

AGC AMPLIFIER

FEATURES

- Low-Distortion Automatic Gain Control (AGC) Amplifier
- 5-V Power Supply
- 8-Pin Mini Small-Outline Package (MSOP)
- Wide Gain Control Range

APPLICATIONS

- Digital TVs
- Digital CATVs
- Digital Set-Top Boxes (STBs)

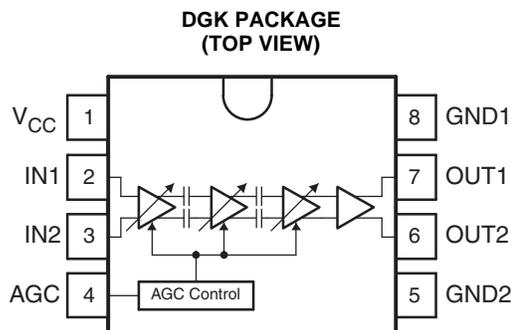
DESCRIPTION

The SN761643 is an automatic gain control (AGC) amplifier for the TV tuner system of a digital TV, CATV, or STB. The circuit consists of three stages of controlled-gain amplification, followed by a fixed-gain output amplifier.

The device is packaged in an 8-pin MSOP suitable for surface mounting.



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

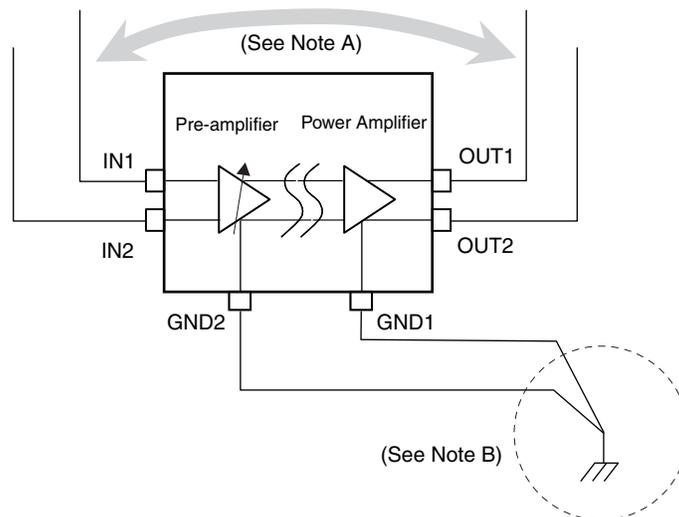


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TERMINAL FUNCTIONS

TERMINAL		I/O	EQUIVALENT CIRCUIT	DESCRIPTION
NAME	NO.			
AGC	4	I		Gain control voltage input
GND1	8			Power amplifier ground
GND2	5	–		Pre-amplifier ground
IN1 IN2	2 3	I		AGC amplifier input
OUT1 OUT2	7 6	O		AGC amplifier output
V _{CC}	1	–		5-V power supply

Correct Use



- A. Be careful to keep enough isolation between input and output line.
- B. Form a ground pattern as widely as possible. GND1 and GND2 should not have common impedance.

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

over operating free-air temperature range (unless otherwise noted)

		MIN	MAX	UNIT	
V _{CC}	Supply voltage range ⁽²⁾	V _{CC} (pin 1)	-0.4	6.5	V
V _I	Input voltage range ⁽²⁾	AGC (pin 4)	-0.4	V _{CC}	V
P _D	Continuous total dissipation ⁽³⁾			477	mW
T _{JC}	Maximum junction temperature			150	°C

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) Voltage values are with respect to the GND of the circuit.

(3) At T_A ≤ 25°C. For T_A > 25°C, the derating factor is 3.82 mW/°C.

RECOMMENDED OPERATING CONDITIONS

		MIN	NOM	MAX	UNIT
V _{CC}	Supply voltage	4.5	5	5.5	V
T _{OPe}	Operating free-air temperature	-20		85	°C

DC ELECTRICAL CHARACTERISTICS

V_{CC} = 5 V, T_A = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
I _{CC}	Supply current	V _{AGC} = 3 V	28		mA
I _{IAGC}	Input current (AGC)	V _{AGC} = 3 V	30	60	μA
V _{AGC} MAX	AGC maximum gain control voltage	Maximum gain	3	V _{CC}	V
V _{AGC} MIN	AGC minimum gain control voltage	Minimum gain	0	0.2	V

