

MONOLITHIC AMPLIFIERS

50Ω

BROADBAND DC to 8 GHz

NEW!



Gali

low power, up to +13.4 dBm output

all specifications at 25°C

| MODEL NO. | FREQ. GHz f _c - f _u | GAIN, dB Typical | | | | | | | MAXIMUM POWER (dBm) at 2 GHz* | | | DYNAMIC RANGE at 2 GHz* | | VSWR (:1) Typ. | | | | ABSOLUTE MAX. RATING ² | | DC OPERATING POWER ³ at Pin 3 | | | THERMAL RESISTANCE ⁴ | CASE STYLE | CONNECTOR | PRICE \$ | | |
|-----------|--|------------------|------|------|------|------|----------------|----------------|-------------------------------|--------------------------|---------------------|-------------------------|----------------|----------------|-----------------------------|-------------|-----------------------------|-----------------------------------|--------|--|------------------|-----|---------------------------------|------------|-----------|----------|----|------|
| | | 0.1 | 1 | 2 | 3 | 4 | 6 [†] | f _u | Min. @ 2GHz | Output (1 dB Comp.) Typ. | Input (no dmg) Min. | NF (dB) Typ. | IP3 (dBm) Typ. | In DC-3 GHz | Out 3-f _u ** GHz | In DC-3 GHz | Out 3-f _u ** GHz | I (mA) | P (mW) | Current (mA) | Device Volt. Typ | Max | θ _{jc} Typ. °C/W | Note B | | | | |
| Gali-1 | DC-8 | 12.7 | 12.5 | 11.8 | 11.3 | 10.5 | 10.5 | 11.0 | 9 | 12.2 | 10.5 | 15 | 4.5 | 27 | 1.3 | 1.7 | 1.4 | 1.8 | 55 | 225 | 40 | 3.4 | 3.0 | 4.1 | 108 | DF782 | mz | .99 |
| Gali-19 | DC-7 | 12.1 | 11.7 | 11.6 | 10.7 | 10.8 | 10.1 | 11.0 | 9.6 | 10.6 | 9.0 | 15 | 6.5 | 23.7 | 1.6 | 1.7 | 1.5 | 2.3 | 55 | — | 40 | 3.6 | 3.2 | 4.0 | 311 | DF782 | mz | 1.19 |
| Gali-21 | DC-8 | 14.3 | 13.9 | 13.1 | 12.4 | 11.5 | 11.9 | 9.0 | 11.5 | 12.6 | 10.5 | 15 | 4.0 | 27 | 1.1 | 1.5 | 1.3 | 2.5 | 55 | 225 | 40 | 3.5 | 3.0 | 4.1 | 128 | DF782 | mz | .99 |
| Gali-29 | DC-7 | 15.4 | 15.1 | 14.7 | 13.7 | 13.6 | 12.9 | 14.2 | 12.7 | 11.2 | 10.0 | 15 | 6.0 | 24.7 | 1.5 | 1.6 | 1.5 | 2.3 | 55 | — | 40 | 3.6 | 3.2 | 4.0 | 340 | DF782 | mz | 1.19 |
| Gali-2 | DC-8 | 16.2 | 15.8 | 14.8 | 13.7 | 12.7 | 13.2 | 15.1 | 12 | 12.9 | 11.0 | 15 | 4.6 | 27 | 1.6 | 2.5 | 1.6 | 2.6 | 55 | 225 | 40 | 3.5 | 3.0 | 4.1 | 101 | DF782 | mz | .99 |
| Gali-33 | DC-4 | 19.3 | 18.7 | 17.5 | 16.3 | 15.5 | 15.8 | — | 16 | 13.4 | 11.4 | 13 | 3.9 | 28 | 1.6 | 2.0 | 1.2 | 1.3 | 55 | 265 | 40 | 4.3 | 3.8 | 4.8 | 110 | DF782 | mz | .99 |
| Gali-39 | DC-7 | 20.8 | 21.1 | 19.7 | 17.7 | 17.0 | 16.1 | 17.6 | 17.7 | 10.5 | 9.0 | 13 | 4.9 | 22.9 | 1.6 | 1.8 | 1.5 | 2.3 | 55 | — | 35 | 3.5 | 3.1 | 3.9 | 350 | DF782 | mz | 1.19 |
| Gali-3 | DC-3 | 22.4 | 21.1 | 19.1 | 17.3 | 16.1 | 15.8 | — | 17.5 | 12.5 | 10.5 | 13 | 3.5 | 25 | 1.5 | — | 1.2 | — | 55 | 225 | 35 | 3.3 | 3.0 | 4.1 | 127 | DF782 | mz | .99 |
| Gali-S66 | DC-3 | 22 | 20.3 | 17.3 | 15.5 | — | — | — | 15 | 2.8 | 1.0 | 13 | 2.7 | 18 | 1.25 | — | 1.7 | — | 50 | 200 | 16 | 3.5 | 3.0 | 4.0 | 136 | DF782 | mz | .99 |

