

# 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<sub>1</sub> dB
- **Single Supply Bias**
- **Cost Effective Ceramic Microstrip Package**

#### Description

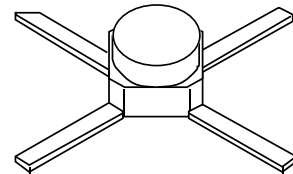
The MGA-64135 is a high performance gallium arsenide Monolithic Microwave Integrated Circuit (MMIC) housed in a cost effective, microstrip package. This device is designed for use as a general purpose 50 ohm gain block in the 2 to 6 GHz frequency range. Typical

applications include narrow and broadband IF and RF amplifiers for commercial, industrial, and military requirements.

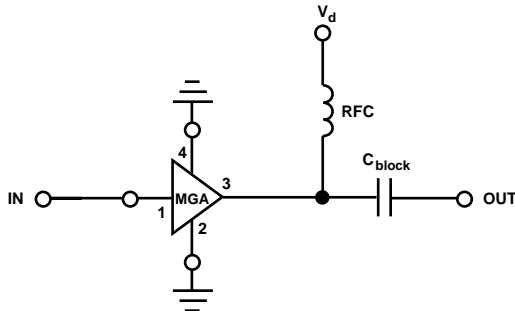
This MMIC is a cascade of two stages, each utilizing shunt feedback to establish a broadband impedance match. The source of each stage is AC grounded to allow biasing from a single positive power supply. The interstage blocking capacitor as well as a resistive “self-bias” network are included on chip.

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 <sup>[1]</sup>
$V_d$	Device Voltage	V	12
$P_{diss}$	Total Power Dissipation <sup>[2]</sup>	mW	650
$P_{in}$	CW RF Input Power	dBm	+13
$T_{ch}$	Channel Temperature	°C	175
$T_{STG}$	Storage Temperature <sup>[3]</sup>	°C	-65 to 175

<b>Thermal Resistance:</b>	$\theta_{jc} = 150^\circ\text{C}/\text{W}^{[4]}$ ; $T_{CH} = 150^\circ\text{C}$
<b>Liquid Crystal Measurement:</b>	1 $\mu\text{m}$ Spot Size <sup>[5]</sup>

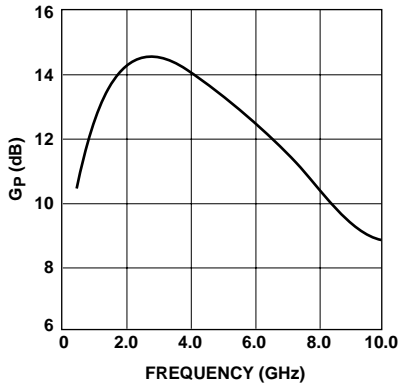
### Notes:

1. Operation of this device above any one of these parameters may cause permanent damage.
2. Derate linearly at 8.3 mW/°C for  $T_{CASE} > 103^\circ\text{C}$ .
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  $\theta_{jc}$  than do alternate methods. See MEASUREMENTS section for more information.

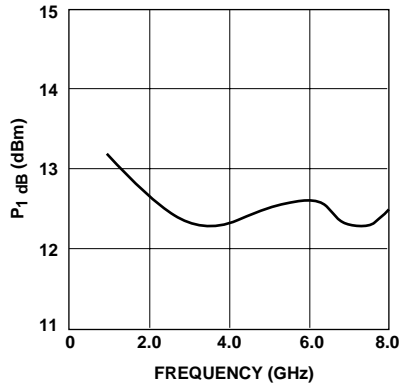
## MGA-64135 Electrical Specifications, $T_A = 25^\circ\text{C}$

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

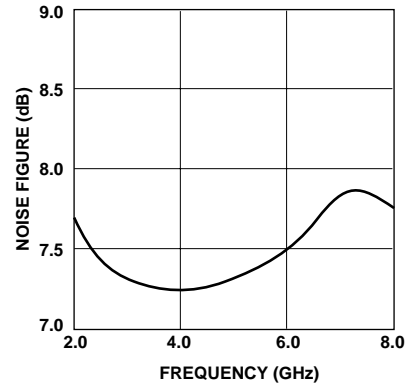
**MGA-64135 Typical Performance,  $T_A = 25^\circ\text{C}$**



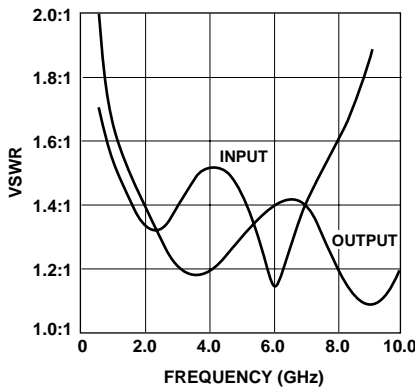
**Figure 1. Power Gain vs. Frequency,  $V_d = 10\text{ V}$ .**



**Figure 2. Output Power @ 1 dB Gain Compression vs. Frequency,  $V_d = 10\text{ V}$ .**



**Figure 3. Noise Figure vs. Frequency,  $V_d = 10\text{ V}$ .**



**Figure 4. VSWR vs. Frequency,  $V_d = 10\text{ V}$ .**

**MGA-64135 Typical Scattering Parameters ( $Z_0 = 50\ \Omega$ ,  $T_A = 25^\circ\text{C}$ ,  $V_d = 10\text{ V}$ )**

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

