2 – 6 GHz Cascadable GaAs MMIC Amplifier

Technical Data

MGA-64135

Features

- **Cascadable 50 Ω Gain Block**
- **Broadband Performance: 2–6 GHz**
  12.0 dB Typical Gain
  ± 0.8 dB Gain Flatness
  12.0 dBm $P_{1\ dB}$
- **Single Supply Bias**
- **Cost Effective Ceramic Microstrip Package**

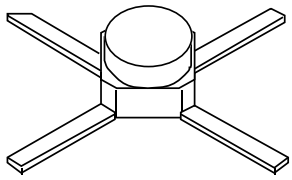
Description

The MGA-64135 is a high performance gallium arsenide Monolithic Microwave Integrated Circuit (MMIC) housed in a cost effective, microstrip package. This device is designed for use as a general purpose 50 ohm gain block in the 2 to 6 GHz frequency range. Typical applications include narrow and broadband IF and RF amplifiers for commercial, industrial, and military requirements.

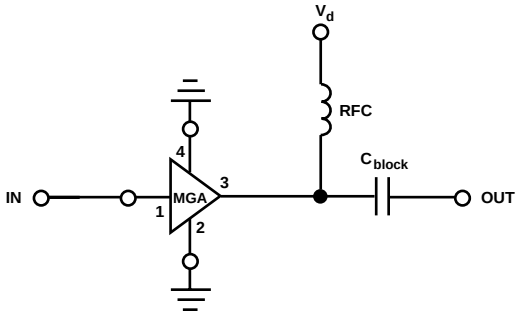
This MMIC is a cascade of two stages, each utilizing shunt feedback to establish a broadband impedance match. The source of each stage is AC grounded to allow biasing from a single positive power supply. The interstage blocking capacitor as well as a resistive "self-bias" network are included on chip.

The die is fabricated using HP's nominal .5 micron recessed Schottky-barrier-gate, gold metallization and silicon nitride passivation to achieve excellent performance, uniformity, and reliability.

35 Micro-X Package



Typical Biasing Configuration



MGA-64135 Absolute Maximum Ratings

Symbol	Parameter	Units	Absolute Maximum[1]
V_d	Device Voltage	V	12
P_{diss}	Total Power Dissipation[2]	mW	650
P_{in}	CW RF Input Power	dBm	+13
T_{ch}	Channel Temperature	°C	175
T_{STG}	Storage Temperature[3]	°C	-65 to 175

Thermal Resistance:	$\theta_{jc} = 150°C/W$[4]; $T_{CH} = 150°C$
Liquid Crystal Measurement:	1 μm Spot Size[5]

Notes:

1. Operation of this device above any one of these parameters may cause permanent damage.
2. Derate linearly at 8.3 mW/°C for $T_{CASE} > 103°C$.
3. Storage above +150°C may tarnish the leads of this package making it difficult to solder into a circuit. After a device has been soldered into a circuit, it may be safely stored up to 175°C.
4. The thermal resistance value is based on measurements taken with the device soldered to a 25 mil Teflon PCB.
5. The small spot size of this technique results in a higher, though more accurate determination of θ_{jc} than do alternate methods. See MEASUREMENTS section for more information.

MGA-64135 Electrical Specifications, $T_A = 25°C$

Symbol	Parameters and Test Conditions: $V_d = 10$ V, $Z_O = 50\ \Omega$		Units	Min.	Typ.	Max.
G_P	Power Gain ($\|S_{21}\|^2$)	f = 2 to 6 GHz	dB	10.0	12.0	
ΔG_P	Gain Flatness	f = 2 to 6 GHz	dB		±1.20	
—	Gain Variation vs. Temperature $T_{CASE} = -25°C$ to +85°C	f = 2 to 6 GHz	dB		±0.5	
VSWR	Input VSWR	f = 2 to 6 GHz			1.5:1	2.0:1
	Output VSWR	f = 2 to 6 GHz			1.4:1	2.0:1
$P_{1\ dB}$	Output Power at 1 dB Gain Compression	f = 2 to 6 GHz	dBm	10.0	12.0	
NF	50 Ω Noise Figure	f = 2 to 6 GHz	dB		7.5	
—	Reverse Isolation ($\|S_{21}\|^2$)	f = 2 to 6 GHz	dB		35	
I_d	Device Current		mA	35	50	65

