



IVA-05118
MagIC™ Silicon Bipolar MMIC
1.5 GHz Variable Gain Amplifier
 May, 1991

Features

- 50 MHz to 1.5 GHz Bandwidth
- Data Rates up to 2.0 Gb/s
- High Gain: 30 dB typical
- Wide Gain Control Range: 30 dB typical
- Differential Output Capability
- Bias $V_{CC}-V_{EE} = 5 V$
- 5 V Compatible V_{GC} Control Voltage, $I_{GC} < 3 mA$
- Fast Gain Control Response: $< 10nsec$ typical
- Hermetic Glass-Metal Surface Mount Package

Description

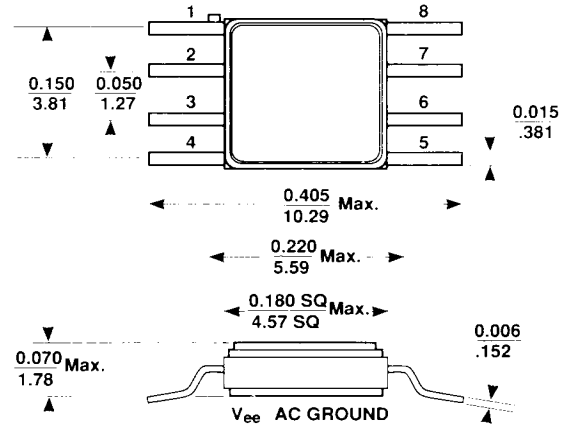
Avantek's IVA-05118 is a variable gain amplifier housed in a miniature glass-metal hermetic surface mount package. It is designed for narrow or wide bandwidth commercial, industrial and military applications that require high gain and wide gain control range. The amplifier can be used in a single-ended or differential output configuration. For low frequency applications ($< 50 MHz$) a bypass capacitor and series resistor are connected to pin 4, the AC Input Ground lead.

Typical applications include variable gain amplification for fiber-optic systems at data rates in excess of the 1.24 Gb/s SONET standard, mobile radio and satellite receivers, millimeter wave receiver IF amplifiers and communications receivers.

The IVA series of variable gain amplifiers is fabricated using Avantek's 10 GHz f_T , 25 GHz f_{MAX} ISOSAT™-I silicon bipolar process. This process uses nitride self-alignment, sub-micrometer lithography, trench isolation, ion implantation, gold metallization and polyimide inter-metal dielectric and scratch protection to achieve excellent performance, uniformity and reliability.

Differential input option is available under part number IVA-05218

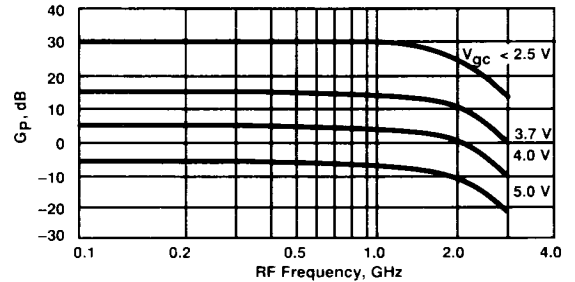
Avantek 180 mil Package



PIN DESCRIPTION	
1 Input	8 Gain Control Voltage
2 V_{EE} AC Ground	7 Inverting Output
3 V_{EE} AC Ground	6 Output
4 AC Input Ground	5 V_{CC}
Bottom of Package is V_{EE} (AC Ground)	

Notes:
 (unless otherwise specified)
 1. Dimensions are in mm
 2. Tolerances in .xxx = ± 0.005
 mm .xx = ± 0.13

TYPICAL VARIABLE GAIN vs. FREQUENCY
 $T_A = 25^\circ C, V_{CC} = 5 V, V_{EE} = 0 V$



Electrical Specifications¹, $T_A = 25^\circ C$

Symbol	Parameters and Test Conditions ² : $V_{CC} = 5 V, V_{EE} = 0 V, V_{GC} = 0 V, Z_0 = 50 \Omega$	Units	Min.	Typ.	Max.
Gp	Power Gain $ S_{21} ^2$ $f = 0.5 GHz$	dB	25	30	
ΔGp	Gain Flatness $f = 0.05$ to $1.0 GHz$	dB		± 0.5	
f_{3dB}	3 dB Bandwidth ³	GHz	1.0	1.5	
GCR	Gain Control Range $f = 0.5 GHz, V_{GC} = 0$ to $5 V$	dB	25	30	
ISO	Reverse Isolation ($ S_{12} ^2$) $f = 0.5 GHz, V_{GC} = 0$ to $5 V$	dB		45	
VSWR	Input VSWR $f = 0.05$ to $1.5 GHz, V_{GC} = 0$ to $5 V$			1.7:1	
	Output VSWR $f = 0.05$ to $1.5 GHz, V_{GC} = 0$ to $5 V$			1.5:1	
NF	50 Ω Noise Figure $f = 0.5 GHz$	dB		9	
P1 dB	Output Power @ 1 dB Compression $f = 0.5 GHz$	dBm		-2	
VOUT	Peak-to-Peak Single-Ended Output Voltage $f = 0.5 GHz$	mVpp		450	
IP3	Output Third Order Intercept Point $f = 0.5 GHz$	dBm		8	
tD	Group Delay $f = 0.5 GHz$	psec		400	
Icc	Supply Current	mA	25	35	45

Notes: 1. The recommended operating voltage range for this device is 4 to 6 V. Typical performance as a function of voltage is on the following page.
 2. As measured using Input Pin 1 and Output Pin 6: with Output Pin 7 terminated into 50 ohms.
 3. Referenced from 50 MHz Gain.

