# Multimemory Programmable
# DynamEQ®II - GA3204

PRELIMINARY DATA SHEET



## FEATURES

- **DynamEQ®II flexibility**
- **six programmable parameters**
- **four memories**
- **24dB/oct state variable filter**
- **twin average detectors**
- **handles high input levels**
- **drives class D integrated receivers**

## thinSTAX™ PACKAGING

Hybrid typical dimensions:
0.200 x 0.115 x 0.060in.
(5.08 x 2.92 x 1.52mm)

## DESCRIPTION

The GA3204 programmable hybrid is composed of a DynamEQ®II Wide Dynamic Range Compression signal processor and the GP523 controller memory chip. The hybrid incorporates 24dB/oct filtering.

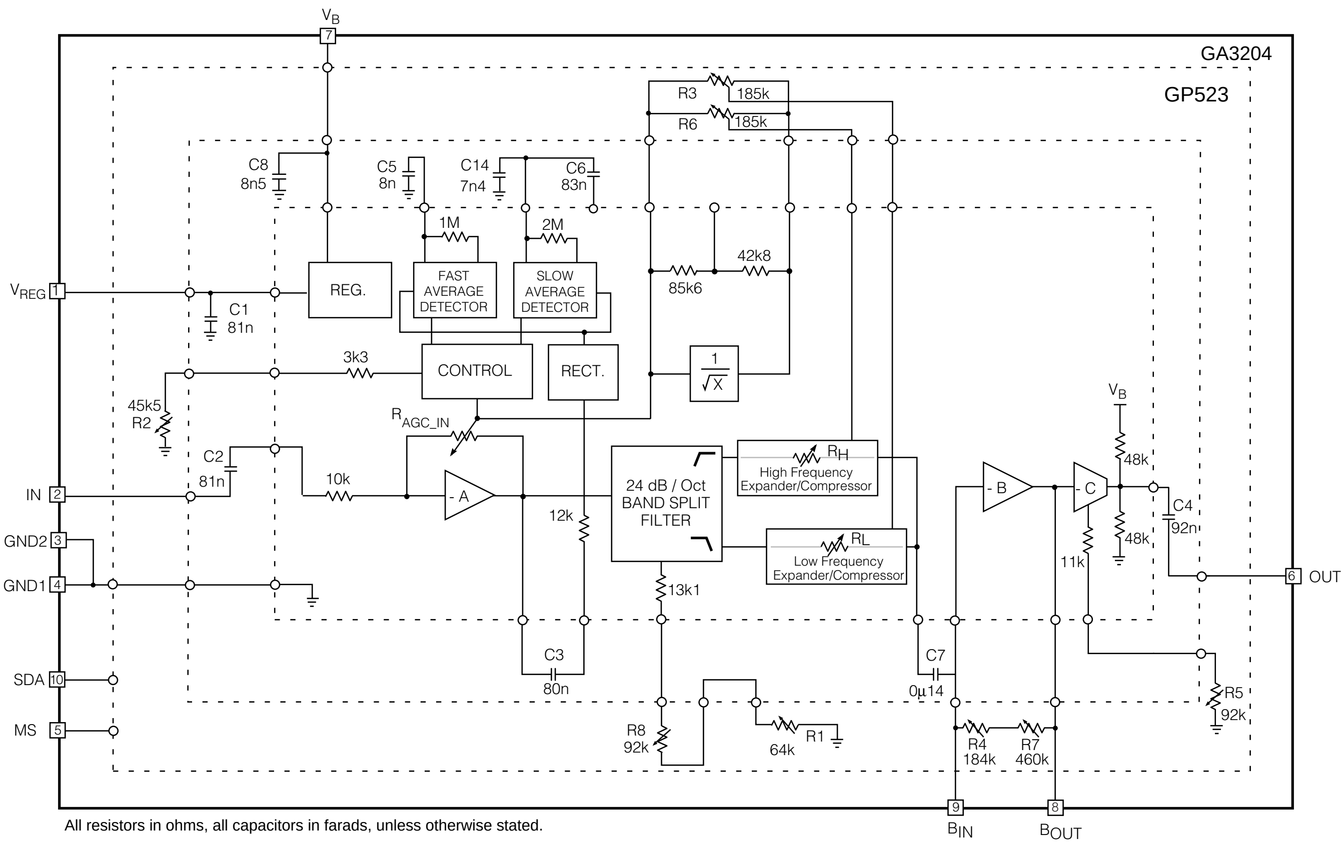
The gain and frequency response are dependent on the user's environment. The Twin Average Detector circuit is optimized for sound quality during normal listening without sacrificing comfort during sudden loud sounds.

The GA3204 features six programmable parameters: independent compression ratio adjustment in the high and low frequency channels, VC adjustment, threshold adjustment, crossover frequency adjustment and MPO adjustment.

Four independent memories add to hybrid flexibility.

The output stage is designed as a preamplifier for the class D integrated receiver.

The GA3204 hybrid code programmed into GP523 is "1".




