

AGC Amplifier

FEATURES

- Low-Distortion AGC Amplifier
- Wide Gain-Control Range
- 5-V Power Supply
- 8-Pin MSOP Package

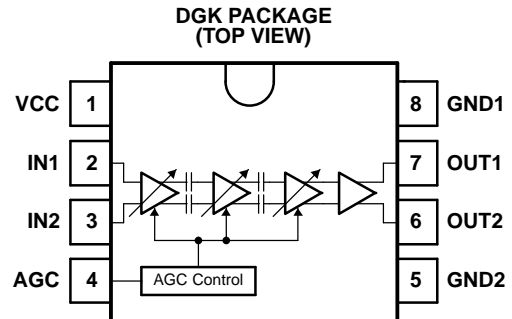
APPLICATIONS

- Digital TV
- Digital CATV, STB

DESCRIPTION

The SN761663 is an 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.



P0026-03



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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.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range (unless otherwise noted) ⁽¹⁾

SN761663	
Supply voltage, V_{CC} (pin 1) ⁽²⁾	–0.4 V to 6.5 V
Input voltage ⁽²⁾ , AGC (pin 4), IN1 (pin 2), IN2 (pin 3)	–0.4 V to V_{CC}
Continuous total dissipation	477 mW ⁽³⁾
Operating free-air temperature, T_A	–20°C to 85°C
Junction temperature, T_J	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 $T_A \leq 25^\circ\text{C}$. For $T_A > 25^\circ\text{C}$, the derating factor is 3.82 mW/°C.

RECOMMENDED OPERATING CONDITIONS

over operating free-air temperature range

		MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	4.5	5	5.5	V
T_A	Operating free-air temperature	–20		85	°C

DC ELECTRICAL CHARACTERISTICS

$V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
I_{CC}	Supply current		23		mA
I_{IAGC}	Input current (AGC)	$V_{AGC} = 3\text{ V}$	30	60	μA
$V_{AGC\text{MAX}}$	AGC maximum gain control voltage	Maximum gain		V_{CC}	V
$V_{AGC\text{MIN}}$	AGC minimum gain control voltage	Minimum gain		1	V

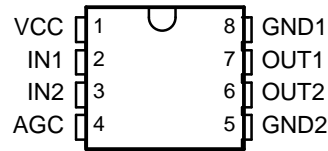
AC ELECTRICAL CHARACTERISTICS

$V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$. Parameters measured in test circuit of [Figure 9](#) or [Figure 10](#).

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
G_{MAX}	Maximum gain	$V_{AGC} = 3\text{ V}$	60	64	dB
G_{MIN}	Minimum gain	$V_{AGC} = 0\text{ V}$	–7	–4	dB
GCR	Gain control range	$V_{AGC} = 0\text{ V}–3\text{ V}$	67		dB
V_{OUT}	Output voltage	Single-ended output	2.6		Vp-p
NF	Noise figure	Maximum gain	10		dB
IM3	Third-order intermodulation distortion	$f_{\text{IN1}} = 43\text{ MHz}$, $f_{\text{IN2}} = 44\text{ MHz}$, $V_{\text{OUT}} = -2\text{ dBm}$, maximum gain	–50		dBc
IIP3	Input intercept point	Minimum gain	11		dBm
R_{IN}	Input resistance (IN1, IN2)		1		k Ω

DEVICE INFORMATION

**DGK PACKAGE
(TOP VIEW)**



P0026-02

TERMINAL FUNCTIONS

TERMINAL		I/O	EQUIVALENT CIRCUIT	DESCRIPTION
NAME	NO.			
AGC	4	I	<p style="text-align: center;">S0118-01</p>	Gain-control voltage
GND1	8	–		Ground
GND2	5	–		Ground
IN1	2	I	<p style="text-align: center;">S0117-01</p>	AGC amplifier input
IN2	3	I		AGC amplifier input
OUT1	7	O	<p style="text-align: center;">S0119-01</p>	AGC amplifier output
OUT2	6	O		AGC amplifier output
V _{CC}	1	–		5-V power supply

