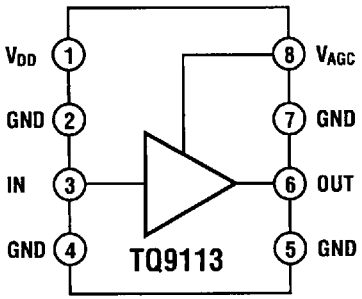
TQ9113

IF/AGC Amplifier



The TQ9113 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 TQ9113 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 V, T_A = 25 °C, Frequency = 100 MHz

Parameter (1)	Min.	Typ.	Max.	Units
Frequency of Operation	30		500	MHz
Gain	12.0	15.0		dB
AGC Range (2)		30		dB
DC Supply Current		2.2	3.0	mA
Gain Control Voltage (3)	0		5	V

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

Features

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

Applications

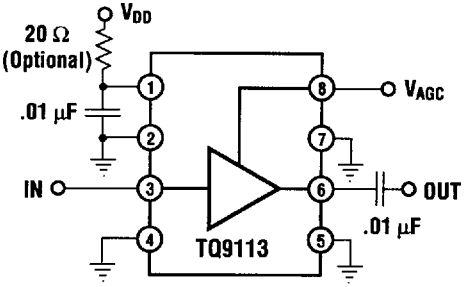
- *GPS (Global Positioning Systems)*
- *Cellular Communications*
- *Spread-Spectrum Receivers*

Electrical Specifications

Test Conditions: V_{DD} = +5 V, T_A = 25 °C, Frequency = 100 MHz

Parameters	Condition	Min.	Typ.	Max.	Units
Frequency of Operation		30		500	MHz
Gain	Freq. = 100 MHz	12.0	15.0		dB
Gain	Freq. = 500 MHz		8		dB
Noise Figure	50 Ω System		6.0		dB
AGC Range	Max. gain = 15 dB		30		dB
Output 3rd Order Intercept			-3.5		dBm
Output 1dB Gain Compression			-15		dBm
DC Supply Current			2.2	3.0	mA
Supply Voltage		4.5	5.0	5.5	V

Test Circuit

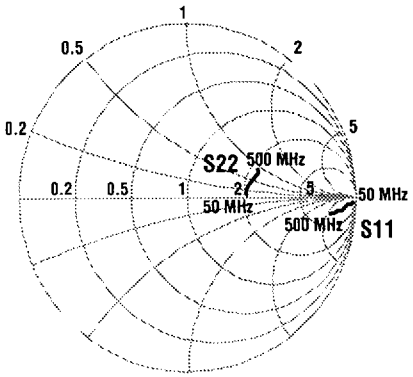


S-Parameters (typical)

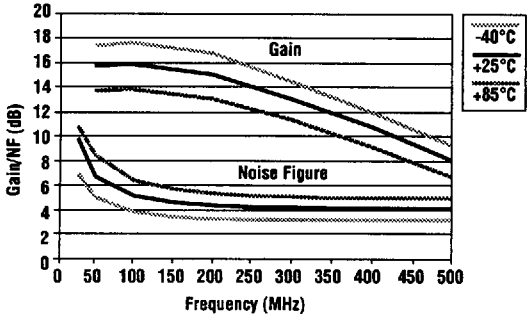
Test Conditions: V_{DD} = + 5 V, T_A = 25 °C, V_{AGC} = 0 V

Freq (MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22	Gain (dB)
50	0.971	-2	5.50	-172	0.0008	102	0.360	4	14.8
100	0.954	-2	5.33	169	0.0007	-151	0.368	9	14.5
200	0.941	-3	4.60	148	0.0013	146	0.401	14	13.3
300	0.916	-3	3.84	135	0.0035	134	0.428	17	11.7
400	0.891	-3	3.18	126	0.0037	126	0.445	19	10.0
500	0.874	-4	2.71	120	0.00493	116	0.450	20	8.7