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

**BLOCK DIAGRAM**

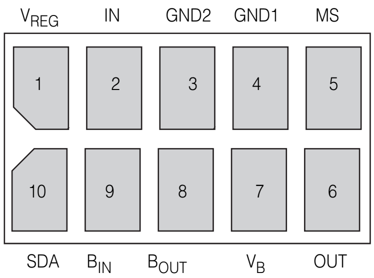
Revision Date: June 2000 Document No. 522 - 17 - 03

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER | VALUE |
|---|---|
| Supply Voltage | 2VDC |
| Power Dissipation | 25 mW |
| Operating Temperature Range | -10° C to 40° C |
| Storage Temperature Range | -20° C to 70° C |

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

## PAD CONNECTIONS






## ELECTRICAL CHARACTERISTICS

Conditions: Supply Voltage $V_B$ = 1.3 V, Frequency = 1 kHz, Temperature = 25°C.
The programmable parameters are adjusted to the following set values unless otherwise specified.
(MPO) R5 - Tap 0; (TH) R2 - Tap 15; (FC) R1 - Tap 7; (HP) R6 - Tap 0; (LP) R3 - Tap 0; (VC) R4 - Tap 15, R7 - Tap 23; R8 - Tap 0.

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| Hybrid Current | $I_{AMP}$ | | - | 395 | 580 | µA |
| Minimum Voltage | Vb | | 1.1 | - | - | V |
| Total Harmonic Distortion | THD | $V_{IN}$ = -40dBV at 1kHz | - | 0.6 | 1 | % |
| THD with Maximum Allowable Input | $THD_M$ | $V_{IN}$ = -23dBV, $R_{VC}$ = 47kΩ | - | 2 | 10 | % |
| Input Referred Noise | IRN | Aweighted filter | - | 3 | - | $\mu V_{RMS}$ |
| Total System Gain | $A_V$ | $V_{IN}$ = -90dBV | 44 | 47 | 50 | dB |
| Regulator Voltage | $V_{REG}$ | $I_{LOAD}$ = 30µA | 890 | 930 | 1000 | mV |
| AGC | | | | | | |
| Lower Threshold | $TH_{LO}$ | | -88.5 | -84.5 | -80.5 | dBV |
| Upper Threshold | $TH_{HI}$ | | -36 | -32 | -28 | dBV |
| Compression Gain Range | ΔA | Gain (-90dBV$_{IN}$) -Gain(-30dBV$_{IN}$) | 36.5 | 39.5 | 42.5 | dB |
| System Gain in Compression | $A_{60}$ | $V_{IN}$ = -60dBV | 26 | 29 | 32 | dB |
| Minimum Compression Ratio | $CMP_{1:1}$ | $V_{IN}$ = 3kHz, -60dBV to -40dBV; R3 - Tap 15; R6 - Tap 15 | 0.9 | 1.0 | 1.1 | Ratio |
| Maximum Compression Ratio | $CMP_{4:1}$ | $V_{IN}$ = 3kHz, -60dBV to -40dBV; R3 - Tap 0; R6 - Tap 0 | 3.6 | 4.0 | 4.3 | Ratio |
| Fast Average Detector Time Constant | $\tau_{FAST}$ | | - | 8 | - | ms |
| Slow Average Detector Time Constant | $\tau_{SLOW}$ | | - | 180 | - | ms |
| FILTER | | | | | | |
| Maximum Crossover Frequency | $f_{C\_MAX}$ | R1 - Tap 0 | 3 | 3.9 | - | kHz |
| Nominal Crossover Frequency | $f_{C\_NOM}$ | R1 - Tap 7 | 1.5 | 1.9 | 2.3 | kHz |
| Minimum Crossover Frequency | $f_{C\_MIN}$ | R1 - Tap 15 | - | 0.9 | 1.4 | kHz |
| Filter Rolloff Rate | | | - | 24 | - | dB/oct |
| STAGE A and B | | | | | | |
| Open Loop Gain (B) | $A_{OL\_B}$ | | - | 52 | - | dB |
| Input Impedance (A) | $R_{IN}$ | | 8 | 10.6 | 12 | kΩ |
| OUTPUT STAGE | | | | | | |
| Stage Gain | $A_C$ | $V_{IN}$ = -90 dBV | 7 | 9 | 11 | dB |
| Maximum Output Level | MPO | $V_{IN}$ = -25 dBV, $R_{VCEXT}$ = 221k | -20 | -18 | -16 | dBV |
| MPO Range | ΔMPO | R5 - Tap 15 to Tap 0, $R_{VCEXT}$ = 221k | 11.6 | 13.6 | 15.6 | dB |
| Output Resistance | $R_{OUT}$ | | - | 24 | - | kΩ |

All conditions and parameters remain as shown in the Test Circuit unless otherwise specified in the CONDITIONS column.