AC ELECTRICAL CHARACTERISTICS

V_{CC} = 5 V, T_A = 25°C, parameters measured in test circuit (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
G _{MAX1}	Maximum gain 1	V _{AGC} = 3 V, f _{IN} = 44 MHz, V _{IN} = -60 dBm, differential out, see Figure 10	57	61	65	dB
G _{MIN1}	Minimum gain 1	V _{AGC} = 0 V, f _{IN} = 44 MHz, V _{IN} = -60 dBm, differential out, see Figure 10	-7	-4	-1	dB
G _{MAX2}	Maximum gain 2	V _{AGC} = 3 V, f _{IN} = 44 MHz, V _{IN} = -60 dBm, see Figure 1 and Figure 11	51	55	59	dB
G _{MIN2}	Minimum gain 2	V _{AGC} = 0 V, f _{IN} = 44 MHz, V _{IN} = -60 dBm, see Figure 1 and Figure 11	-13	-10	-7	dB
GCR	Gain control range	V _{AGC} = 0 V to 3 V	65			dB
V _{OUT}	Output voltage	Single-ended output, see Figure 3	2.1			V _{p-p}
NF	Noise figure	Maximum gain, see Figure 2	11			dB
IM3	Third-order intermodulation distortion	f _{IN1} = 43.5 MHz, f _{IN2} = 44.5 MHz, Maximum gain, V _{OUT} = -2 dBm/tone, 1V _{p-p} See Figure 5 and Figure 12	-50			dBc
IIP3	Input intercept point	Minimum gain	11			dBm
r _{IN}	Input resistance (IN1, IN2)		1			kΩ
r _{OUT}	Output resistance (OUT1, OUT2)		25			Ω

TYPICAL CHARACTERISTICS

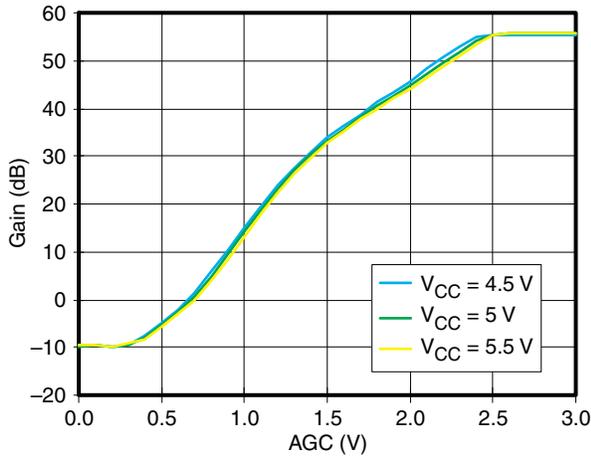


Figure 1. Gain vs AGC ($T_A = 25^\circ\text{C}$)

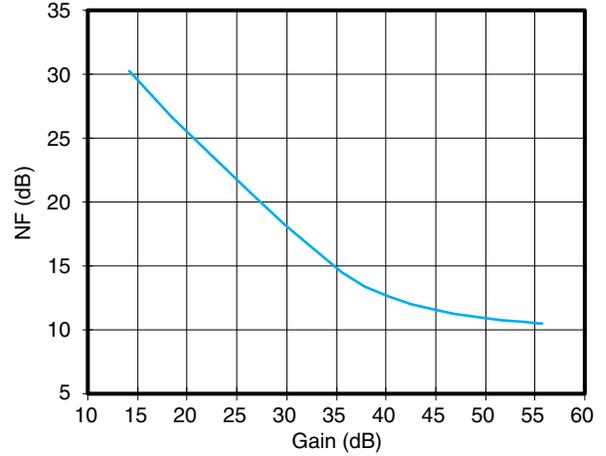


Figure 2. Noise Figure vs Gain ($V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$)

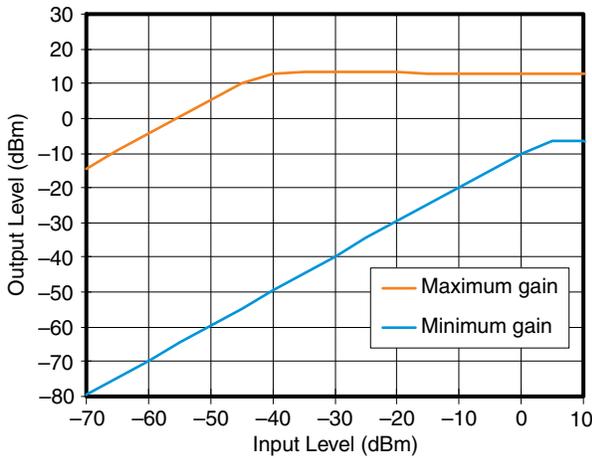


Figure 3. Output Level vs Input Level ($T_A = 25^\circ\text{C}$)

