

## AGC Amplifier

### FEATURES

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

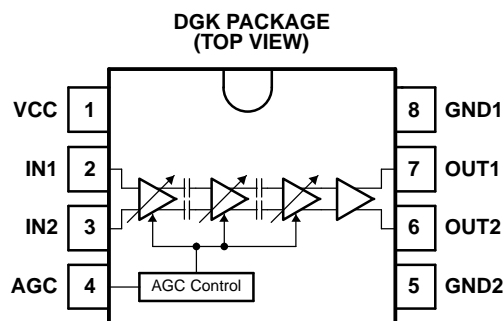
### APPLICATIONS

- 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



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.



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) <sup>(1)</sup>

SN761663	
Supply voltage, $V_{CC}$ (pin 1) <sup>(2)</sup>	–0.4 V to 6.5 V
Input voltage <sup>(2)</sup> , AGC (pin 4), IN1 (pin 2), IN2 (pin 3)	–0.4 V to $V_{CC}$
Continuous total dissipation	477 mW <sup>(3)</sup>
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	3		$V_{CC}$	V
$V_{AGC\text{MIN}}$	AGC minimum gain control voltage Minimum gain	0		1	V

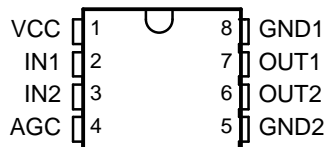
## AC ELECTRICAL CHARACTERISTICS

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$G_{\text{MAX}}$	Maximum gain $V_{AGC} = 3\text{ V}$	56	60	64	dB
$G_{\text{MIN}}$	Minimum gain $V_{AGC} = 0\text{ V}$	–10	–7	–4	dB
GCR	Gain control range $V_{AGC} = 0\text{ V} - 3\text{ V}$		67		dB
$V_{\text{OUT}}$	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
$R_{\text{IN}}$	Input resistance (IN1, IN2)		1		kΩ

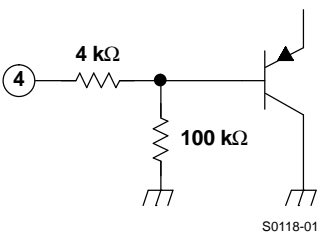
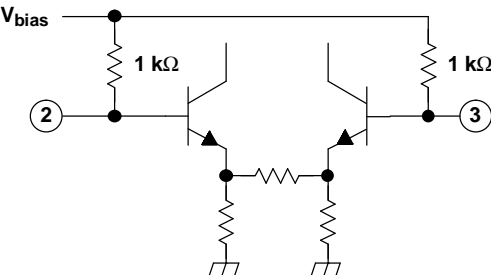
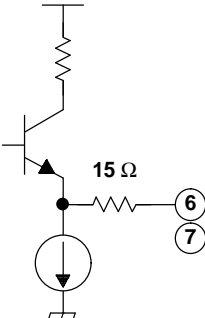
## DEVICE INFORMATION

**DGK PACKAGE  
(TOP VIEW)**



P0026-02

## TERMINAL FUNCTIONS

TERMINAL		I/O	EQUIVALENT CIRCUIT	DESCRIPTION
NAME	NO.			
AGC	4	I	 <p>S0118-01</p>	Gain-control voltage
GND1	8	–		Ground
GND2	5	–		Ground
IN1	2	I	 <p>S0117-01</p>	AGC amplifier input
IN2	3	I		AGC amplifier input
OUT1	7	O	 <p>S0119-01</p>	AGC amplifier output
OUT2	6	O		AGC amplifier output
V <sub>CC</sub>	1	–		5-V power supply

## TYPICAL CHARACTERISTICS

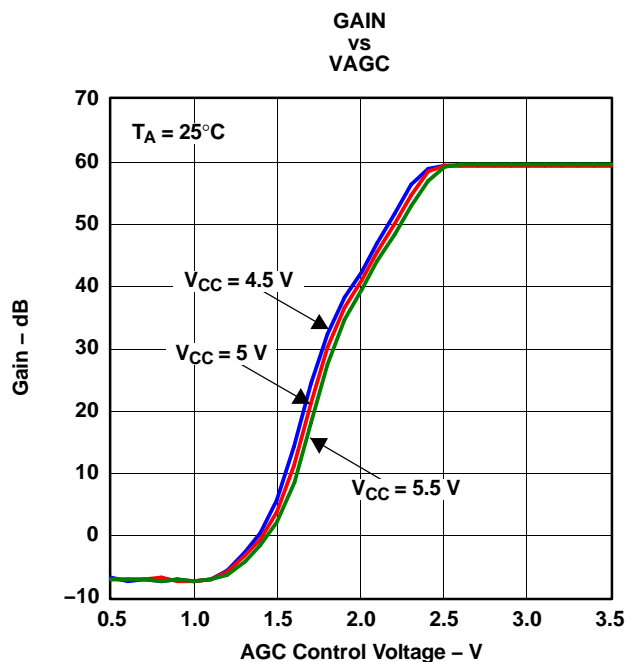


Figure 1.