intermediate power, up to +15.9 dBm output

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------|------|------|------|------|------|------|------|---|------|------|------|----|-----|------|------|------|-----|-----|----|-----|----|-----|-----|-----|-----|-------|----|------|
| Gali-6F | DC-4 | 12.1 | 12.0 | 11.6 | 11.4 | 10.9 | 12.3 | — | 10 | 15.8 | 14.3 | 20 | 4.5 | 35.5 | 1.5 | 1.5 | 1.9 | 2.2 | 65 | 350 | 50 | 4.8 | 4.2 | 5.4 | 93 | DF782 | mz | 1.29 |
| Gali-4F | DC-4 | 14.3 | 14.0 | 13.4 | 13.0 | 12.3 | 13.2 | — | 11 | 15.3 | 13.8 | 20 | 4.0 | 32 | 1.2 | 1.2 | 1.5 | 1.8 | 65 | 325 | 50 | 4.4 | 4.0 | 5.0 | 93 | DF782 | mz | 1.29 |
| Gali-51F | DC-4 | 18.0 | 17.3 | 15.9 | 14.8 | 13.4 | 13.3 | — | 14 | 15.9 | 14.4 | 13 | 3.5 | 32 | 1.2 | 1.3 | 1.5 | 1.7 | 65 | 325 | 50 | 4.4 | 4.0 | 5.0 | 78 | DF782 | mz | 1.29 |
| Gali-5F | DC-4 | 20.4 | 19.3 | 17.4 | 16.0 | 14.8 | 15.1 | — | 15.5 | 15.7 | 14.2 | 13 | 3.5 | 31.5 | 1.2 | 1.2 | 1.4 | 1.4 | 65 | 325 | 50 | 4.3 | 3.9 | 4.9 | 103 | DF782 | mz | 1.29 |
| Gali-55 | DC-4 | 21.9 | 20.6 | 18.5 | 17.0 | 15.5 | 15.7 | — | 17 | 15 | 13.5 | 13 | 3.3 | 28.5 | 1.25 | 1.35 | 1.3 | 1.5 | 65 | 350 | 50 | 4.3 | 3.8 | 4.8 | 100 | DF782 | mz | 1.29 |
| Gali-52 | DC-2 | 22.9 | 20.8 | 17.8 | 15.9 | 14.4 | — | — | 16 | 15.5 | 13.5 | 13 | 2.7 | 32 | 1.35 | — | 1.4 | — | 65 | 350 | 50 | 4.4 | 4.0 | 4.8 | 85 | DF782 | mz | 1.29 |

see suggested PCB layout PL-019 for Gali models

features

- In GaP HBT microwave amplifiers, except Gali-S66
- Gali-S66, advanced silicon technology
- miniature SOT-89 package
- frequency range, DC to 8 GHz, usable to 10 GHz
- up to 18.2 dBm typ. output power
- excellent package for heat dissipation, exposed metal bottom
- low thermal resistance for high reliability

model identification

| Model | marking [†] | Model | marking [†] |
|----------|----------------------|----------|----------------------|
| Gali-1 | 01 | Gali-5F | 05F |
| Gali-19 | 19 | Gali-55 | 55 |
| Gali-21 | 21 | Gali-52 | 52 |
| Gali-29 | 29 | Gali-4 | 04 |
| Gali-2 | 02 | Gali-49 | 49 |
| Gali-33 | 33 | Gali-5 | 05 |
| Gali-3 | 03 | Gali-51 | 51 |
| Gali-39 | 39 | Gali-59 | 59 |
| Gali-6F | 06F | Gali-6 | 06 |
| Gali-4F | 04F | Gali-S66 | 66 |
| Gali-51F | 51F | Gali-74 | 74 |