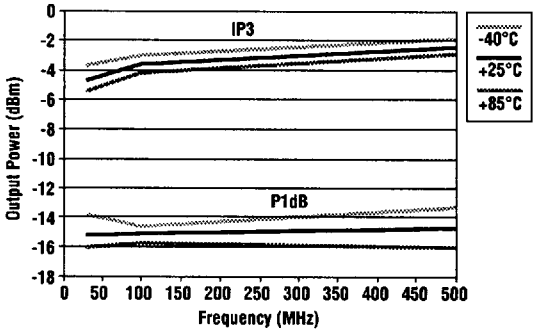
Input and Output Impedance



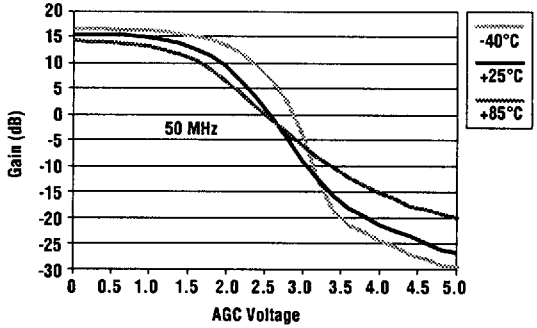
Gain / NF vs. Frequency vs. Temperature



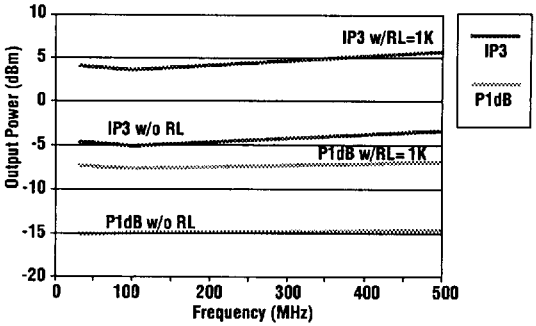
P1dB and IP3 vs. Frequency vs. Temperature



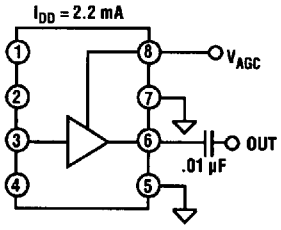
AGC Transfer Curve vs. Temperature



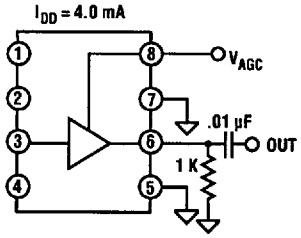
P1dB and IP3 vs. Frequency vs. Load Resistor



Standard Output Circuit



Increased-Dynamic-Range Output Circuit

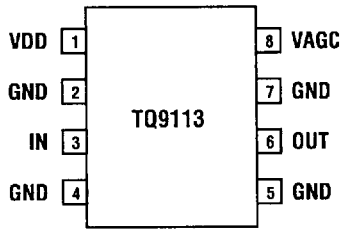


Pin Descriptions

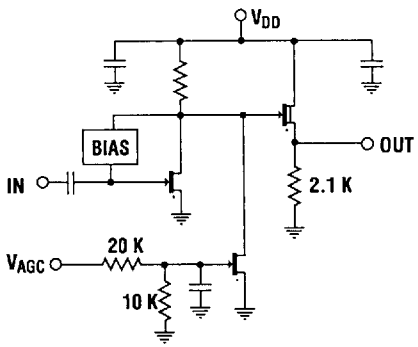
Pin Name	Pin #	Description
V_{DD}	1	+5 V Power Supply. Decouple with 0.01 uF within 0.25 inch of package.
IN	3	Input is DC-blocked. VSWR and gain may be improved with external impedance matching, if desired.
OUT	6	Output port requires a DC block. Output gain compression point and third order intercept point can be increased by the addition of a shunt resistor. (See note on output circuit options.)
V_{AGC}	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_{AGC} 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

TQ9113 Pinout



Circuit Schematic

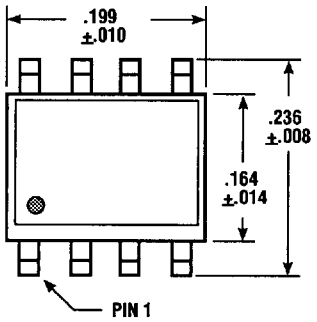


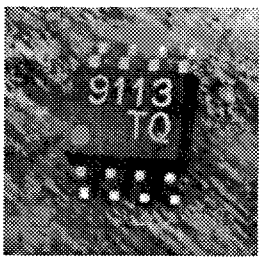
Absolute Maximum Ratings

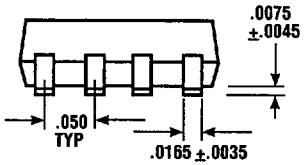
Parameter	Min.	Typ.	Max.	Units
DC Power Supply			7	V
V_{AGC}			7	V
Power Dissipation			70	mW
Input Power			+10	dBm
Storage Temperature	-55		+150	°C
Operating Temperature	-40		+85	°C

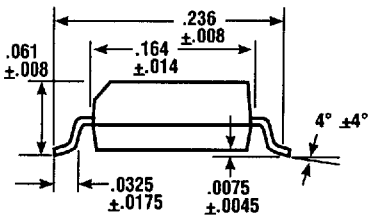
Note: ESD-sensitive device - Class 1

SO-8 Plastic Package









TriQuint SEMICONDUCTOR