

FEATURES

- highly configurable, versatile DSP platform
- high quality two-channel AGC signal processing
- fully programmable via serial data interface
- high performance data converters - dual, over-sampled A/Ds; over-sampled D/A with efficient switched-mode output power amp
- drives zero-bias 2-terminal receivers
- multiple communication rates up to 85.3kb/s
- thinSTAX™ packaging - CIC size
- multi-memory
- internal/external volume control
- volume control taper determined by external VC

DESCRIPTION

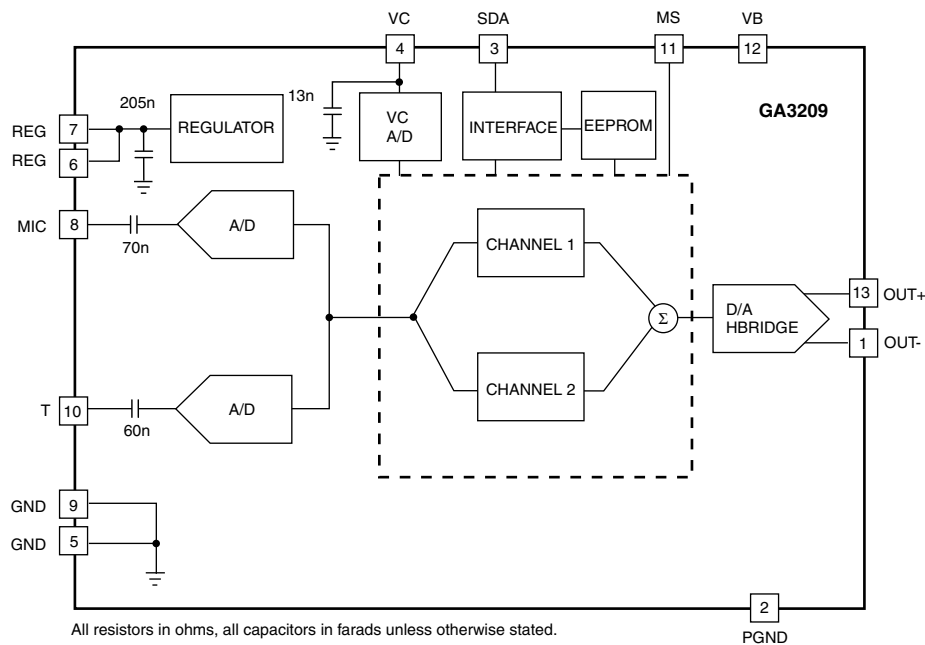
The GA3209 hybrid is a programmable DSP system based on a two-channel compression circuit. It can be used as a platform for a wide range of hearing aid applications. Its extensive programmability and compact size make it ideal for sophisticated CIC applications. The reflowable thinSTAX™ packaging enables easy use in BTE applications. This very versatile DSP hybrid is capable of multiple configurations and has a wide range of functions.

The GA3209 hybrid code programmed into the GC5050 controller chip is "4".

thinSTAX™ PACKAGING

Hybrid typical dimensions:

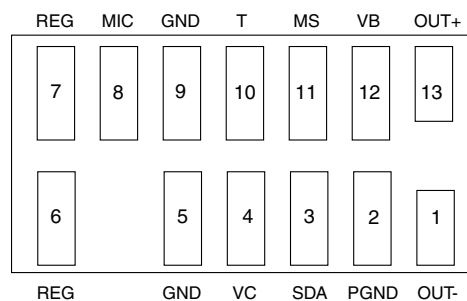
0.227 x 0.125 x 0.060 in
(5.76 x 3.18 x 1.52 mm)



BLOCK DIAGRAM

ABSOLUTE MAXIMUM RATING

Operating Temperature Range	-10°C to 40°C
Storage Temperature Range	-20°C to 70°C
Absolute Maximum Power Dissipation	25mW
Maximum Operating Supply Voltage	1.5VDC
Absolute Maximum Supply Voltage	2VDC