IVA-05118 Silicon Bipolar MMIC 1.5 GHz Variable Gain Amplifier

Absolute Maximum Ratings

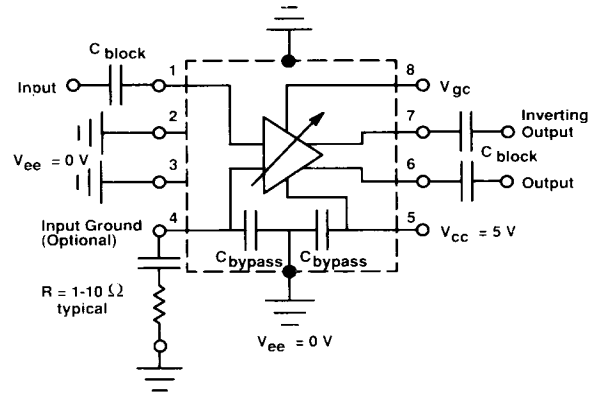
Parameter	Absolute Maximum ¹
Device Voltage	8 V
Power Dissipation ^{2,3}	600 mW
Input Power	+14 dBm
$V_{gc} - V_{ee}$	7 V
Junction Temperature	200 °C
Storage Temperature	-65 to 200 °C

Thermal Resistance²: $\theta_{JC} = 50^{\circ}\text{C}/\text{W}$

Notes:

- Permanent damage may occur if any of these limits are exceeded.
- $T_{CASE} = 25^{\circ}\text{C}$
- Derate at $20\text{ mW}/^{\circ}\text{C}$ for $T_C > 170^{\circ}\text{C}$.

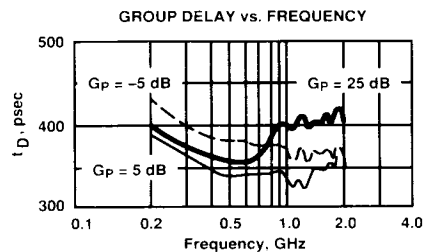
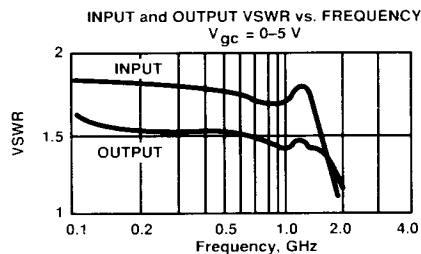
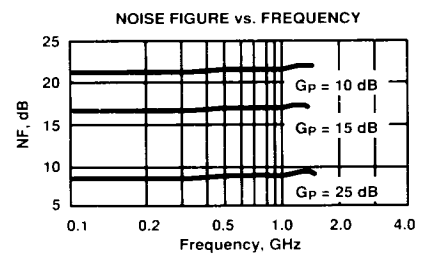
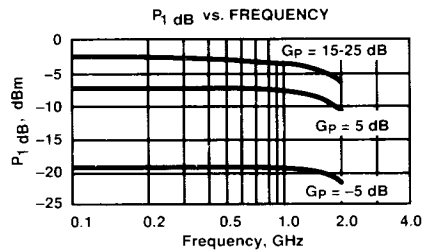
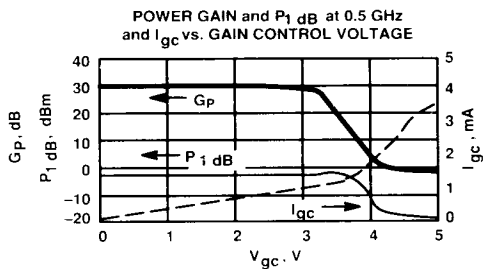
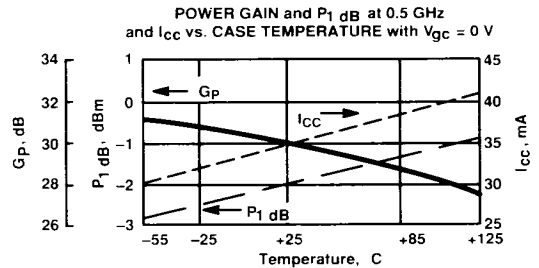
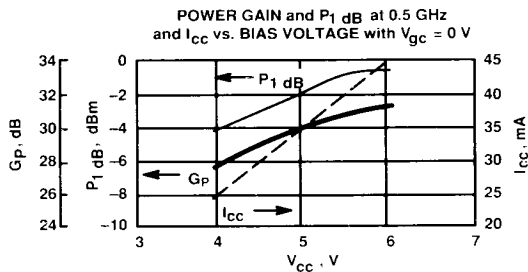
Typical Biasing Configuration and Functional Block Diagram



Typical Performance, $T_A = 25^{\circ}\text{C}$,

$V_{CC} = 5\text{ V}$, $V_{EE} = 0\text{ V}$

(unless otherwise noted)



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