

The TQ9114 IF/AGC (Intermediate Frequency/Automatic Gain Control) Amplifier is part of TriQuint's RFIC Downconverter Building Block family. Intended for use as an Automatic Gain Control Amplifier in an IF stage, a wide range of gain control is available. The TQ9114 provides wide-bandwidth operation from a standard +5 V power supply. Its low current consumption and small, plastic surface-mount package are ideally suited for low-cost hand-held and battery-powered applications.

### Electrical Specifications

**Test Conditions:**  $V_{DD} = +5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ , Frequency = 100 MHz

Parameter <sup>(1)</sup>	Min.	Typ.	Max.	Units
Frequency of operation	30		500	MHz
Gain MHz	27	30		dB
AGC Range <sup>(2)</sup>	50	60		dB
DC Supply Current		3.1	4.5	mA
Gain Control Voltage	0		5	V

Note: 1. Min/Max values listed are production tested.  
 2.  $V_{AGC} = 0\text{ V}$ , Max. Gain;  $V_{AGC} = +5\text{ V}$ , Min. Gain  
 3. Voltages which produce Min. and Max. Gain

## TQ9114

### IF/AGC Amplifier

#### Features

- 30 – 500 MHz operation
- 30 dB gain @ 100 MHz
- 60 dB AGC range
- Single + 5 V supply
- 3.1 mA supply current
- SO-8 plastic package

#### Applications

- GPS (Global Positioning Systems)
- Cellular Communications
- Spread-Spectrum Receivers

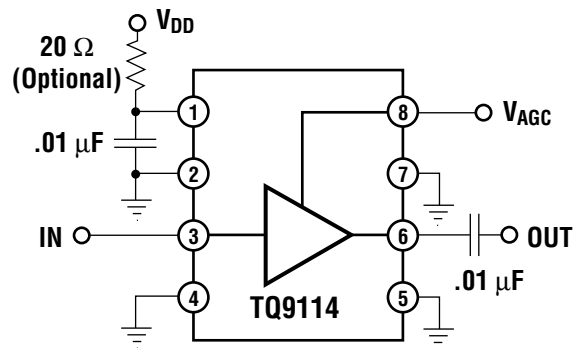
# TQ9114

## Electrical Specifications

Test Conditions:  $V_{DD} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ , Frequency = 100 MHz

Parameters	Condition	Min.	Typ.	Max.	Units
Frequency of Operation		30		500	MHz
Gain	Freq. = 100 MHz	27	30		dB
Gain	Freq. = 500 MHz	17	21		dB
Gain Control Range	Max. gain = 30 dB		60		dB
Noise Figure	50 $\Omega$ System		6.0		dB
Output 3rd Order Intercept			-5		dBm
Output 1dB Compression			-15		dBm
Gain Control Voltage		0		5	V
Supply Current			3.1	4.5	mA
Supply Voltage		4.5	5.0	5.5	V

## Test Circuit



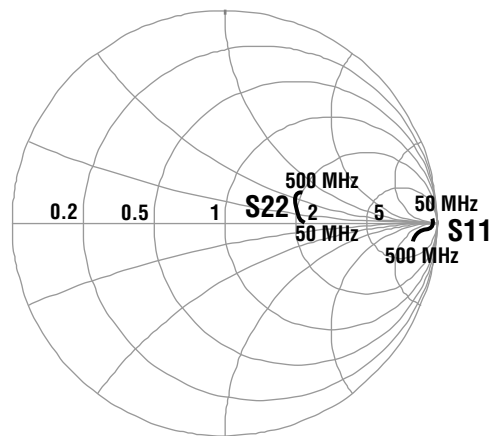
## S-Parameters (typical)

Test Conditions:  $V_{DD} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ ,  $V_{AGC} = 0\text{ V}$

Freq (MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$	Gain (dB)
50	0.972	-1	38.3	19	0.0006	-90	0.356	4	31.7
100	0.968	0	35.6	-17	0.0008	157	0.365	4	31.0
200	0.971	-1	29.2	-53	0.0004	103	0.358	7	29.3
300	0.973	-2	27.7	-78	0.0004	48	0.358	13	27.1
400	0.947	-1	17.2	-96	0.0007	83	0.371	18	24.7
500	0.931	-3	13.1	-110	0.0012	105	0.387	20	22.4