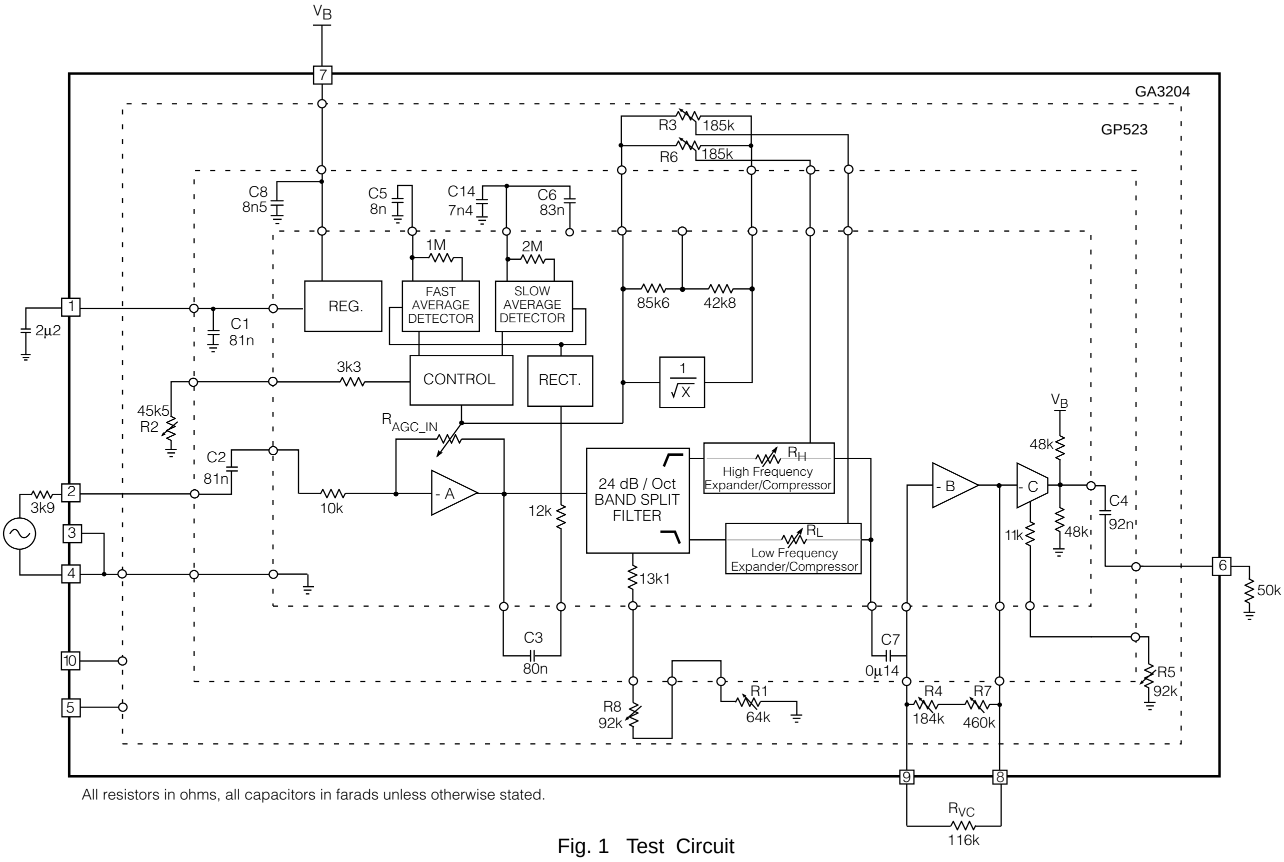



Fig. 1 Test Circuit

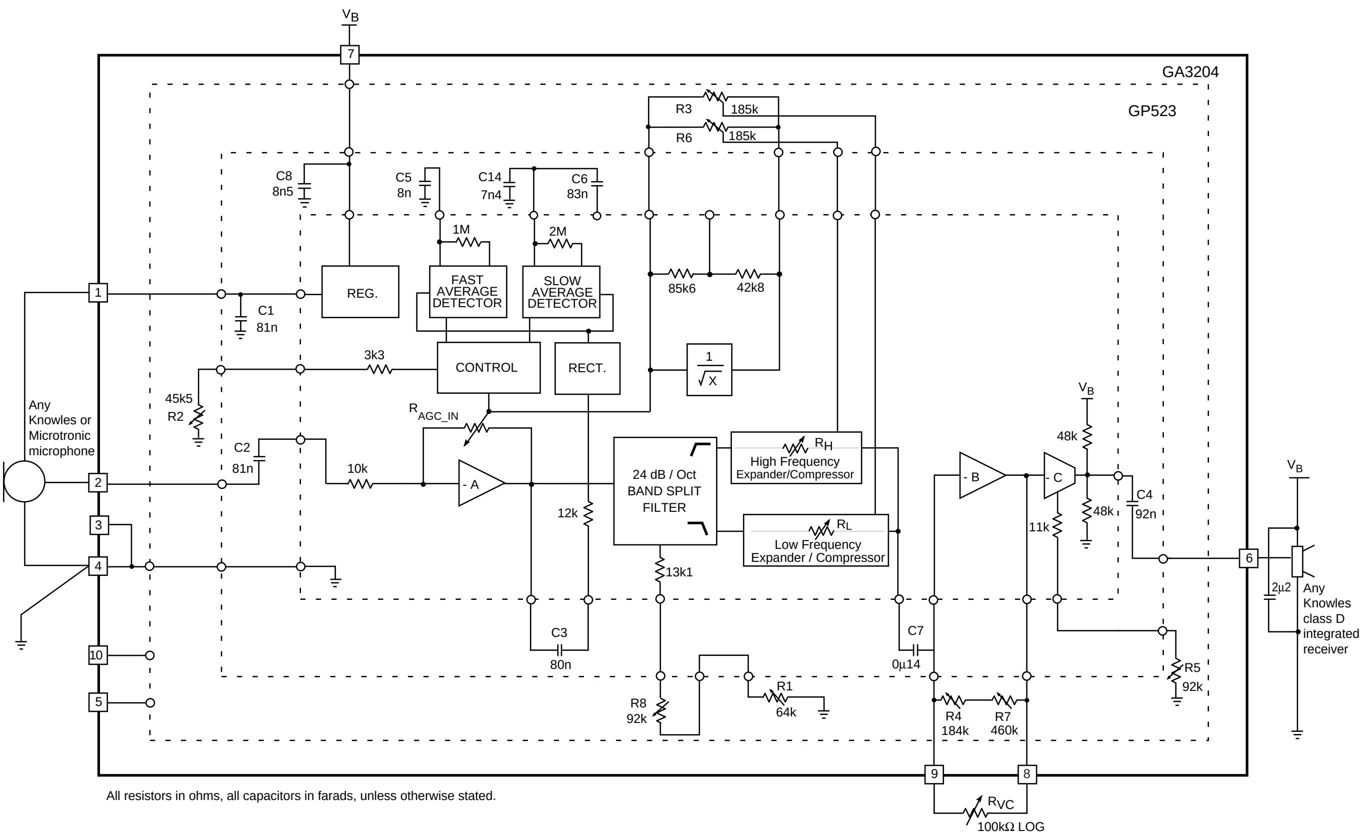



Fig. 2 Typical Application Circuit