MGA-64135 Typical Performance, $T_A = 25°C$

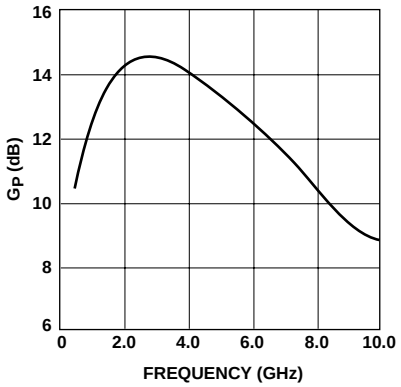


Figure 1. Power Gain vs. Frequency, V_d = 10 V.

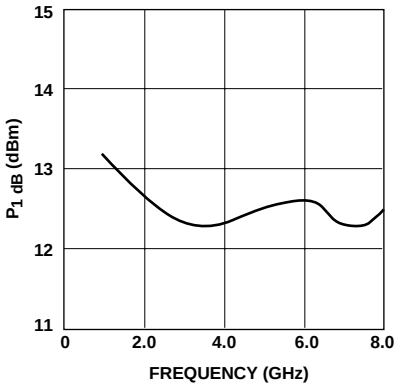


Figure 2. Output Power @ 1 dB Gain Compression vs. Frequency, V_d = 10 V.

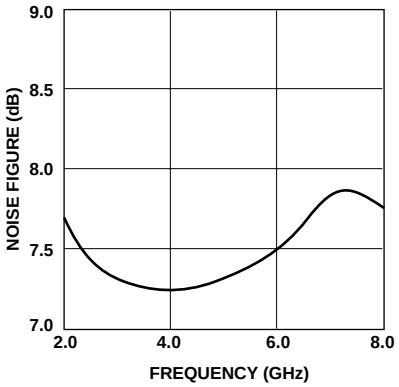


Figure 3. Noise Figure vs. Frequency, V_d = 10 V.

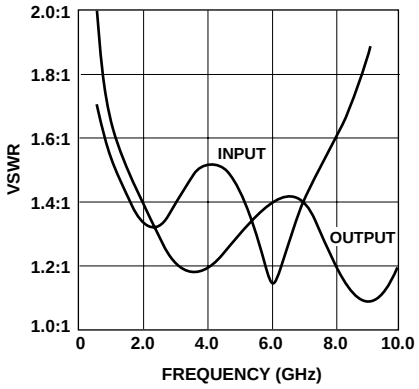


Figure 4. VSWR vs. Frequency, V_d = 10 V.

MGA-64135 Typical Scattering Parameters (Z_O = 50 Ω, T_A = 25°C, V_d = 10 V)

Freq. GHz	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang
0.5	.27	–38	10.6	3.38	174	–31.0	.028	–13	.38	–41
1.0	.18	–44	12.9	4.42	–9	–33.1	.022	–20	.26	–48
2.0	.14	–67	14.3	5.21	–54	–34.9	.018	–19	.16	–59
3.0	.17	–91	14.5	5.33	–93	–37.1	.014	–21	.11	–75
4.0	.20	–105	14.2	5.11	–131	–37.8	.013	–15	.11	–71
5.0	.18	–114	13.6	4.79	–167	–37.3	.014	–10	.14	–57
6.0	.07	–162	12.8	4.35	157	–38.5	.012	–1	.17	–41
7.0	.15	96	11.8	3.89	123	–36.0	.016	3	.16	–42
8.0	.23	76	10.8	3.46	92	–34.3	.019	4	.10	–54
9.0	.32	63	9.5	2.98	63	–29.3	.034	12	.04	159
10.0	.43	52	8.6	2.68	38	–27.6	.041	–11	.09	116

35 Micro-X Package Dimensions