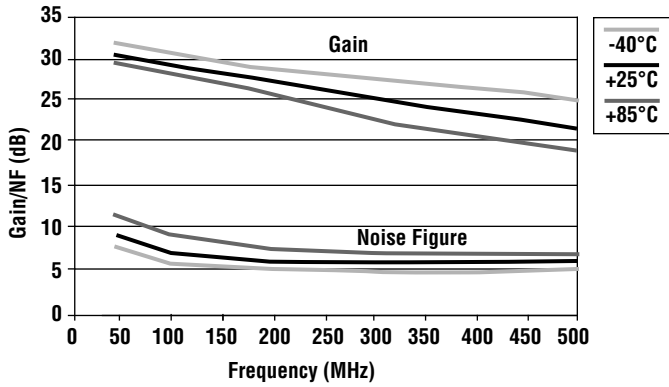
ICS

## Input and Output Impedance

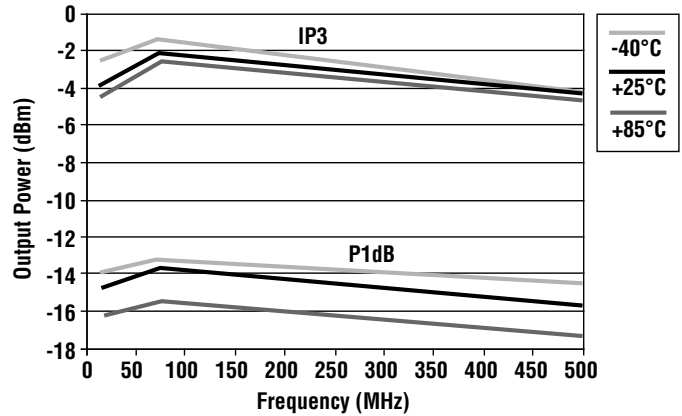


# TQ9114

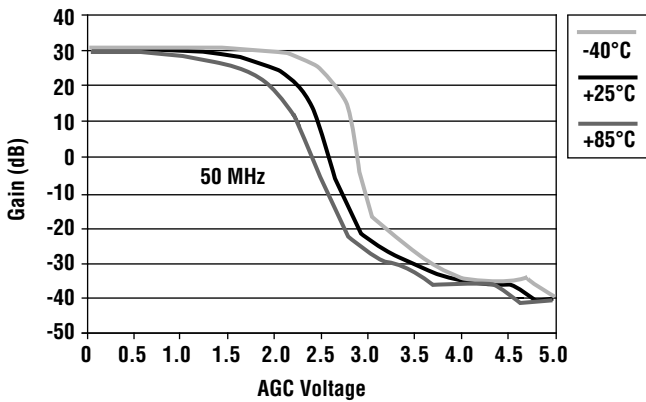
**Gain / NF vs. Frequency vs. Temperature**



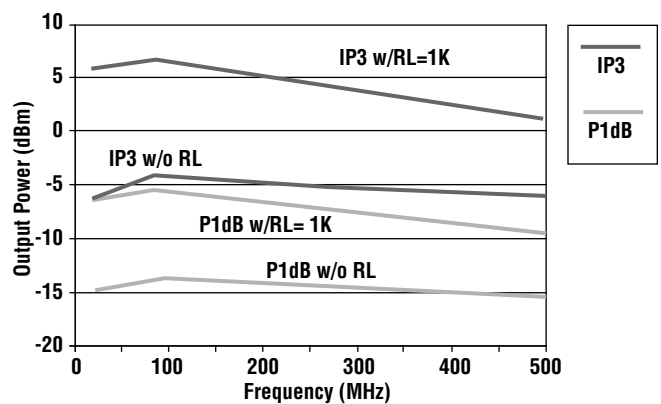
**P1dB and IP3 vs. Frequency vs. Temperature**



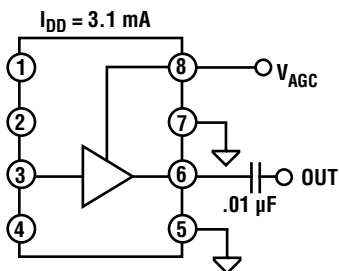
**AGC Transfer Curve vs. Temperature**



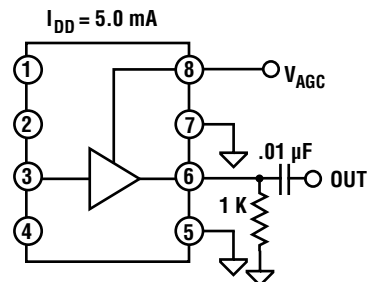
**P1dB and IP3 vs. Frequency vs. Load Resistor**