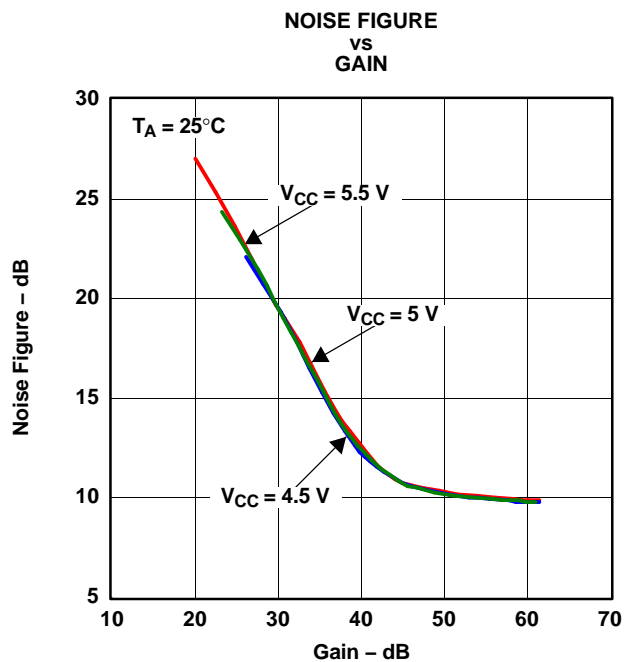


Figure 2.

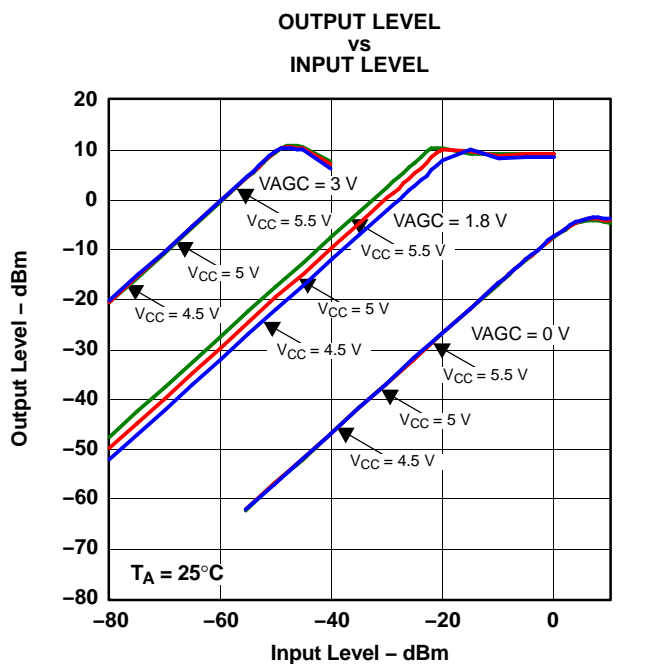


Figure 3.

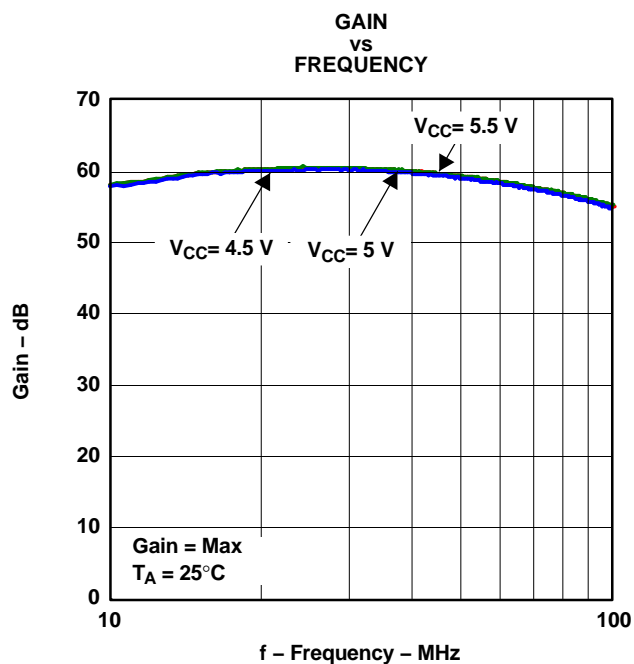


Figure 4.