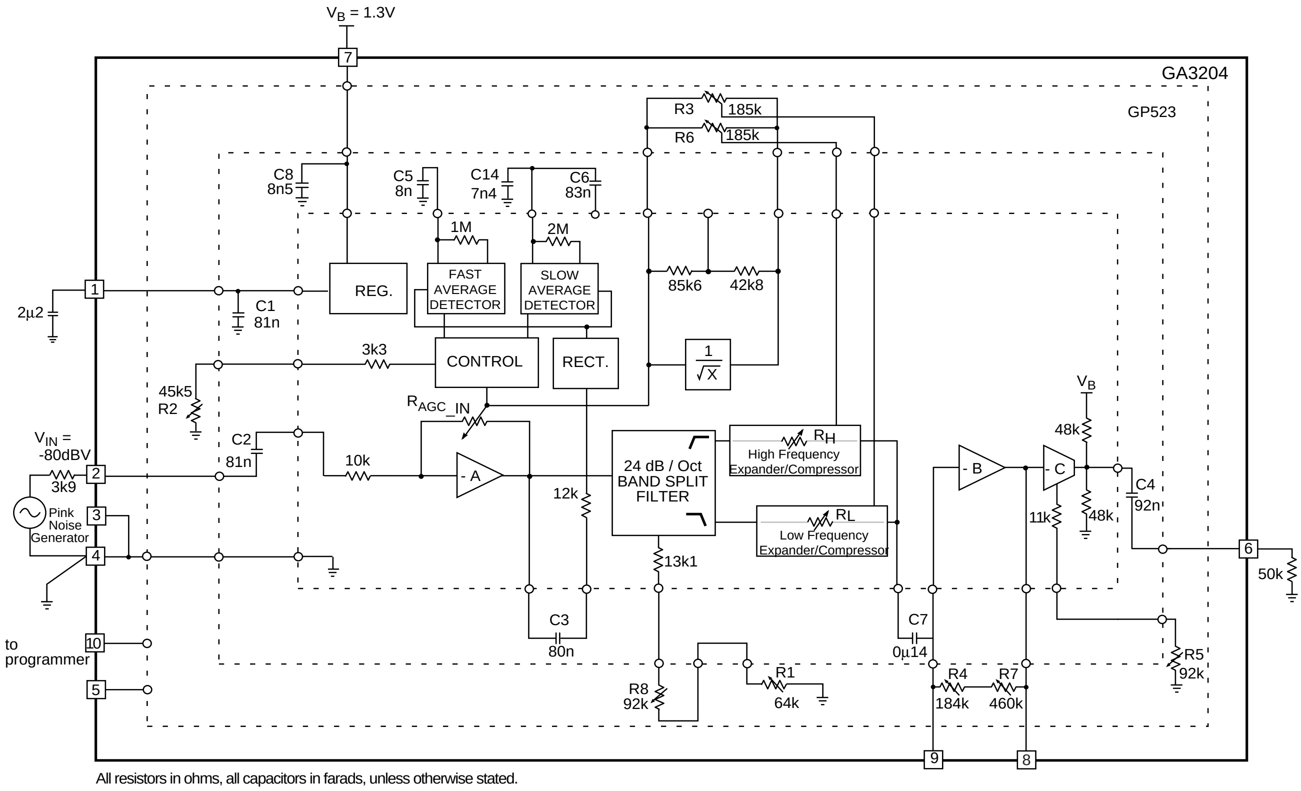



Fig. 3 Characterization Circuit (Used to generate typical curves)