TYPICAL CHARACTERISTICS

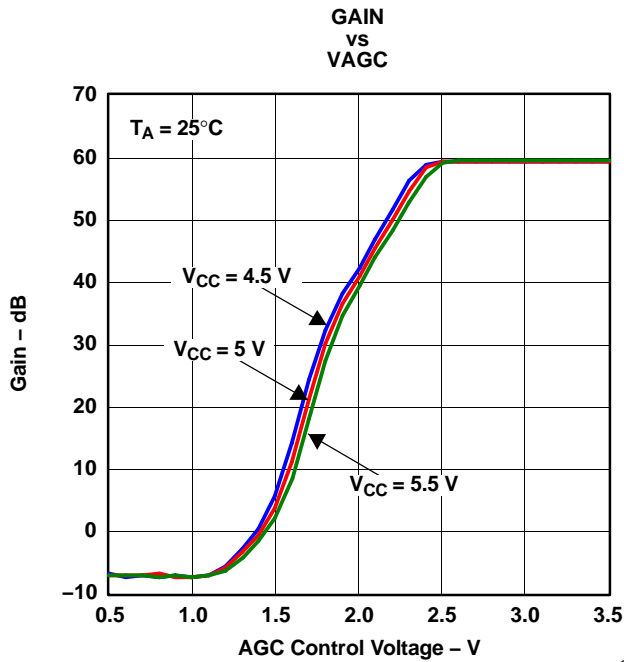


Figure 1.

G001

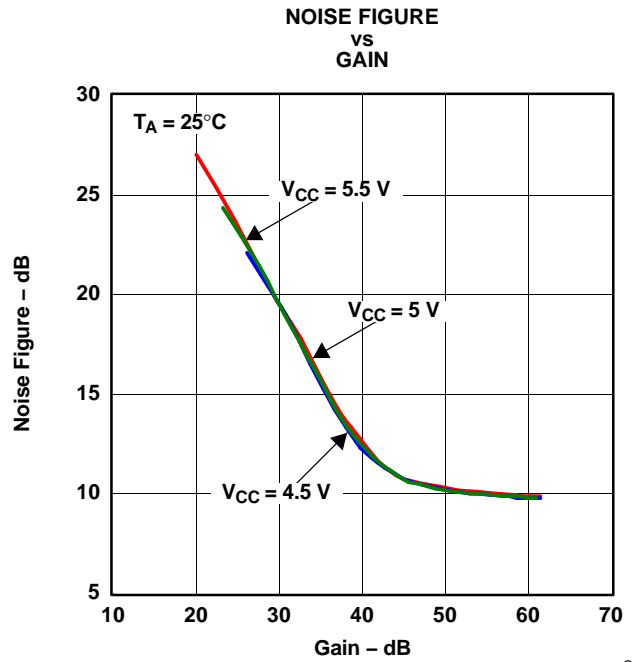


Figure 2.

G002

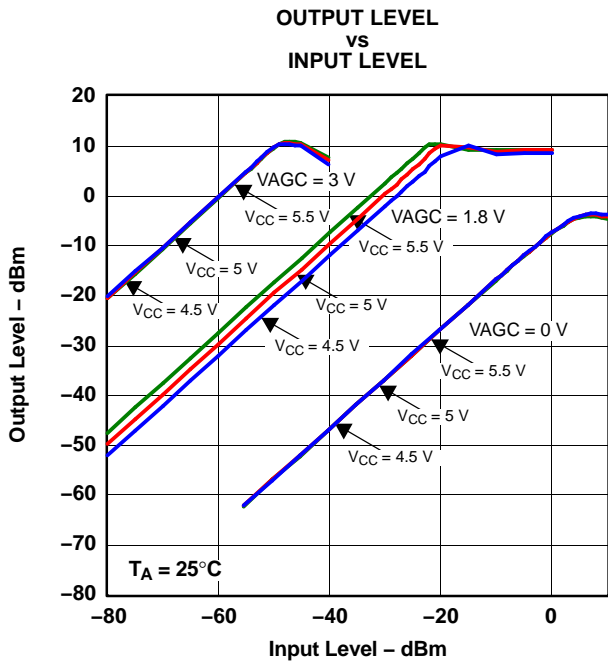


Figure 3.

