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**
- **SOUNDDESIGN™ high-fidelity audio quality**
- **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**
- **tri-state memory select operation**
- **audible memory change indicator**

thinSTAX™ PACKAGING

Hybrid typical dimensions:

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

DESCRIPTION

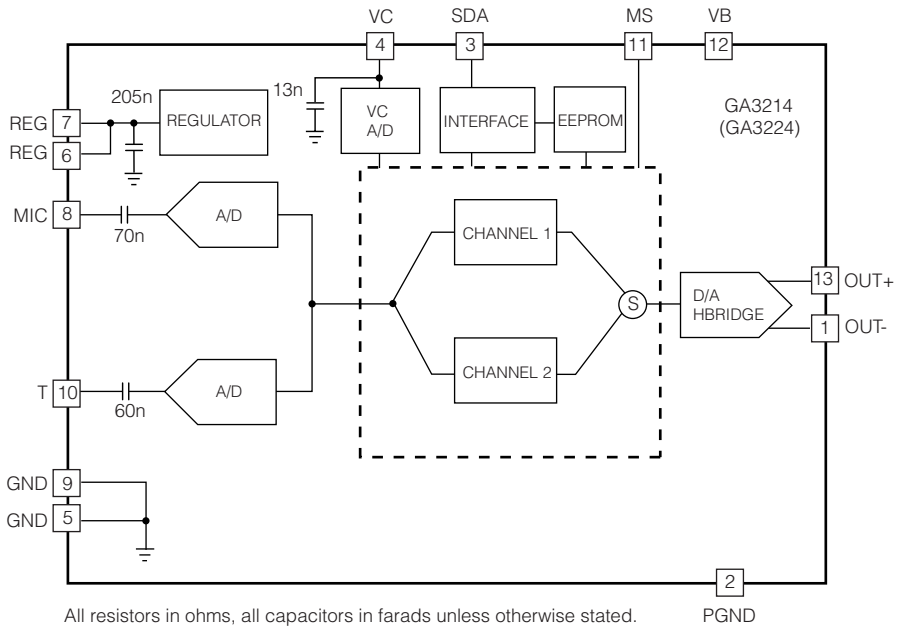
The GA3214 (GA3224) hybrid is a programmable DSP system based on a two-channel compression circuit. It can be used as a platform for a wide range of hearing aid applications. Its extensive programmability and compact size make it ideal for sophisticated CIC applications. The reflowable thinSTAX™ packaging enables easy use in BTE applications. This very versatile DSP hybrid is capable of multiple configurations and has a wide range of functions.

The GA3214 hybrid contains the GC5051 controller chip and the GA3224 hybrid contains the GC5057 controller chip. The only difference between the GC5051 and the GC5057 is in their Power On Reset (POR) behaviour.

For a detailed description of the POR behaviour of the GC5051 and GC5057 controller chips, please refer to PARAGON™ DIGITAL Reference Guide, Document #20143.

The GA3214 and the GA3224 hybrid code programmed into the GC5051 and the GC5057 controller chips is “8”.

This data sheet is a part of a set of documents available for this product. Please refer to “Getting Started with PARAGON™ DIGITAL” information note for a list of other documents.



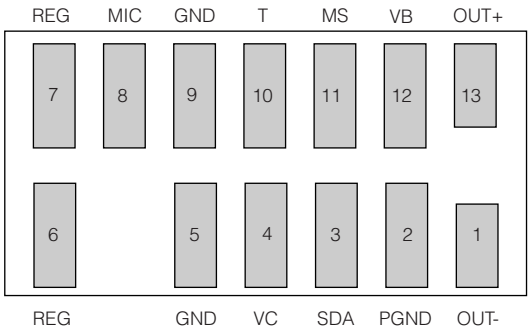
All resistors in ohms, all capacitors in farads unless otherwise stated.