Table of Defaults

| | |
|---|---|
| R1 - Tap 7 | R5 - Tap 0 |
| R2 - Tap 15 | R6 - Tap 0 |
| R3 - Tap 0 | R7 - Tap 7 |
| R4 - Tap 13 | R8 - Tap 0 |

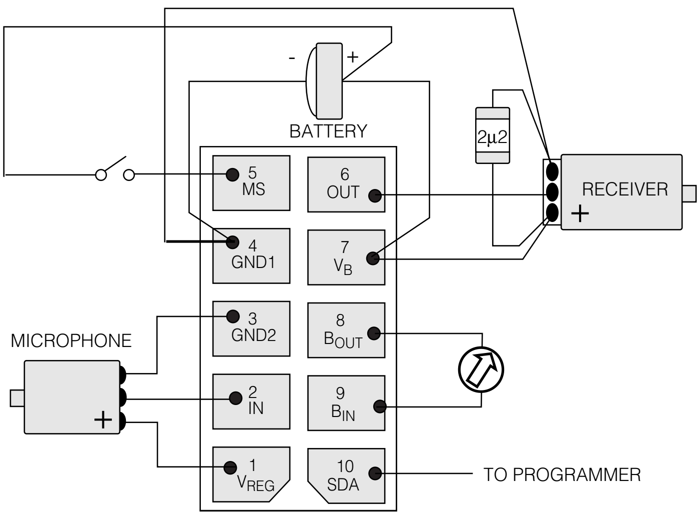



Fig. 4 Typical Assembly Diagram



GA3204

## TYPICAL PERFORMANCE CURVES

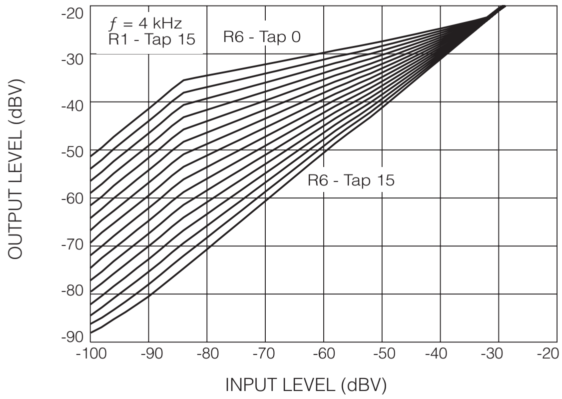



Fig. 5 I/O Transfer Function for Different Compression Ratios (High Frequency Channel)

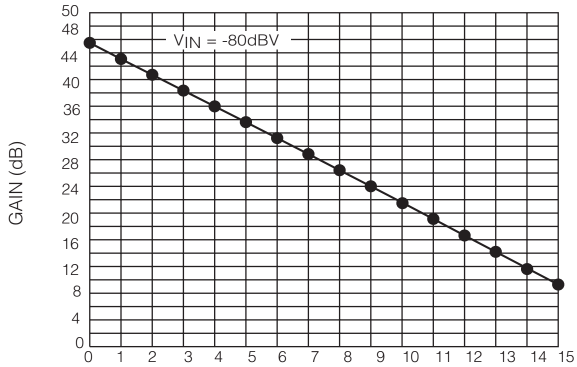



Fig. 6 High Frequency Gain (Compression Ratio Adjustment)



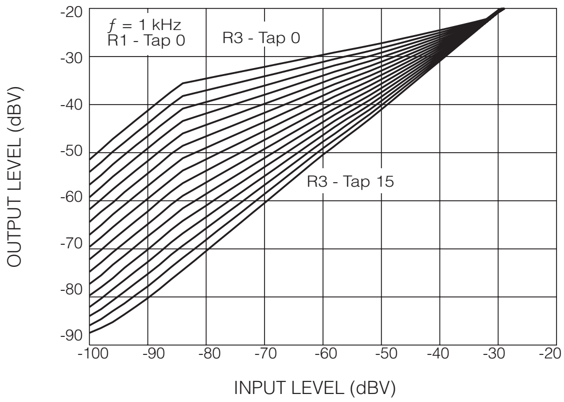



Fig. 7 I/O Transfer Function for Different Compression Ratios (Low Frequency Channel)