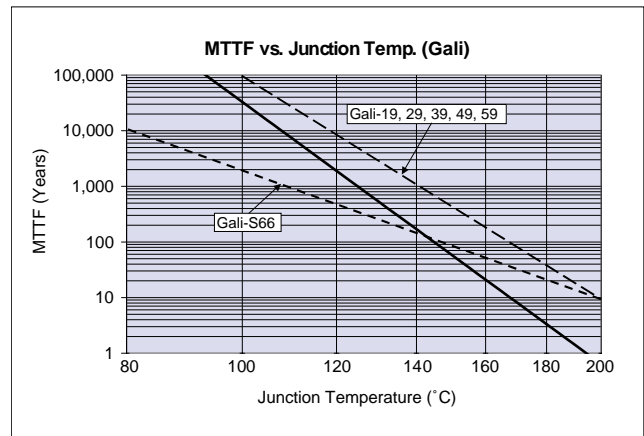
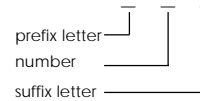
[†]Prefix letter (optional) designates assembly location. Suffix letters (optional) are for wafer identification.

absolute maximum ratings

- operating temperature: -45°C to 85°C
- storage temperature: -65°C to 150°C

NOTES:

- ◆ Aqueous washable
- † Specified at 5 GHz for Gali-19,-29,-39,-49,-59
- * at 1 GHz for Gali-4,5,51,52,6,4F,5F,51F,6F,-74; at 7 GHz Gali-19,-29-39. For IP3, Gali-49,-59 at 1 GHz. Gali-74 at 0.1 GHz.
- ** f_u is the upper frequency limit for each model as shown in the table. VSWR for Gali-74 is for DC-1 GHz
- *** For Gali-74 @ 1GHz
- ⊕ Low frequency cutoff determined by external coupling capacitors.
- A. Environmental specifications and re-flow soldering information available in General Information Section.
- B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
- C. Prices and Specifications subject to change without notice.
- D. For Quality Control Procedures see Table of Contents, Section 0, "Mini-Circuits Guarantees Quality" article. For Environmental Specifications see Amplifier Selection Guide.
- 1. Model number designated by alphanumeric code marking.
- 2. Permanent damage may occur if any of these limits are exceeded. These ratings are not intended for continuous normal operation.
- 3. Supply voltage must be connected to pin 3 through a bias resistor in order to prevent damage. See "Biasing MMIC Amplifiers" in minicircuits.com/application.html. Reliability predictions are applicable at specified current & normal operating conditions.
- 4. Thermal resistance θ_{jc} is from hottest junction in device to mounting surface of leads.



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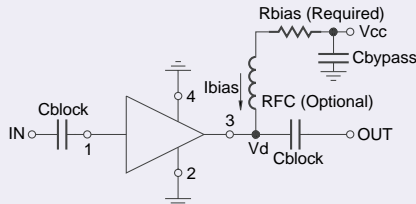
medium power, up to +18.3 dBm output