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



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



CAUTION
LEVEL 3 MOISTURE
SENSITIVE DEVICES
DO NOT OPEN PACKAGES EXCEPT UNDER
CONTROLLED CONDITIONS



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			100	140	225	Hz
High Frequency System Bandwidth			15.2	16	16.8	kHz
Total Maximum System Gain	A_V	V_{IN} = -95 dBV @ 3kHz; squelch disabled See Note 1.	81	83	85	dB
Converter Gain	A_{CONV}	A/D + D/A gain.	27	29	31	dB
Total Harmonic Distortion	THD	V_{IN} = -40 dBV	-	0.05	1	%
THD at Maximum Input	THD_M	V_{IN} = -15 dBV, HRX - ON	-	1.5	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

ELECTRICAL CHARACTERISTICS (CONTINUED)

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

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
INPUT						
Input Referred Noise	IRN	Bandwidth 100Hz - 8kHz	-	-108	-106	dBV
Input Impedance	Z_{IN}		11.2	16	22	kΩ
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			30.4	32	33.6	kHz
A/D Dynamic Range		Bandwidth 100Hz - 8kHz	-	86	-	dB
OUTPUT						
Maximum RMS Output Voltage		0dBFS f = 1kHZ	-3	-1	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}		160	200	240	kΩ
Volume Control Range	ΔA		47.5	48	48.5	dB
MS INPUT						
Low State	Lo		0	-	$V_{REG}/3$	V
Open State	Z		$V_{REG}/3$	-	$2V_{REG}/3$	V
High State	Hi		$2V_{REG}/3$	-	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	237	250	263	µs
		Baud = 1	118	125	132	µs
		Baud = 2	59	62.5	66	µs
		Baud = 3	29.76	31.25	32.81	µs
		Baud = 4	14.88	15.63	16.41	µs
		Baud = 5	7.44	7.81	8.20	µs
		Baud = 6	3.72	3.91	4.10	µs
		Baud = 7	1.86	1.95	2.05	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 GA3214 / GA3224 is available from Gennum Web Site
www.gennum.com/hip/software/index.html.