G003

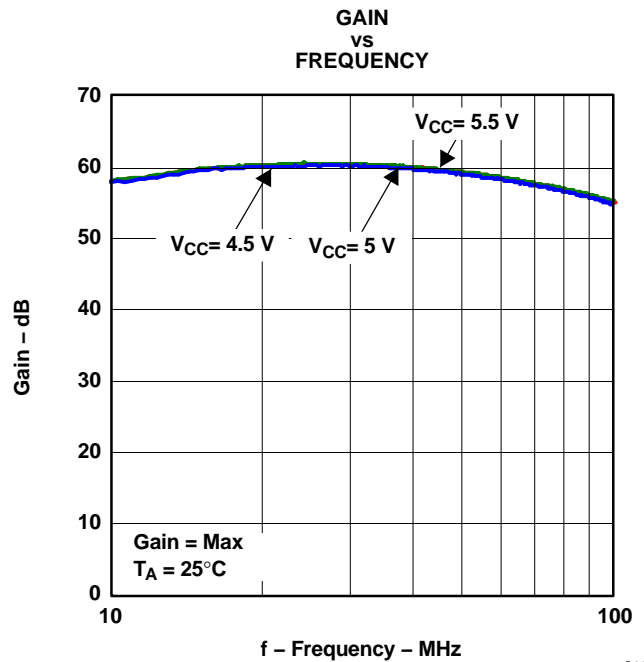


Figure 4.

G004

TYPICAL CHARACTERISTICS (continued)

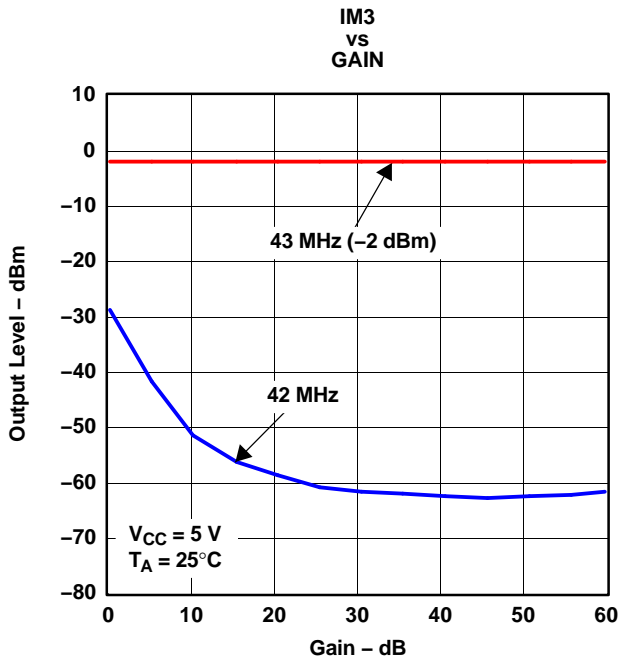


Figure 5.