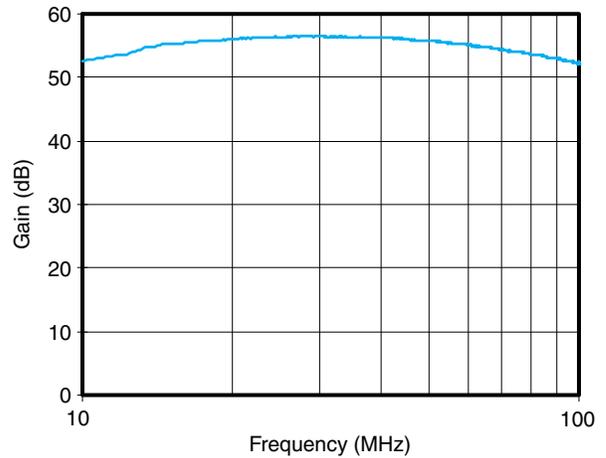


Figure 4. Gain vs Frequency (Gain = Max, $T_A = 25^\circ\text{C}$)

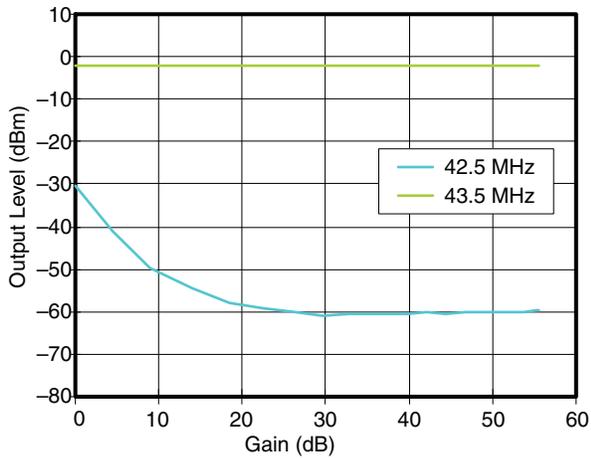


Figure 5. IM3 vs Gain ($V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$)

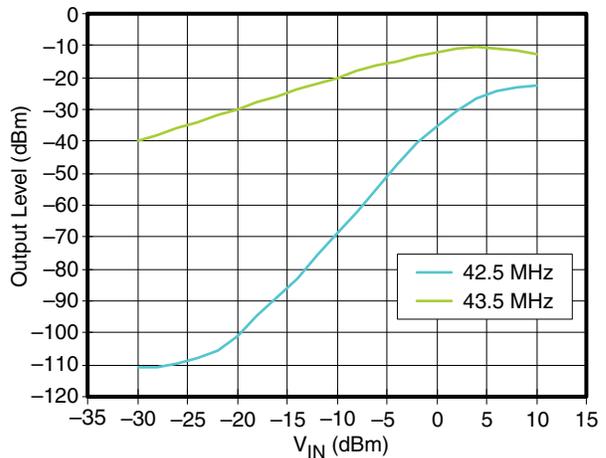


Figure 6. IM3 (Gain = Min, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$)

TYPICAL CHARACTERISTICS (continued)

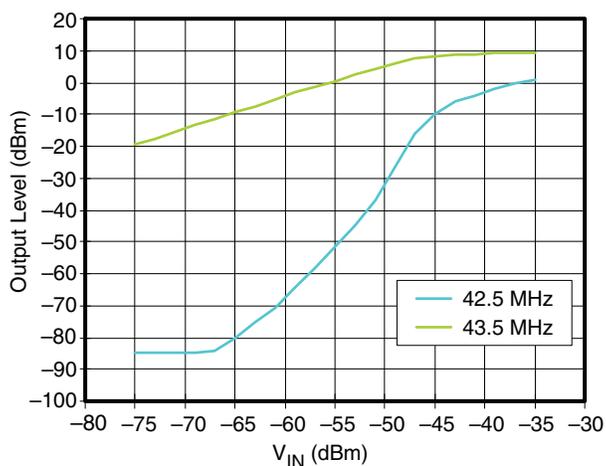


Figure 7. IM3 (Gain = Max, $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$)