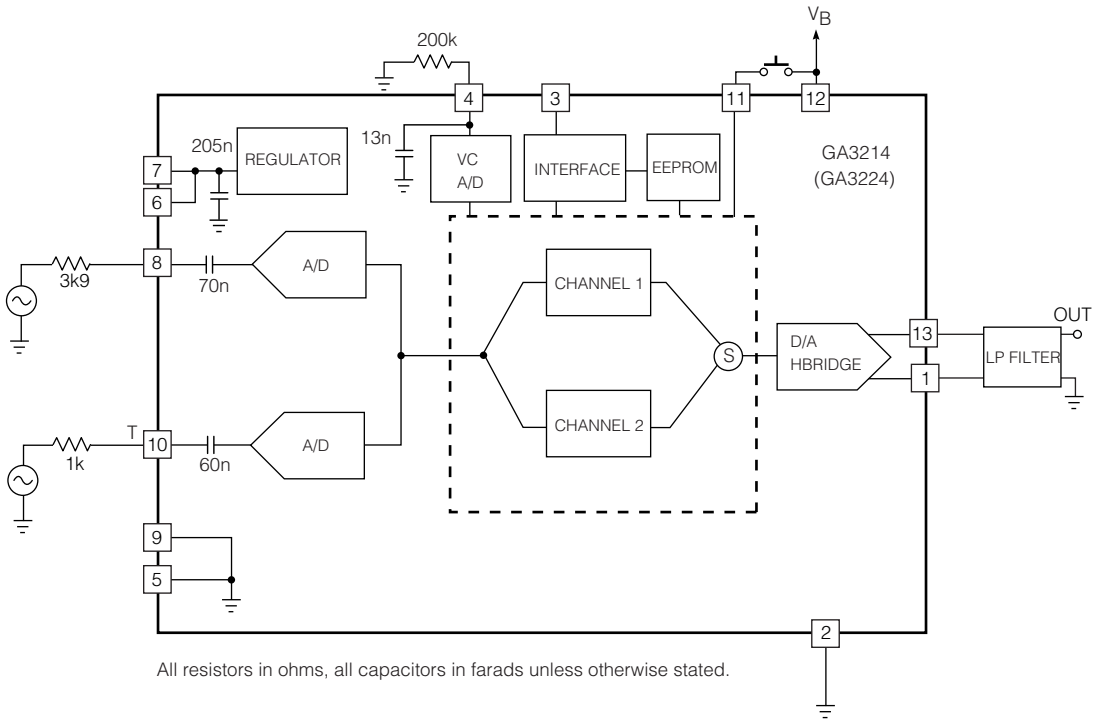


Figure 1: Test Circuit

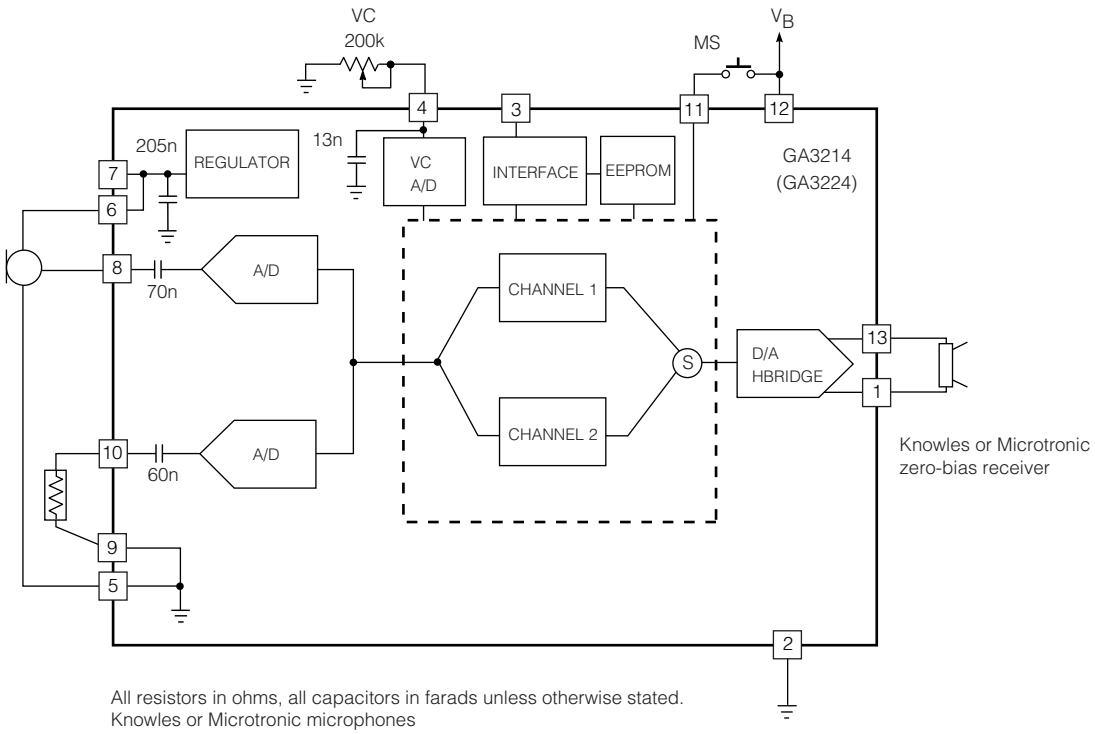


Figure 2: Typical Application Circuit

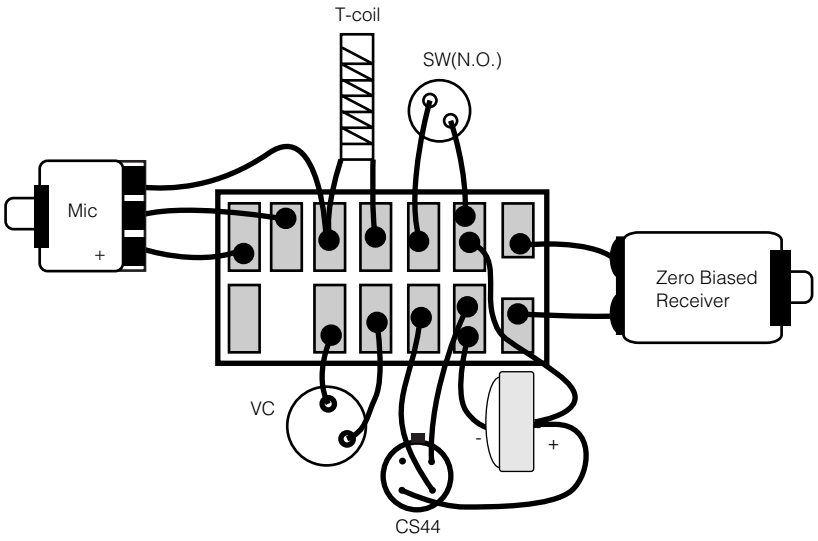
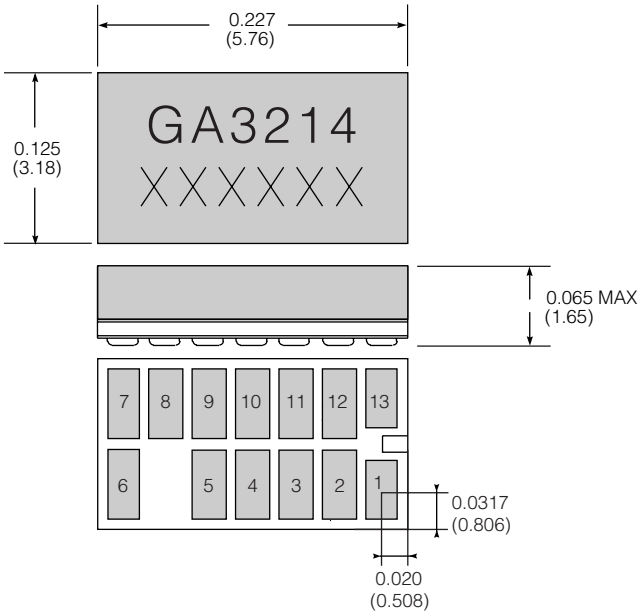


Figure 3: Assembly Diagram

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
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	23.0	40.5	MIL
2	-31.5	3	24.0	46.5	
3	-63.0	3	23.0	46.5	
4	-94.0	3	23.0	46.5	
5	-125.0	3	23.0	46.5	
6	-187.0	3	23.0	46.5	
7	-187.0	64.5	23.0	46.5	
8	-156.0	64.5	23.0	46.5	
9	-125.0	64.5	23.0	46.5	
10	-94.0	64.5	23.0	46.5	
11	-63.0	64.5	23.0	46.5	
12	-31.5	64.5	24.0	46.5	
13	0	67.5	23.0	40.5	
1	0	0	0.584	1.029	mm
2	-0.800	0.076	0.610	1.181	
3	-1.600	0.076	0.584	1.181	
4	-2.388	0.076	0.584	1.181	
5	-3.175	0.076	0.584	1.181	
6	-4.750	0.076	0.584	1.181	
7	-4.750	1.638	0.584	1.181	
8	-3.962	1.638	0.584	1.181	
9	-3.175	1.638	0.584	1.181	
10	-2.388	1.638	0.584	1.181	
11	-1.600	1.638	0.584	1.181	
12	-0.800	1.638	0.610	1.181	
13	0	1.715	0.584	1.029	

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

REVISION NOTES:
GA3224 hybrid code changed.
For latest product information, visit www.gennum.com

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