## TYPICAL CHARACTERISTICS (continued)

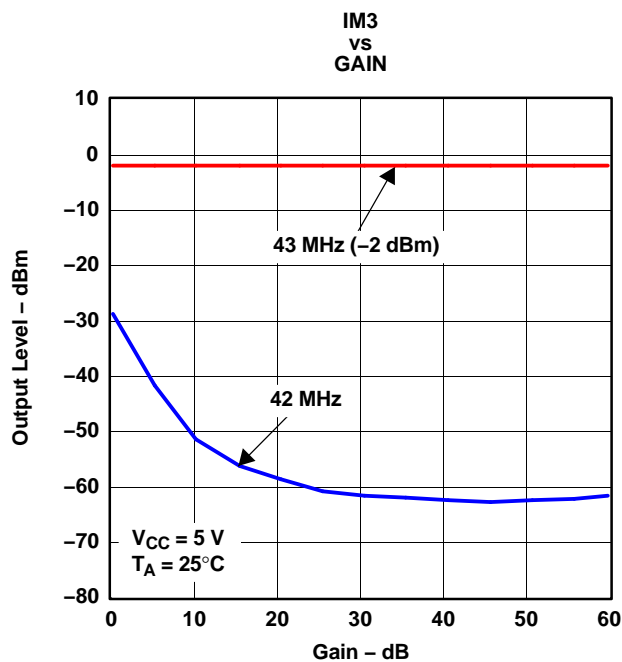


Figure 5.

G005

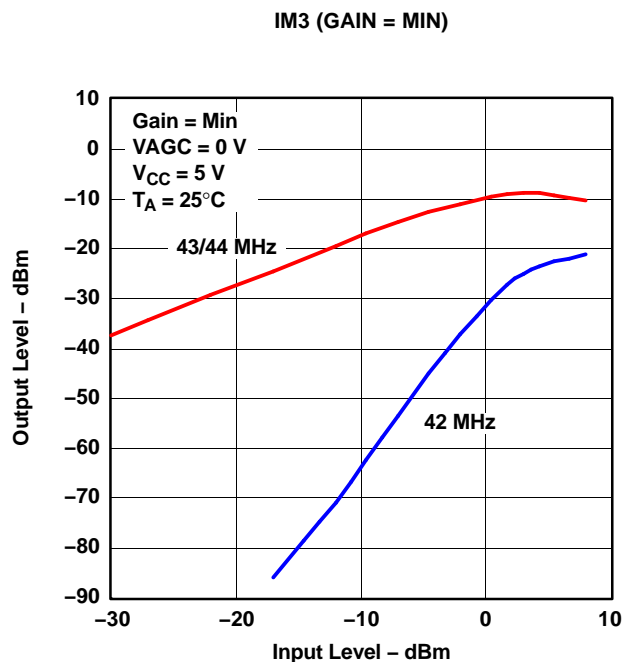


Figure 6.

G006

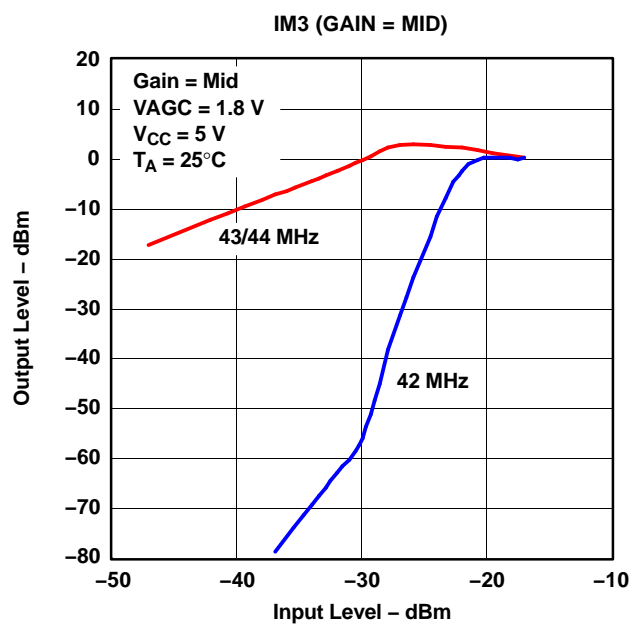


Figure 7.