S-Parameter

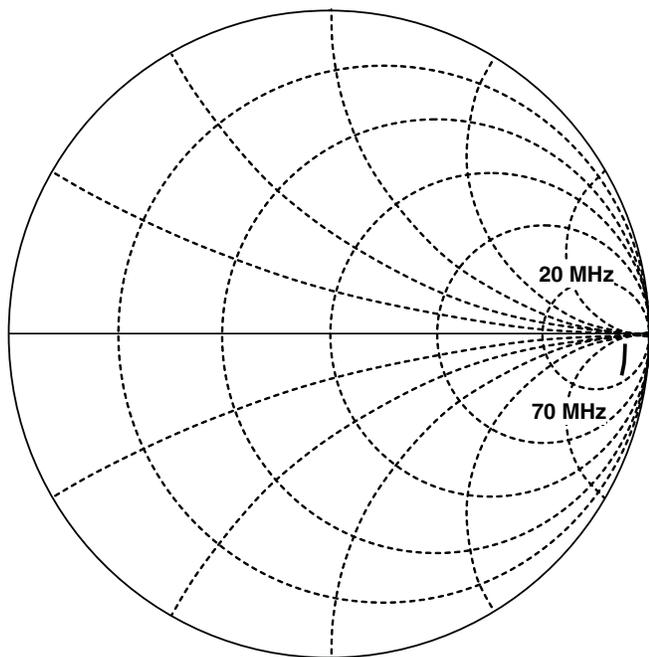


Figure 8. IN1

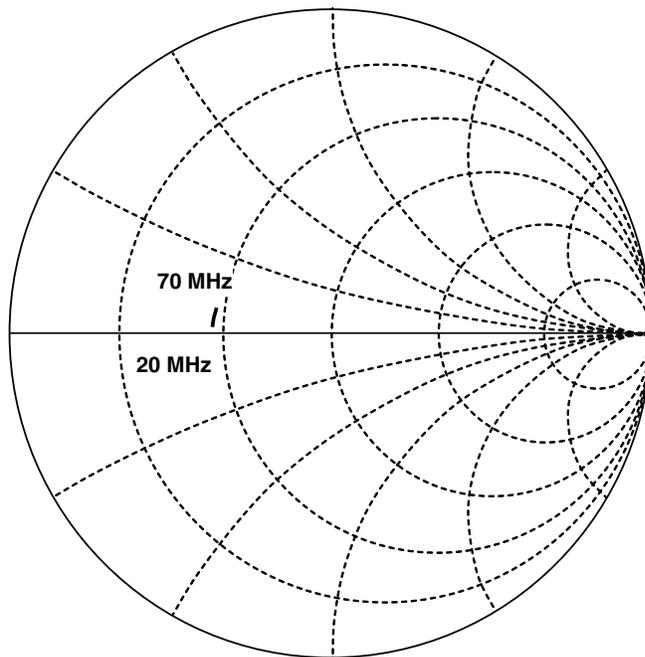


Figure 9. OUT1

APPLICATION INFORMATION

Test Circuits

This application information is advisory, and a performance check is required for actual application circuits.