all specifications at 25°C

| MODEL NO. | FREQ. GHz f _c - f _u | GAIN, dB Typical | | | | | | | | MAXIMUM POWER (dBm) at 2 GHz* | | | DYNAMIC RANGE at 2 GHz* | | VSWR (:1) Typ. | | | | ABSOLUTE MAX. RATING ² | | DC OPERATING POWER ³ at Pin 3 | | | | THERMAL RESISTANCE ⁴ | CASE STYLE | CONNECTION | PRICE \$ |
|-----------|--|---------------------|------|------|------|------|----------------|------|---------------|-------------------------------|---------------------|--------------|-------------------------|-------------|-----------------------------|-------------|-----------------------------|--------|-----------------------------------|--------------|--|-----|---------------------------|--------|---------------------------------|------------|------------|----------|
| | | over frequency, GHz | | | | | | | | Output (1 dB Comp.) Typ. | Input (no dmg) Min. | NF (dB) Typ. | IP3 (dBm) Typ. | In DC-3 GHz | Out 3-f _u ** GHz | In DC-3 GHz | Out 3-f _u ** GHz | I (mA) | P (mW) | Current (mA) | Device Volt. | | θ _{jc} Typ. °C/W | Note B | Qty. (30) | Qty. (30) | | |
| | | 0.1 | 1 | 2 | 3 | 4 | 6 [†] | 7 | Min. @ 2GHz** | | | | | | | | | | | | Typ | Min | | | | | Max | Min |
| Gali-6 | DC-4 | 12.2 | 12.2 | 11.8 | 11.3 | 11.4 | 12.3 | — | 10 | 18.2 | 16.5 | 20 | 4.5 | 35.5 | 1.5 | 1.4 | 1.8 | 2.0 | 85 | 475 | 70 | 5.0 | 4.6 | 5.6 | 93 | DF782 | mz | 1.49 |
| Gali-4 | DC-4 | 14.4 | 14.1 | 13.5 | 12.9 | 12.5 | 13.1 | — | 11 | 17.5 | 16.0 | 20 | 4.0 | 34 | 1.2 | 1.2 | 1.4 | 1.7 | 85 | 475 | 65 | 4.6 | 4.2 | 5.5 | 93 | DF782 | mz | 1.79 |
| Gali-49 | DC-5 | 14.0 | 13.7 | 13.6 | 13.7 | 13.3 | 13.1 | 10.7 | 11.5 | 16.4 | 15.0 | 20 | 5.5 | 33.3 | 1.7 | 1.2 | 1.5 | 1.4 | 85 | — | 65 | 5.0 | 4.5 | 5.4 | 171 | DF782 | mz | 1.49 |
| Gali-51 | DC-4 | 18.1 | 17.5 | 16.1 | 14.7 | 13.7 | 13.4 | — | 14 | 18.0 | 16.5 | 13 | 3.5 | 35 | 1.3 | 1.2 | 1.5 | 1.7 | 85 | 475 | 65 | 4.5 | 4.2 | 5.5 | 78 | DF782 | mz | 1.49 |
| Gali-5 | DC-4 | 20.6 | 19.4 | 17.5 | 16.0 | 14.9 | 15.1 | — | 16 | 18.0 | 16.0 | 13 | 3.5 | 35 | 1.2 | 1.2 | 1.4 | 1.4 | 85 | 475 | 65 | 4.4 | 4.0 | 4.9 | 103 | DF782 | mz | 1.49 |
| Gali-59 | DC-5 | 20.6 | 19.7 | 18.3 | 16.7 | 15.4 | 14.0 | 10.2 | 16.3 | 17.6 | 16.5 | 13 | 4.3 | 33.3 | 1.6 | 1.5 | 1.5 | 1.7 | 85 | — | 65 | 4.8 | 4.3 | 5.2 | 209 | DF782 | mz | 1.79 |
| Gali-74 | DC-1 | 25.1 | 21.8 | 18.0 | 15.3 | 13.4 | — | — | 20 | 18.3 | 17.3 | 10 | 2.7 | 38 | 1.2 | — | 1.6 | — | 130 | 700 | 80 | 4.8 | 4.3 | 5.3 | 120 | DF782 | mz | 2.35 |