G005

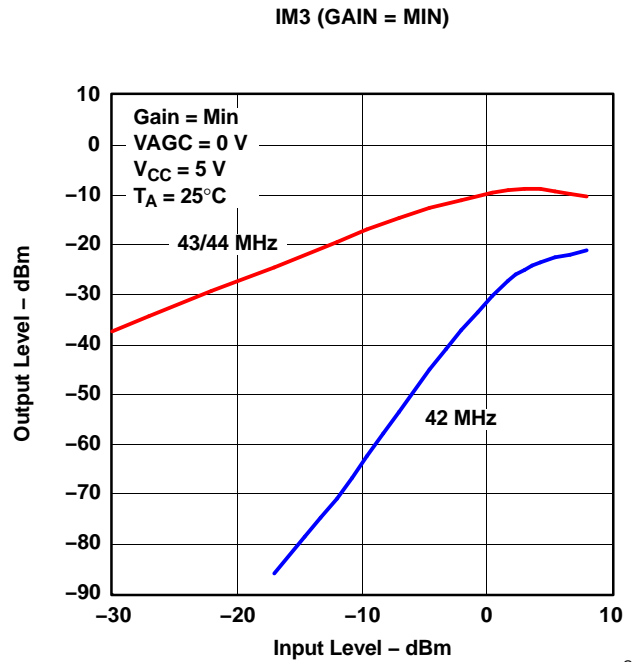


Figure 6.

G006

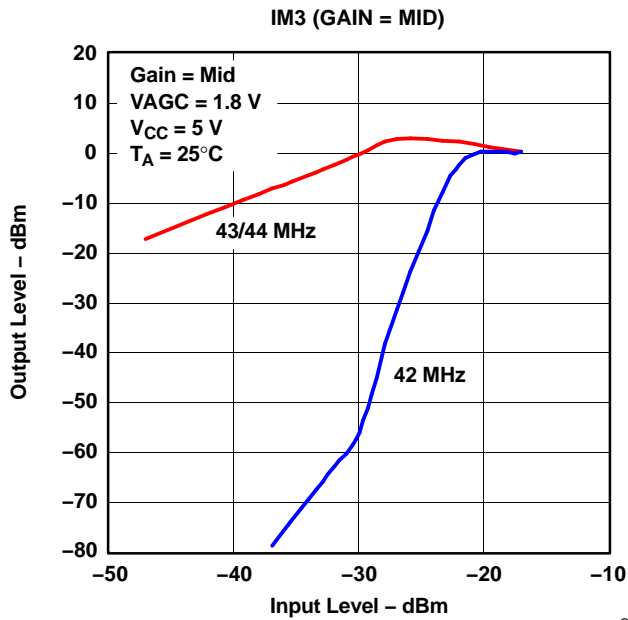


Figure 7.