**Standard Output Circuit**



**Increased-Dynamic-Range Output Circuit**

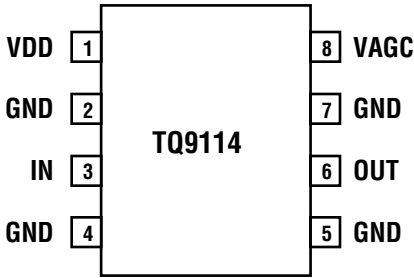


**Pin Descriptions**

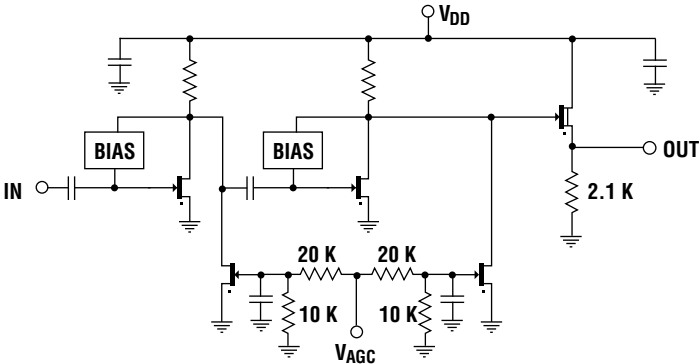
Pin Name	Pin #	Description
V <sub>DD</sub>	1	+5 V Power Supply. Decouple with 0.01 uF within 0.25 inch of package.
IN	3	Input is DC-blocked. VSWR and gain may be improved with external impedance matching, if desired.
V <sub>AGC</sub>	8	Gain control input. 0 V = maximum gain, +5 V = minimum gain. Slope of gain vs. voltage transfer function can be decreased by the addition of a series resistance in the V <sub>AGC</sub> line. (See schematic.)
GND	2, 4, 5, 7	Ground connection. Keep physically short for stability and performance. Pins are internally connected.

Note: Refer to block diagram for pin location

**TQ9114 Pinout**



**Circuit Schematic**



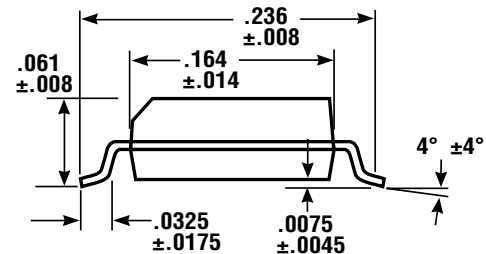
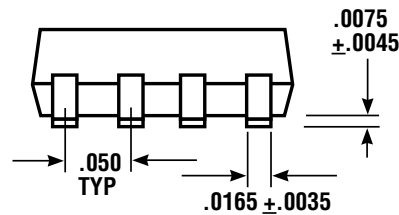
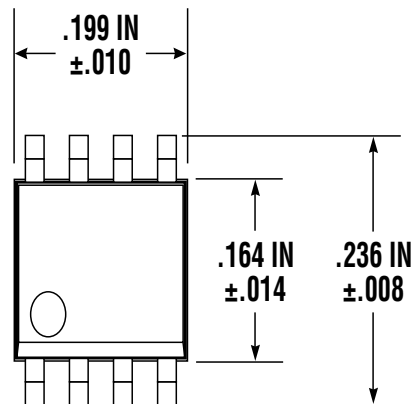
# TQ9114

## Absolute Maximum Ratings

Parameter	Min.	Typ.	Max.	Units
DC Power Supply			7	V
V <sub>AGC</sub>			7	V
Power Dissipation			70	mW
Input Power			+10	dBm
Storage Temperature	-55		+150	°C
Operating Temperature	-40		+85	°C

Note: ESD-sensitive device - Class 1

## SO-8 Plastic Package (N Suffix)



The information provided herein is believed to be reliable; TriQuint assumes no responsibility for inaccuracies or omissions. TriQuint assumes no responsibility for the use of this information, and all such information shall be entirely at the user's own risk. Prices and specifications are subject to change without notice. No patent rights or licenses to any of the circuits described herein are implied or granted to any third party. TriQuint does not authorize or warrant any TriQuint product for use in life-support devices and/or systems.

Copyright © 1995 TriQuint Semiconductor, Inc. All rights reserved.

Revision B.1, June 8, 1995

**TriQuint**   
SEMICONDUCTOR