G007

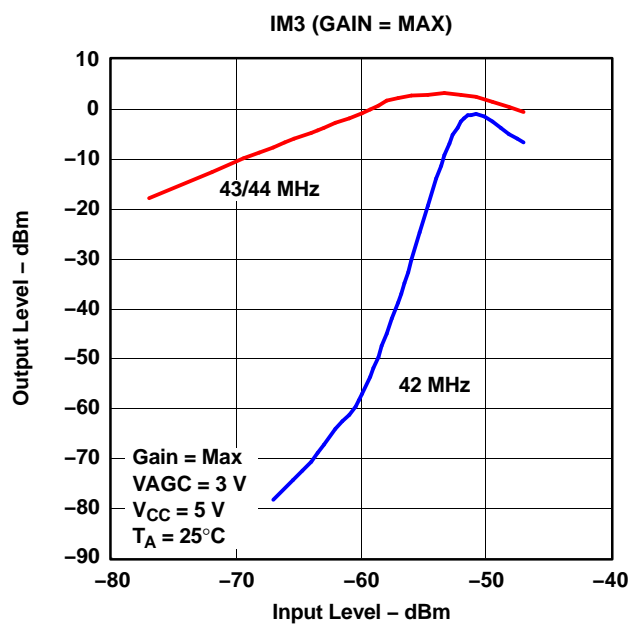


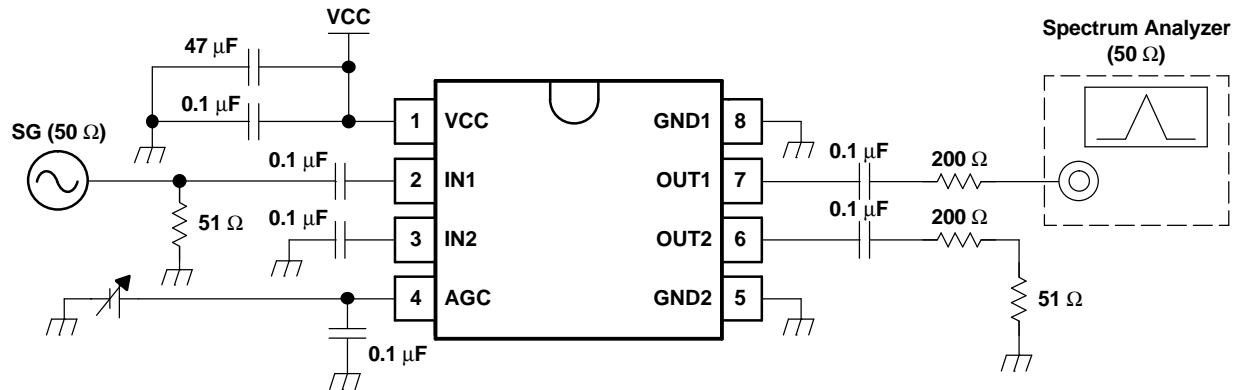
Figure 8.

G008

## APPLICATION INFORMATION

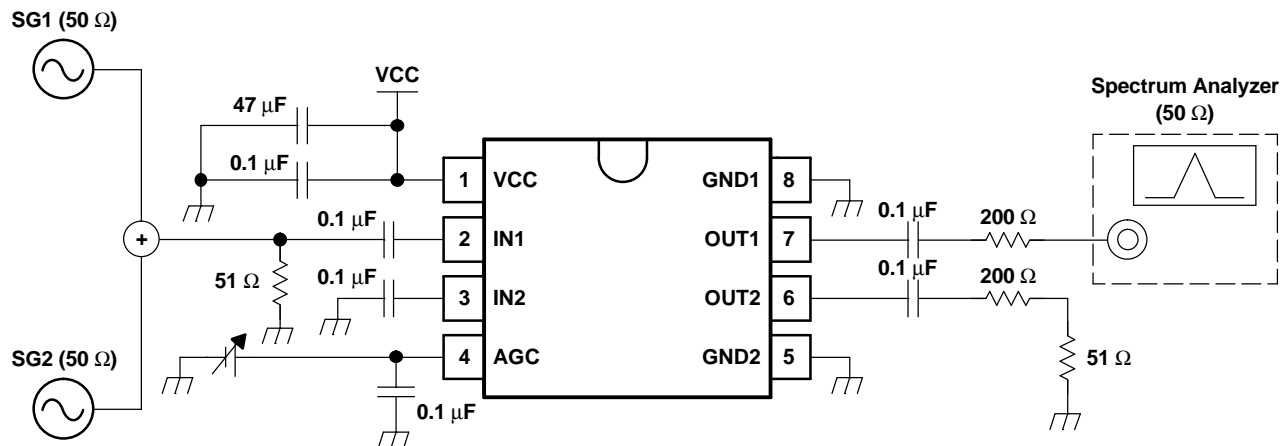
## TEST CIRCUITS

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 <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
SN761663DGK	ACTIVE	MSOP	DGK	8	100	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN761663DGKG4	ACTIVE	MSOP	DGK	8	100	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
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

<sup>(1)</sup> 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.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) 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.