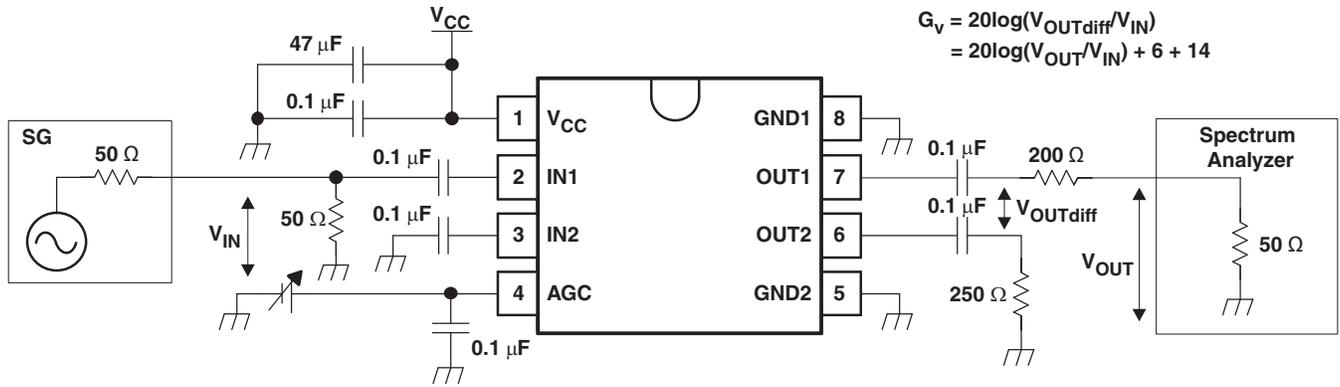


Figure 10. Measurement Circuit for Gain and Output Voltage 1

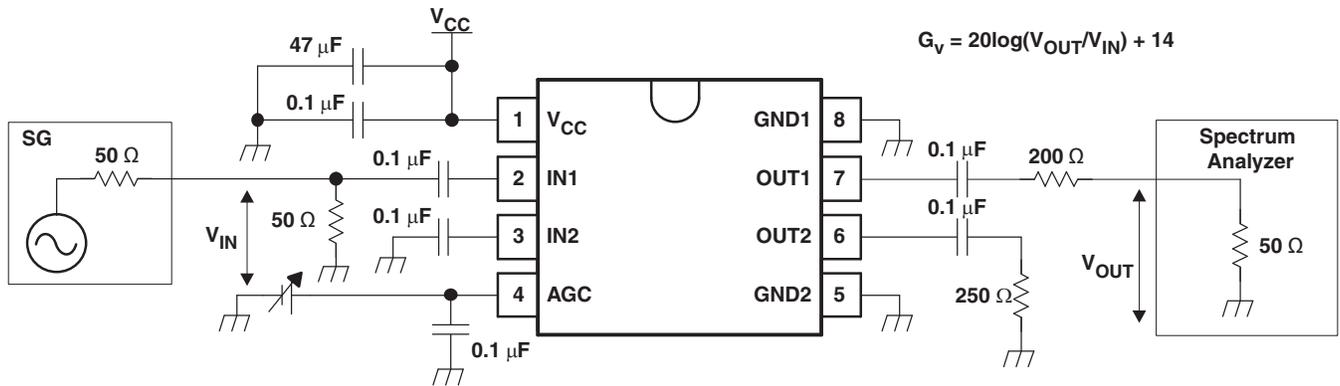


Figure 11. Measurement Circuit for Gain and Output Voltage 2

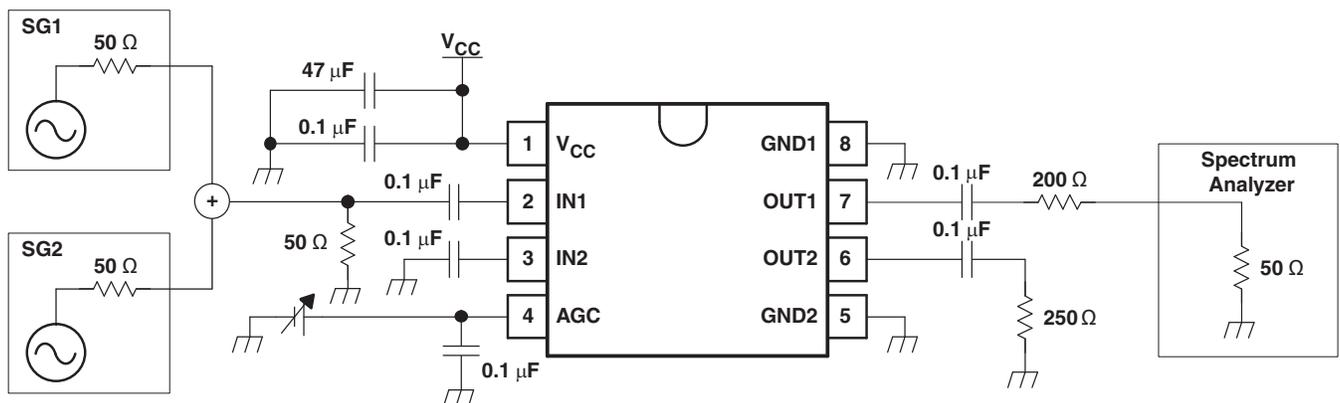


Figure 12. Measurement Circuit for IM3 and IIP3

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