see suggested PCB layout PL-019 for Gali models

typical biasing configuration



Test Board includes case, connectors, and components (in bold) soldered to PCB

R BIAS

"1%" Resistor Values (ohms) for Optimum Biasing of Gali Models

| Vcc | Gali-1 | Gali-19 | Gali-2 Gali-29 | Gali-21 | Gali-3 Gali-39 | Gali-33 | Gali-4 | Gali-5 | Gali-51 | Gali-52 | Gali-55 | Gali-6 | Gali-4F | Gali-5F | Gali-51F | Gali-6F | Gali-566 | Gali-49 | Gali-59 | Gali-74 |
|-----|--------|---------|-------------------|---------|-------------------|---------|--------|--------|---------|---------|---------|--------|---------|---------|----------|---------|----------|---------|---------|---------|
| 7 | 90.9 | 88.7 | 88.7 | 88.7 | 107 | 69.8 | 38.3 | 40.2 | 40.2 | 51.1 | 52.3 | 30.1 | 51.1 | 52.3 | 52.3 | 49.9 | 187 | 34.0 | 36.5 | 28.7 |
| 8 | 113 | 113 | 113 | 113 | 133 | 93.1 | 52.3 | 53.6 | 53.6 | 69.8 | 71.5 | 43.2 | 69.8 | 71.5 | 71.5 | 69.8 | 243 | 48.7 | 51.1 | 41.2 |
| 9 | 137 | 137 | 137 | 137 | 162 | 115 | 66.5 | 68.1 | 68.1 | 88.7 | 90.9 | 56.2 | 90.9 | 90.9 | 90.9 | 88.7 | 301 | 64.9 | 64.9 | 53.6 |
| 10 | 162 | 162 | 162 | 162 | 191 | 140 | 80.6 | 82.5 | 82.5 | 110 | 110 | 69.8 | 110 | 110 | 110 | 110 | 374 | 80.6 | 80.6 | 66.5 |
| 11 | 187 | 187 | 187 | 187 | 221 | 165 | 95.3 | 97.6 | 97.6 | 130 | 130 | 84.5 | 130 | 130 | 130 | 127 | 432 | 95.3 | 97.6 | 78.7 |
| 12 | 215 | 215 | 215 | 210 | 249 | 191 | 110 | 113 | 113 | 150 | 150 | 97.6 | 150 | 150 | 150 | 147 | 499 | 110 | 113 | 90.9 |
| 13 | 237 | 237 | 237 | 237 | 280 | 215 | 127 | 127 | 127 | 169 | 169 | 113 | 169 | 169 | 169 | 165 | 562 | 127 | 127 | 102 |
| 14 | 261 | 261 | 261 | 261 | 309 | 243 | 143 | 143 | 143 | 191 | 191 | 127 | 191 | 191 | 191 | 187 | 619 | 143 | 143 | 115 |
| 15 | 287 | 287 | 287 | 287 | 340 | 267 | 158 | 158 | 158 | 210 | 215 | 140 | 210 | 210 | 210 | 205 | 681 | 158 | 158 | 127 |
| 16 | 309 | 309 | 316 | 316 | 365 | 287 | 174 | 174 | 174 | 232 | 232 | 154 | 232 | 232 | 232 | 226 | 750 | 174 | 174 | — |
| 17 | 332 | 332 | 340 | 340 | 392 | 316 | 187 | 191 | 191 | 261 | 249 | 169 | 249 | 249 | 249 | 249 | 806 | 187 | 191 | — |
| 18 | 357 | 357 | 365 | 365 | 422 | 340 | 205 | 205 | 205 | 280 | 274 | 182 | 274 | 274 | 274 | 267 | 866 | 205 | 205 | — |
| 19 | 383 | 383 | 392 | 392 | 453 | 365 | 221 | 221 | 221 | 301 | 287 | 196 | 294 | 294 | 294 | 287 | 931 | 221 | 221 | — |
| 20 | 412 | 412 | 412 | 412 | 475 | 392 | 237 | 237 | 237 | 316 | 309 | 210 | 316 | 316 | 316 | 309 | 976 | 237 | 237 | — |

designers kits available

pin connections

| | |
|------------|----------|
| PORT | mz |
| RF IN | 1 |
| RF OUT | 3 |
| DC | 3 |
| GND EXT. | 2,4 |
| DEMO BOARD | Gali-TB* |

*Gali-TBF for Gali-4F, -5F, -51F, -6F

| KIT No. | No. of Units in KIT | Description | Price \$ per KIT |
|---------|---------------------|--|------------------|
| K1-Gali | 90 | Kit includes 1 test board plus 10 of each: Gali-1,21,2,33,3,6,4,51,5 | 99.95 |
| K2-Gali | 50 | Kit includes 1 test board plus 10 of each: Gali-6F,4F,51F,5F,55 | 64.95 |



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