**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)

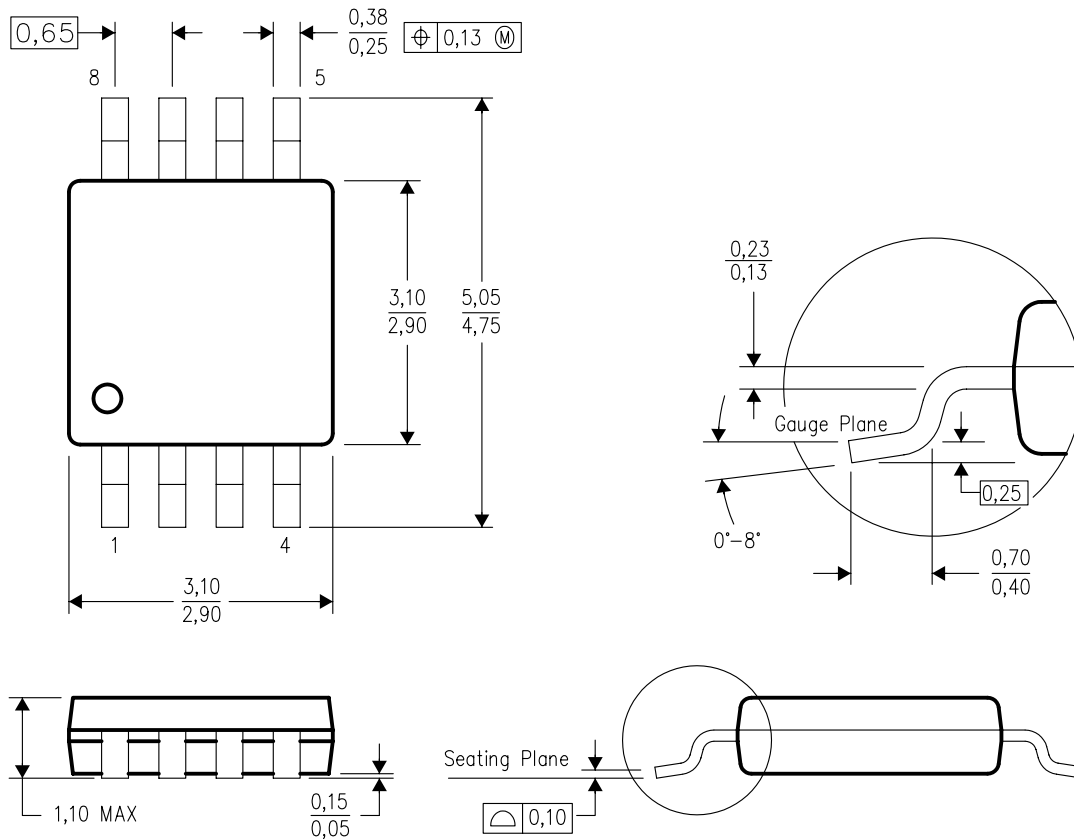
<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

## DGK (S-PDSO-G8)

## PLASTIC SMALL-OUTLINE PACKAGE



4073329/D 12/03

- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion.
  - D. Falls within JEDEC MO-187 variation AA.



## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

<b>Products</b>		<b>Applications</b>	
Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>	Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>	Automotive	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>	Broadband	<a href="http://www.ti.com/broadband">www.ti.com/broadband</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>	Digital Control	<a href="http://www.ti.com/digitalcontrol">www.ti.com/digitalcontrol</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>	Military	<a href="http://www.ti.com/military">www.ti.com/military</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>	Optical Networking	<a href="http://www.ti.com/opticalnetwork">www.ti.com/opticalnetwork</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>	Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
		Telephony	<a href="http://www.ti.com/telephony">www.ti.com/telephony</a>
		Video & Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>
		Wireless	<a href="http://www.ti.com/wireless">www.ti.com/wireless</a>

Mailing Address: Texas Instruments  
Post Office Box 655303 Dallas, Texas 75265

Copyright © 2005, Texas Instruments Incorporated