PAD CONNECTION**ELECTRICAL CHARACTERISTICS**

Conditions: Supply Voltage $V_B = 1.3V$; Temperature = 25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Hybrid Current	I_{AMP}	See current consumption section	-	700	-	μA
Minimum Operating Supply Voltage	V_{BOFF}	Ramp down	0.94	1.0	1.05	V
Supply Voltage turn on threshold	V_{BON}	Ramp up	1.06	1.10	1.16	V
Supply Voltage Hysteresis			90	100	110	mV
Supply Voltage during Communication	V_{BC}	During Communication	1.19	1.35	1.5	V
Hybrid Current during Communication	I_P	Programming (<5 ms)	-	3.7	-	mA
EEPROM Burn Cycles		Note 2	100k	-	-	cycles
Low Frequency System Bandwidth			-	125	-	Hz
High Frequency System Bandwidth			-	16	-	kHz
Total Maximum System Gain	A_V	$V_{IN} = -95$ dBV @ 3kHz; squelch disabled See Note 1.	-	83	-	dB
Converter Gain	A_{CONV}	A/D + D/A gain.	-	29	-	dB
Total Harmonic Distortion	THD	$V_{IN} = -40$ dBV	-	-	1	%
THD at Maximum Input	THD _M	$V_{IN} = -15$ dBV, HRX - ON	-	-	3	%
Clock Frequency	f_{clk}		1.945	2.048	2.151	MHz
REGULATOR						
Regulator Voltage	V_{REG}		0.90	0.95	1.00	V
Regulator Supply Rejection	PSRR _{REG}		-	50	-	dB
INPUT						
Input Referred Noise	IRN	Bandwidth 100Hz - 8kHz	-	-	-106	dBV
Input Impedance	Z_{IN}		-	16	-	k Ω
Anti-alias Filter Rejection (input referred)		$f = f_{clk} - 8kHz$, $V_{IN} = -40dBV$	-	80	-	dB
Maximum Input Level			-	-15	-	dBV
Input Dynamic Range		HRX - ON, Bandwidth 100Hz - 8kHz	-	95	-	dB
Audio Sample Rate			-	32	-	kHz
A/D Dynamic Range		Bandwidth 100Hz - 8kHz	-	86	-	dB
Mic - Telecoil Isolation		Identical Front and Rear channel configuration	-	30	-	dB

ELECTRICAL CHARACTERISTICS (Continued)Conditions: Supply Voltage $V_B = 1.3V$; Temperature = 25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
OUTPUT						
Maximum RMS Output Voltage		0dBFS $f = 1kHz$	-	-1	-	dBV
D/A Dynamic Range		Bandwidth 100Hz - 8kHz	-	80	-	dB
Output Impedance	Z_{OUT}	Note 2	-	-	20	Ω
VOLUME CONTROL						
Volume Control Resistance	R_{VC}		-	200	-	k Ω
Volume Control Range	ΔA		47.5	48.13	48.5	dB
MS INPUT						
Pull Down Resistance			-	1	-	M Ω
Logic 1 Voltage			V_{REG}	-	V_B	V
SDA INPUT						
Logic 0 Voltage		Note 2	0	-	0.3	V
Logic 1 Voltage		Note 2	1	-	1.3	V
SDA OUTPUT						
Standby Pull Up Current			1.4	2	2.6	μA
Sync Pull Up Current			450	500	550	μA
Logic 0 Current (Pull Down)			225	250	275	μA
Logic 1 Current (Pull Up)			225	250	275	μA
Synchronization Time (Synchronization Pulse Width)	T_{SYNC}	Baud = 0 Baud = 1 Baud = 2	237 118 59	250 125 62.5	263 132 66	μs

NOTE 1: Total System Gain consists of: *Wideband System Gain + High and Low Independent Channel Gains + Converter Gain*
 Total System Gain is calibrated during Cal/Config process.

NOTE 2: Sample tested.