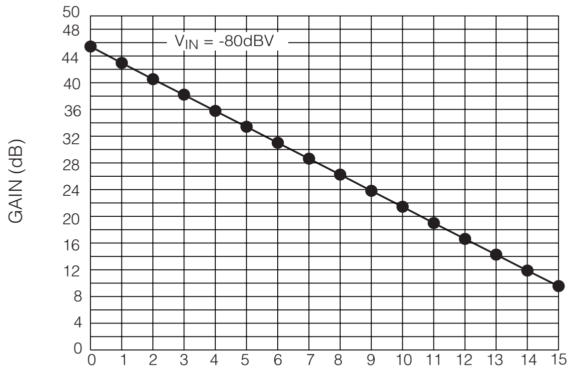



Fig. 8 Low Frequency Gain (Compression Ratio Adjustment)

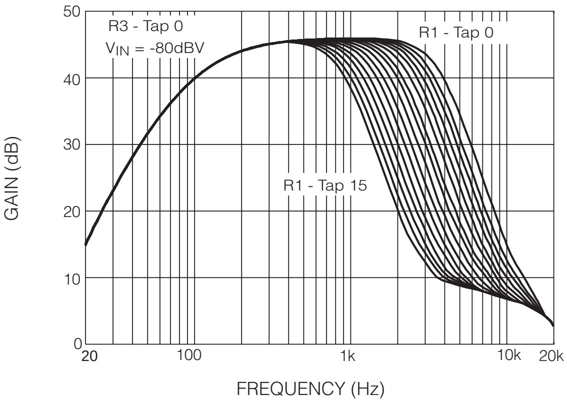



Fig. 9 Frequency Response for Different Crossover Frequency Steps

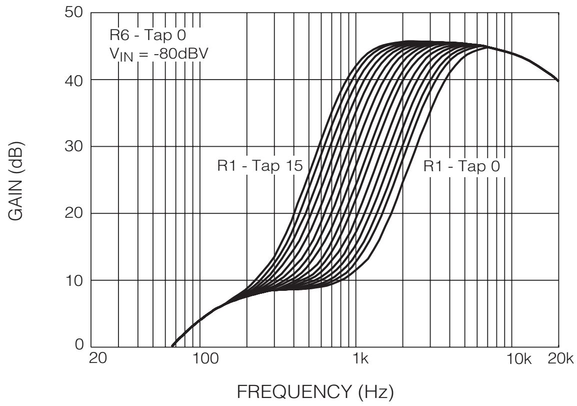



Fig. 10 Frequency Response for Different Crossover Frequency Steps

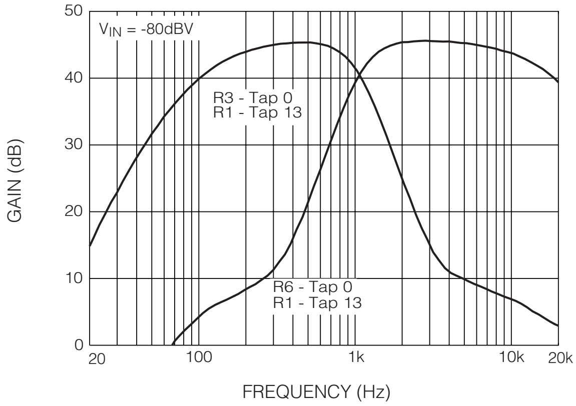



Fig. 11 Crossover Frequency Representation

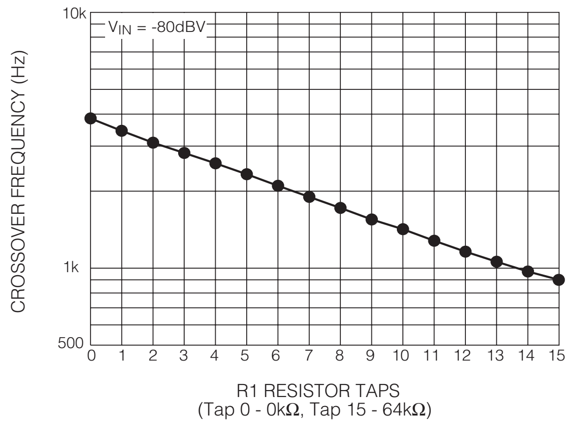



Fig. 12 Crossover Frequency Adjustment

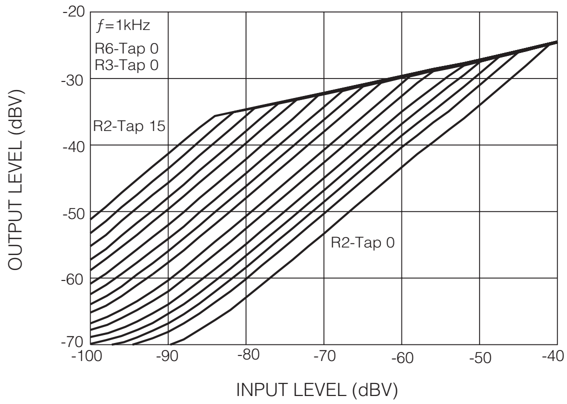



Fig. 13 I/O Transfer Function
for Different Thresholds

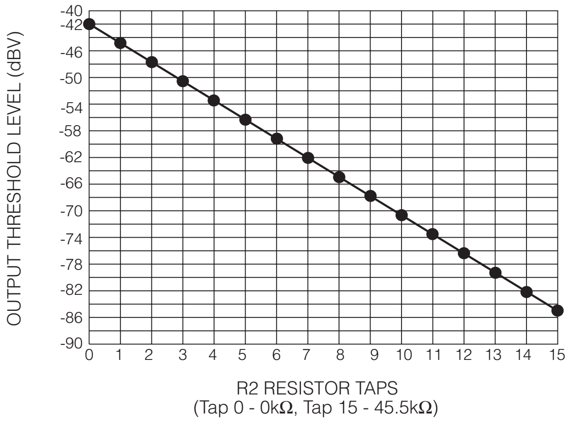



Fig. 14 Threshold Adjustment

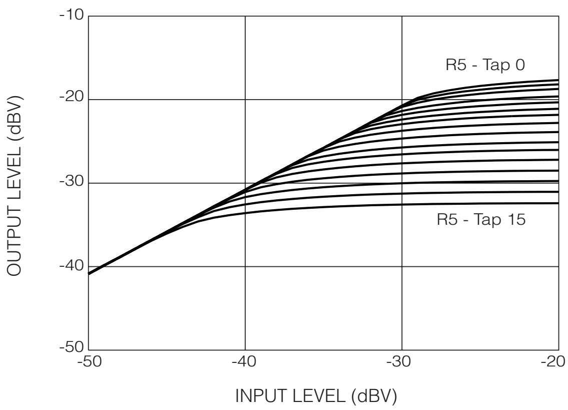



Fig. 15 I/O Transfer Function
for Different MPO Steps

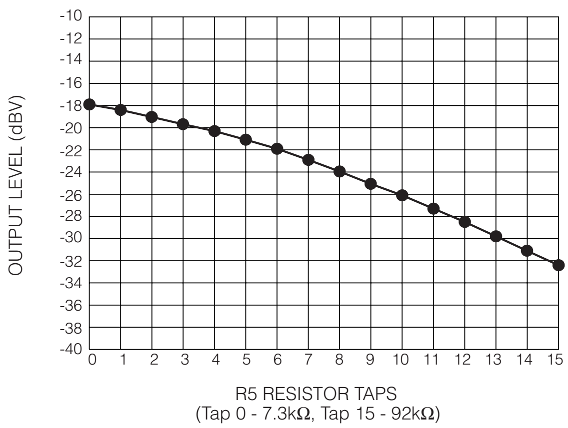



