

# MONOLITHIC AMPLIFIERS

50Ω

BROADBAND DC to 8 GHz

**NEW!**



Gali/GVA

low power, up to +13.4 dBm output

all specifications at 25°C

MODEL NO.	FREQ. GHz f <sub>c</sub> - f <sub>u</sub>	GAIN, dB Typical								MAXIMUM POWER (dBm) at 2 GHz*			DYNAMIC RANGE at 2 GHz*		VSWR (:1) Typ.				ABSOLUTE MAX. RATING <sup>2</sup>		DC OPERATING POWER <sup>3</sup> at Pin 3			THERMAL RESISTANCE <sup>4</sup>		CASE STYLE	CONNECTION	PRICE \$ ea.
		0.1	1	2	3	4	6 <sup>†</sup>	f <sub>u</sub>	Min. @ 2GHz	Output (1 dB Comp.) Typ.	Input (no dmg) Min.	NF (dB) Typ.	IP3 (dBm) Typ.	In DC-3 GHz	Out 3-f <sub>u</sub> ** GHz	DC-3 3-f <sub>u</sub> ** GHz	I (mA)	P (mW)	Current (mA)	Device Volt. Typ	Max	θ <sub>jc</sub> Typ. °C/W	Note B	Qty. (30)				
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

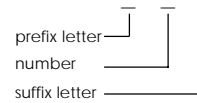
## features

- 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 21.2 dBm typ. output power
- excellent package for heat dissipation, exposed metal bottom
- low thermal resistance for high reliability

## model identification

Model	marking <sup>†</sup>	Model	marking <sup>†</sup>
Gali-1	01	Gali-55	55
Gali-19	19	Gali-52	52
Gali-21	21	Gali-4	04
Gali-24	24	Gali-49	49
Gali-29	29	Gali-5	05
Gali-2	02	Gali-51	51
Gali-33	33	Gali-59	59
Gali-3	03	Gali-6	06
Gali-39	39	Gali-S66	66
Gali-6F	06F	Gali-74	74
Gali-4F	04F	Gali-84	84
Gali-51F	51F	GVA-84	V84
Gali-5F	05F		

<sup>†</sup>Prefix letter (optional) designates assembly location. Suffix letters (optional) are for wafer identification.

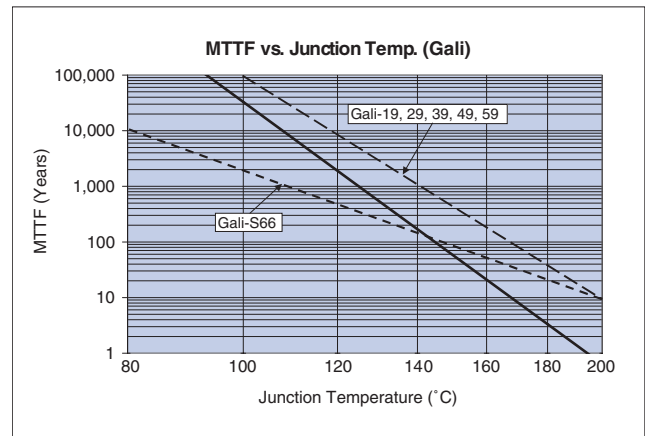


## absolute maximum ratings

operating temperature: -45°C to 85°C  
storage temperature: -65° 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<sub>u</sub> 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](http://minicircuits.com/application.html). Reliability predictions are applicable at specified current & normal operating conditions.
- 4. Thermal resistance θ<sub>jc</sub> is from hottest junction in device to mounting surface of leads.



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# Surface Mount



Gali/GVA

medium power, up to + 21.2 dBm output

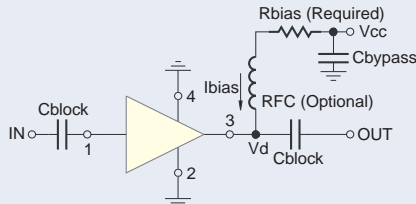
all specifications at 25°C

MODEL NO.	FREQ. GHz f <sub>1</sub> - f <sub>2</sub>	GAIN, dB Typical								MAXIMUM POWER (dBm) at 2 GHz*			DYNAMIC RANGE at 2 GHz*		VSWR (:1) Typ.				ABSOLUTE MAX. RATING <sup>2</sup>		DC OPERATING POWER <sup>3</sup> at Pin 3				THERMAL RESISTANCE <sup>4</sup>	CASE STYLE	CONNECTION	PRICE \$ ea.
		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 <sub>u</sub> ** GHz	DC-3 GHz	3-f <sub>u</sub> ** GHz	I (mA)	P (mW)	Current (mA)	Device Volt.		θ <sub>jc</sub> Typ. °C/W	Note B			Qty. (30)	
		0.1	1	2	3	4	6 <sup>†</sup>	7	10	Typ.	Min.	Typ.	Typ.	Typ.	Typ.	Typ.	Typ.	Typ.	Typ.	Min	Max	Min	Max					
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-24	DC-6	25.3	22.6	19.1	16.6	14.9	14.9	—	18.1	19.4	18.4	13	4.2	36.3	1.3	1.4	1.8	2.2	160	1000	80	5.8	5.4	6.2	64	DF782	mz	1.75
GVA-84	DC-6	24.1	21.7	18.4	16.0	14.6	12.5	—	17.4	20.6	20.1	13	5.5	36.6	1.2	1.3	2.0	2.7	160	1000	see note 5 below				64	DF782	mz	1.82
Gali-84	DC-6	25.6	22.7	19.2	16.7	15.0	11.8	—	18.2	21.2	19.6	13	4.4	38	1.2	1.4	1.8	2.2	160	1000	100	5.0	4.8	5.2	64	DF782	mz	1.99
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 & GVA models

\*Note 5 - 85 min @ 4.8V, 108 typ @ 5.0V, 130, max @ 5.2V

### typical biasing configuration



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

Rbias not required for GVA-84

### R BIAS

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

Vcc	Gali-1	Gali-19	Gali-2	Gali-21	Gali-3	Gali-33	Gali-4	Gali-5	Gali-51	Gali-52	Gali-55	Gali-6	Gali-4F	Gali-5F	Gali-51F	Gali-6F	Gali-56	Gali-49	Gali-59	Gali-74	Gali-24	Gali-84
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	28.7	22.1
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	41.2	32.4
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	53.7	42.2
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	66.5	52.3
12	215	215	215	210	249	191	110	113	113	150	150	97.6	150	150	150	147	499	110	113	90.9	78.7	61.9
13	237	237	237	237	280	215	127	127	127	169	169	113	169	169	169	165	562	127	127	102	90.9	71.5
14	261	261	261	261	309	243	143	143	143	191	191	127	191	191	191	187	619	143	143	115	105	82.5
15	287	287	287	287	340	267	158	158	158	210	215	140	210	210	210	205	681	158	158	127	115	93.1
16	309	309	316	316	365	287	174	174	174	232	232	154	232	232	232	226	750	174	174	—	127	102
17	332	332	340	340	392	316	187	191	191	261	249	169	249	249	249	249	806	187	191	—	140	113
18	357	357	365	365	422	340	205	205	205	280	274	182	274	274	274	267	866	205	205	—	154	121
19	383	383	392	392	453	365	221	221	221	301	287	196	294	294	294	287	931	221	221	—	165	133
20	412	412	412	412	475	392	237	237	237	316	309	210	316	316	316	309	976	237	237	—	178	140

### 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



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