G007

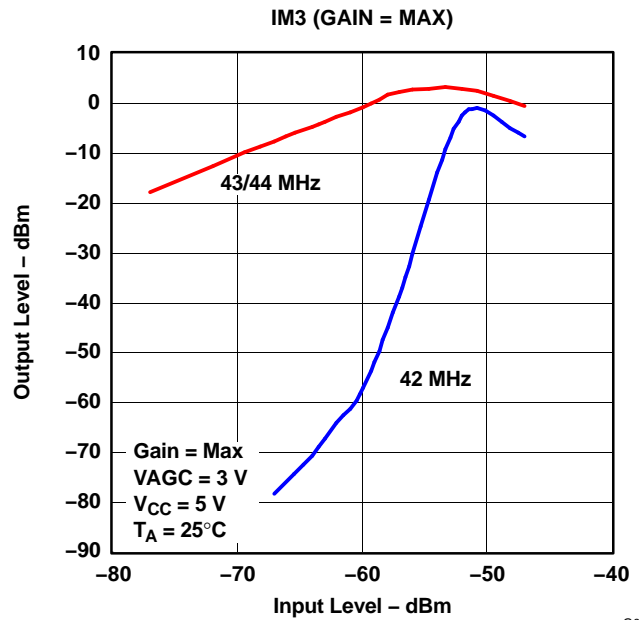


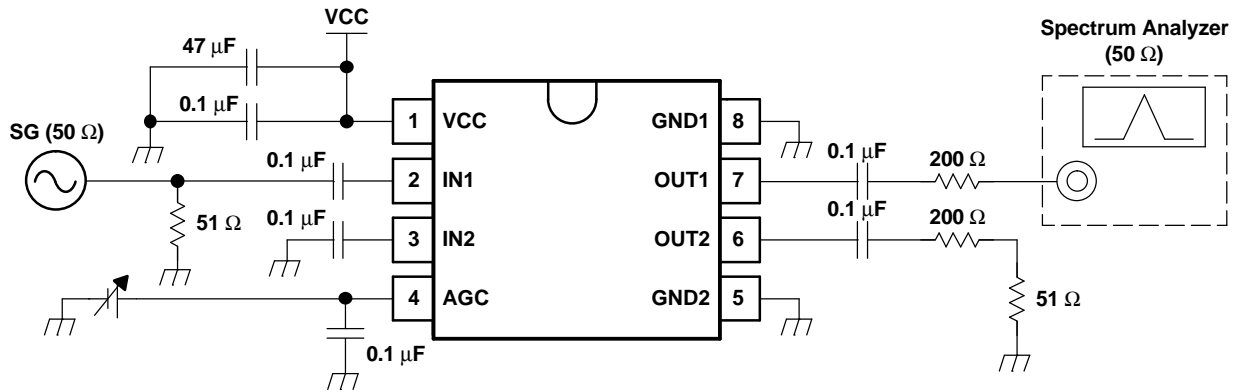
Figure 8.

G008

APPLICATION INFORMATION

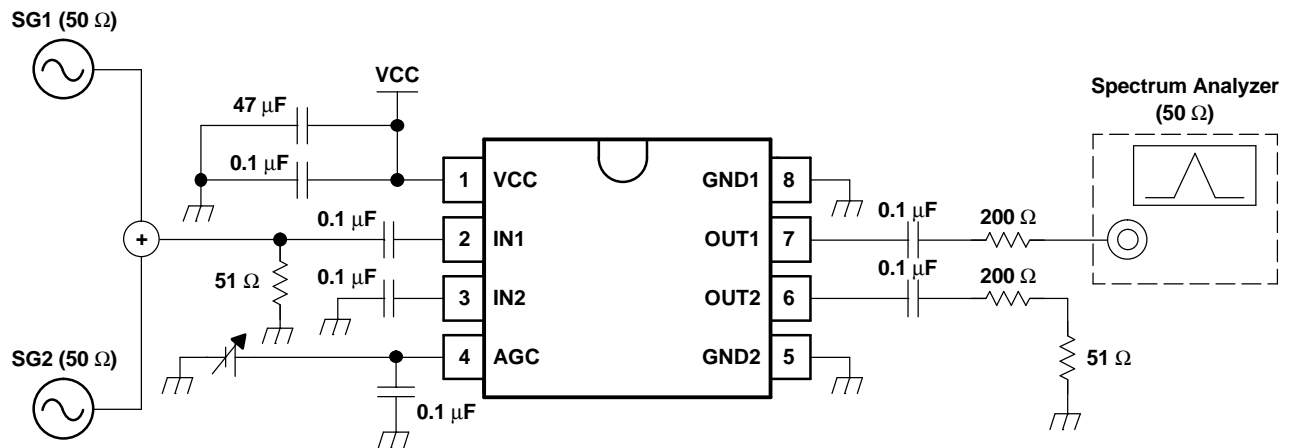
TEST CIRCUITS

Figure 9 and Figure 10 are test circuits for the SN761663. Figure 9 is the circuit for measurement of gain and output voltage. Figure 10 is the circuit for measurement of intermodulation distortion and input intercept point. This application information is advisory, and a performance check is required for actual application circuits.



S0120-01

Figure 9. Measurement Circuit for Gain and Output Voltage



S0121-01

Figure 10. Measurement Circuit for IM3 and IIP3

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN761663DGKR	ACTIVE	MSOP	DGK	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN761663DGKRG4	ACTIVE	MSOP	DGK	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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DGK (S-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 per end.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed 0.50 per side.
 - E. Falls within JEDEC MO-187 variation AA, except interlead flash.

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