SUPPORT SOFTWARE

All support software for the GA3209 is available from Gennum

Web Site www.gennum.com/hip/software/paragon_sw.html

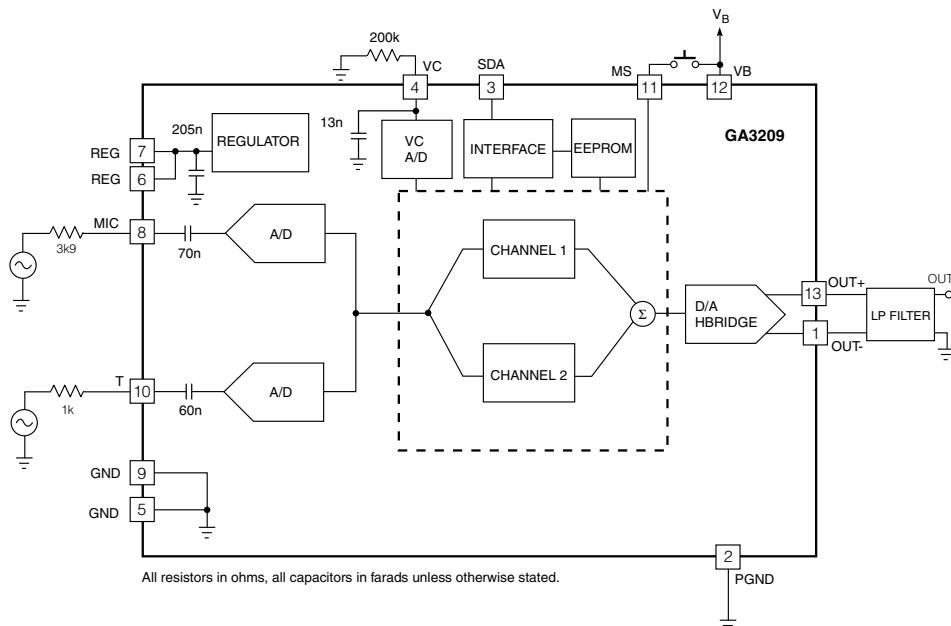


Fig. 1 Test Circuit

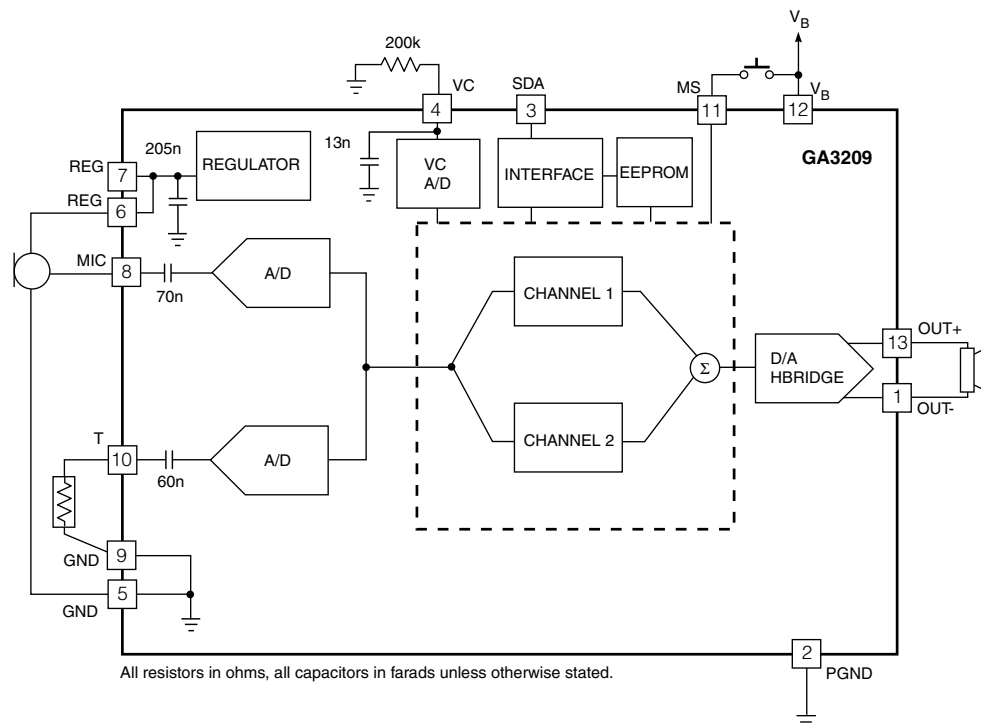


Fig. 2 Typical Application Circuit

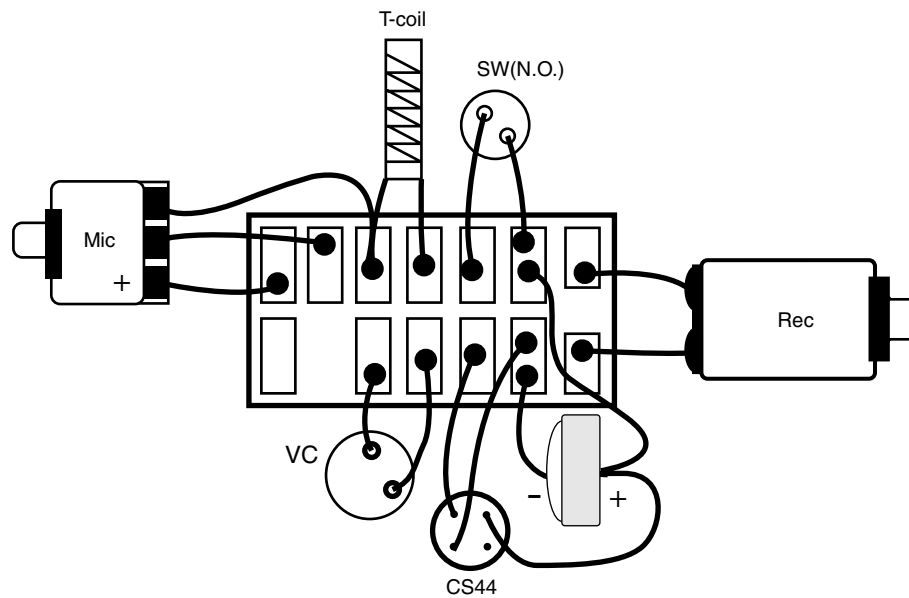
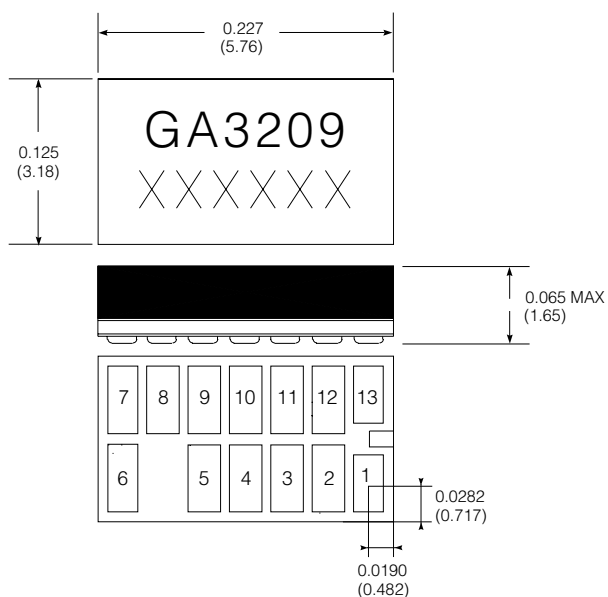


Fig. 3 Assembly Diagram

PACKAGE DIMENSIONS



Dimension units are in inches.
 Dimensions in parentheses are in millimetres, converted from inches and include minor rounding errors.
 1.0000 inches = 25.400mm
 Dimension tolerances: ± 0.003 (± 0.08) unless otherwise stated.
 Work order number: XXXXXX
 Minimum Pad Size: 0.022 x 0.042 (0.56 x 1.05)
 This Hybrid is designed for either point-to-point manual soldering or for reflow according to Gennum's reflow process (Information Note 521-45).

PAD LOCATION

PAD NO.	PAD POSITION		PAD DIMENSION		
	X	Y	Xdim	Ydim	
1	0	0	22.2	41.5	
2	-31.1	3	23.6	47.5	
3	-62.9	3	23.6	47.5	
4	-94.7	3	23.6	47.5	
