin	RF input port, matched to 50 Ω system. No series DC blocking capacitor required	80×80
2	RFout	RF output port, matched to 50 Ω system. No series DC blocking capacitor required	80×80
3	Vd1	Drain bias supply pin; 100 pF, 1000 pF and 10 μF shunt bypass capacitors are required externally.	120×120
4	Vg1	Gate bias supply pin; 100 pF, 1000 pF and 10 μF shunt bypass capacitors are required externally.	120×120

Recommended Assembly Schematic

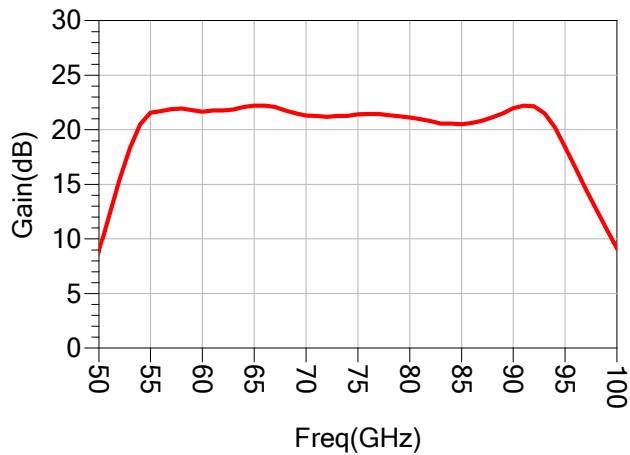


Note: The peripheral capacitor C1 has a capacitance of 100 pF, and C2 is 10000 pF. Single-layer capacitor is recommended for C1, which shall be placed as close as possible to the chip bonding pads. It is recommended to add an external 10 μF bypass capacitor for both Vg and Vd.

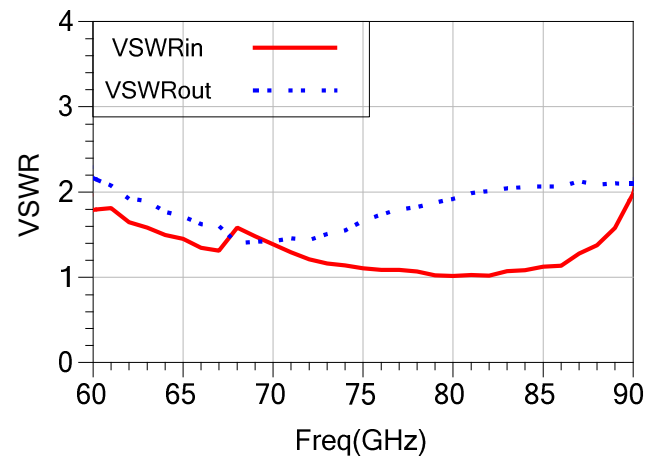
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On-Wafer Measurement Curves ($T_A=+25^{\circ}\text{C}$) $V_d=2.5\text{V}$, $I_d=67\text{mA}$

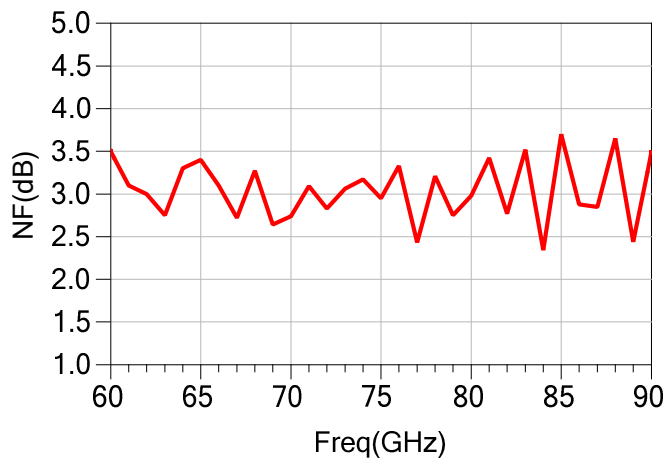
Small Signal Gain vs. Frequency



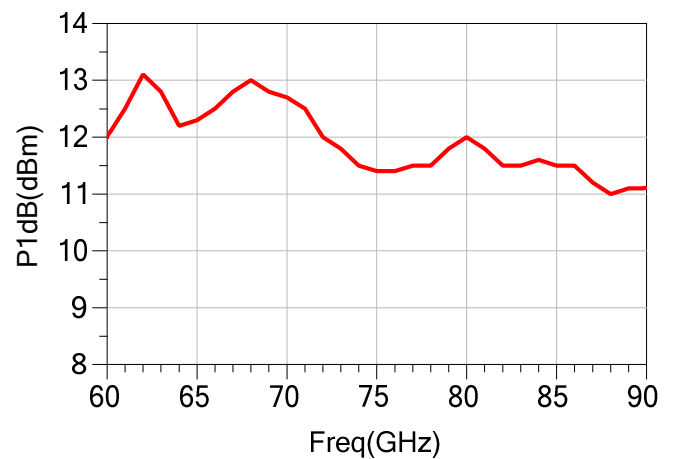
Input VSWR/Output VSWR vs. Frequency



Noise Figure vs. Frequency



P1dB vs. Frequency



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Handling & Operating Precautions

- 1) Storage: Dies must be stored in ESD-protected containers under nitrogen atmosphere.
- 2) Cleaning: All die handling shall be performed in a cleanroom environment. Liquid cleaning solvents are prohibited for die cleaning. die handling shall be performed in a cleanroom environment. Liquid cleaning solvents are prohibited for die cleaning.
- 3) ESD Protection: Strictly follow all ESD control protocols to prevent electrostatic damage to the die.
- 4) General Handling: Handle dies only with vacuum pick-up tools or precision fine-tip tweezers. Avoid contact between tools/fingers and the die surface.
- 5) Power-up & Power-down Sequence: Power-up: Apply gate voltage first, then drain voltage. Power-down: Remove drain voltage first, then gate voltage.
- 6) Die Mounting: Two acceptable processes are AuSn eutectic sintering or conductive epoxy bonding. The mounting substrate surface must be clean and flat; minimize the gap between the die and RF input/output substrate traces.
 - Sintering Process: Use 80/20 AuSn solder. Sinter temperature shall not exceed 300 °C, total sinter time ≤20 seconds, scrub time ≤3 seconds.
 - Epoxy Bonding: Apply minimal conductive epoxy dosage; follow curing specifications provided by epoxy supplier.
- 7) Wire Bonding Requirements:
 - Unless otherwise specified, use two 25µm diameter gold bonding wires for RF input and output, with shortest possible wire length.
 - Thermosonic bonding temperature: 150 °C; use minimum feasible ultrasonic power. Ball bonding capillary force: 40~50gf; Wedge bonding capillary force: 18~22gf.
- 8) Contact your supplier for technical support if any issues occur.