Fig. 16 MPO Adjustment

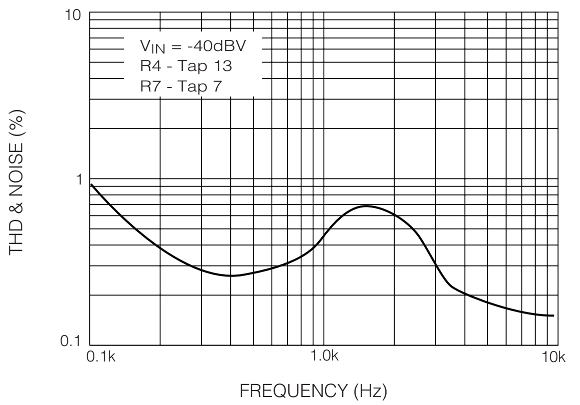



Fig. 17 THD and Noise vs Frequency

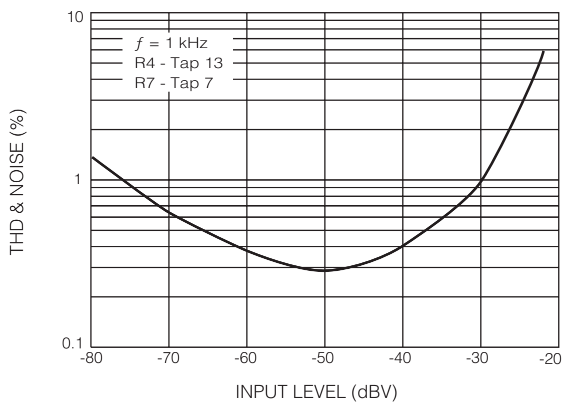



Fig 18 THD and Noise vs Input Level

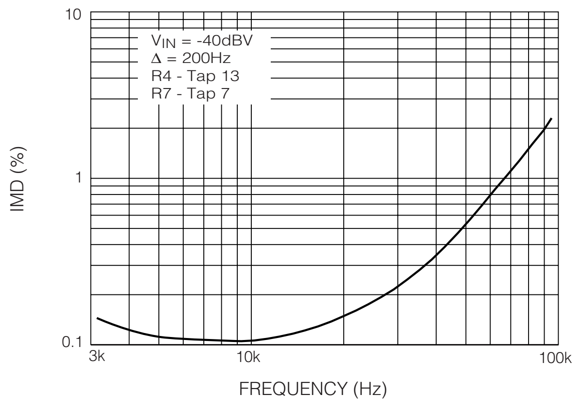



Fig. 19 Intermodulation Distortion (CCIF) vs Frequency

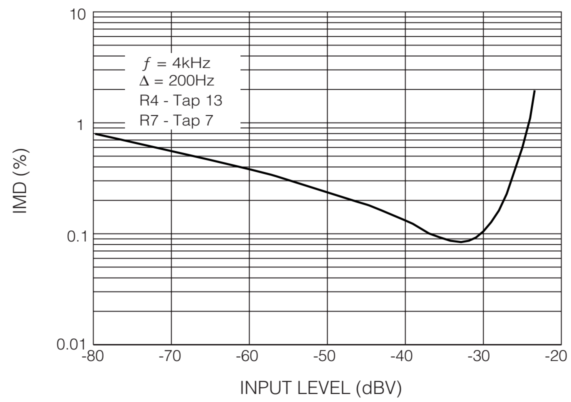



Fig. 20 Intermodulation Distortion (CCIF) vs Input Level

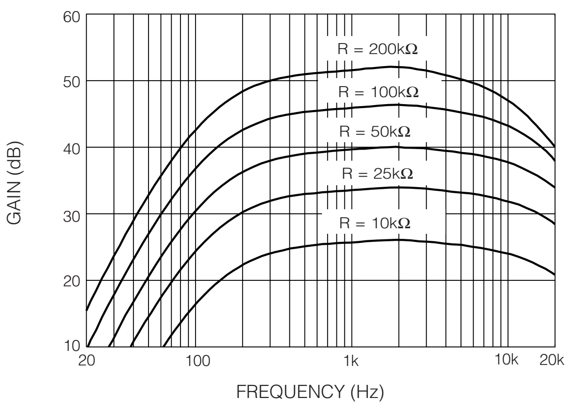
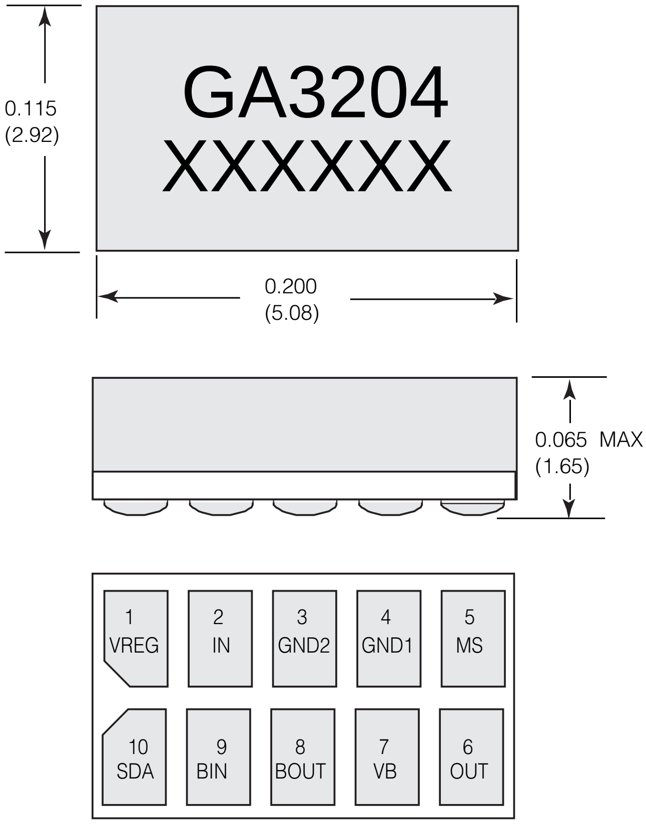



Fig. 21 Frequency Response for Different Feedback Resistor Values

GA3204

## PACKAGE DIMENSIONS




Dimensions are in inches.

Dimensions in parenthesis are in millimetres converted

from inches and include minor rounding errors.

1.0000 inches = 25.400 mm.

Dimension tolerances ±0.003 (±0.08) unless otherwise stated.

Minimum Pad sizes 0.0285 x 0.0400 (0.724 x 1.016).

XXXXXX - work order number.

This hybrid is designed for either point-to-point manual soldering or it can be reflowed according to Gennum's recommended reflow process (Information Note 521-45).




GENNUM CORPORATION
MAILING ADDRESS:
P.O. Box 489, Stn. A, Burlington, Ontario, Canada L7R 3Y3
Tel. +1 (905) 632-2996 Fax +1 (905) 632-2814
SHIPPING ADDRESS:
970 Fraser Drive, Burlington, Ontario, Canada L7L 5P5

GENNUM JAPAN CORPORATION
C-101, Miyamae Village, 2-10-42 Miyamae, Suginami-ku, Tokyo 168-0081, Japan Tel. +81 (3) 3334-7700 Fax: +81 (3) 3247-8839


REVISION NOTES:

Changes to conditions and Tap values in the Electrical Characteristics Table.

*For latest product information, visit www.gennum.com*

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