5	-126.5	3	23.6	47.5	
6	-189.45	3	22.3	47.5	
7	-189.45	65.5	22.3	47.5	
8	-158.35	65.5	23.5	47.5	
9	-126.5	65.5	23.6	47.5	
10	-94.7	65.5	23.6	47.5	
11	-62.9	65.5	23.6	47.5	
12	-31.1	65.5	23.6	47.5	
13	0	68.5	22.2	41.5	
1	0	0	0.564	1.054	
2	-0.790	0.076	0.599	1.207	
3	-1.598	0.076	0.599	1.207	
4	-2.405	0.076	0.599	1.207	
5	-3.213	0.076	0.599	1.207	
6	-4.812	0.076	0.566	1.207	
7	-4.812	1.664	0.566	1.207	
8	-4.022	1.664	0.597	1.207	
9	-3.213	1.664	0.599	1.207	
10	-2.405	1.664	0.599	1.207	
11	-1.598	1.664	0.599	1.207	
12	-0.790	1.664	0.599	1.207	
13	0	1.740	0.564	1.054	

GA3209

CAUTION

ELECTROSTATIC
 SENSITIVE DEVICES
 DO NOT OPEN PACKAGES OR HANDLE
 EXCEPT AT A STATIC-FREE WORKSTATION



DOCUMENT IDENTIFICATION

PRELIMINARY DATA SHEET
 The product is in a preproduction phase and specifications are subject to change without notice.

REVISION NOTES:

Correction to Package Dimensions diagram.

For latest product information, visit www.gennum.com

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