GENNUM CORPORATION

MAESTRO® I
Programmable Hybrid

GM3002A-HYB DATA SHEET

FEATURES

- **programmable parameters**
  - **gain**
  - **low pass filter**
  - **high pass filter**
  - **AGC threshold**
  - **release time**
  - **MPO**
  - **receiver bias current**
- **fixed attack time**
- **typical gain 60 dB**
- **voltage drive output stage**
- **EEPROM non-volatile memory**
- **RAM memory for temporary storage**

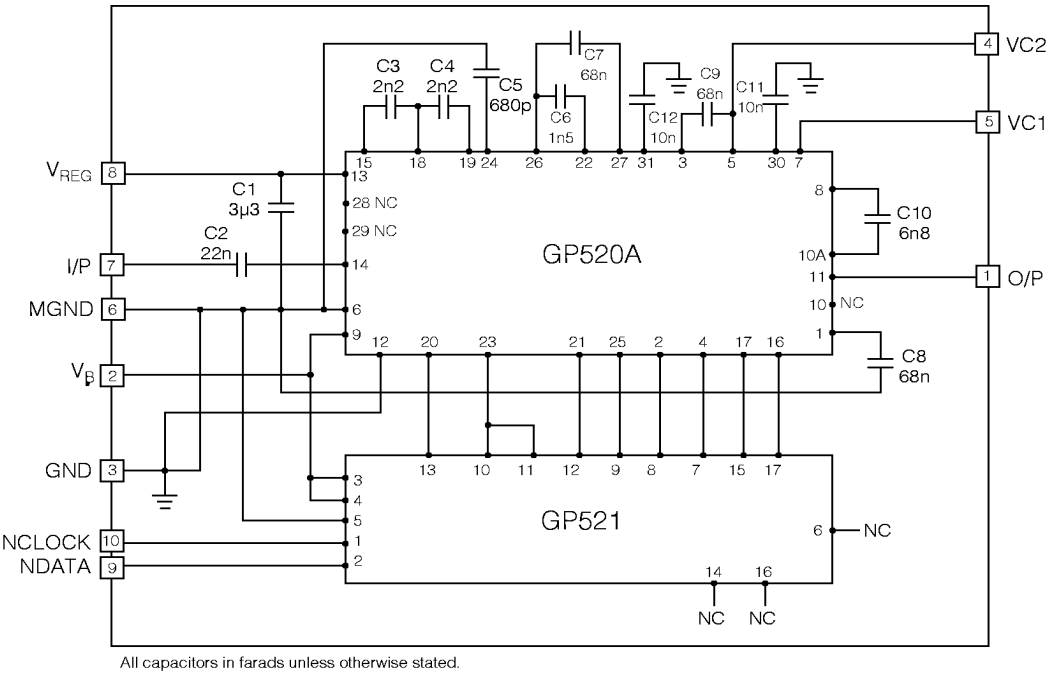
STANDARD PACKAGING

- Hybrid typical dimensions:
  0.348 in x 0.192 in x 0.110 in
  (8.84 mm x 4.88 mm x 2.80 mm)

DESCRIPTION

The programmable hybrid is composed of the GP520A analog signal processor, the GP521 controller memory chip and twelve coupling and filtering capacitors. The hybrid utilizes optimal technology for each block of the system. The bipolar analog signal path results in high fidelity acoustic performance of the hearing instrument. The CMOS memory / controller allows for unlimited reprogramming of the RAM memory. Once the final fitting is determined it can be stored in the EEPROM permanent memory. The information is retained even when the battery is removed. The advantage of the hybrid is that it offers a complete system. Only three external components (microphone, receiver and volume control) are necessary to make a final hearing instrument.

For hybrid communication protocol refer to the GP521 Data Sheet Document No. 510 - 79.



All capacitors in farads unless otherwise stated.

FUNCTIONAL BLOCK DIAGRAM

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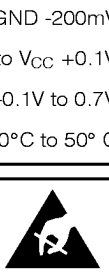
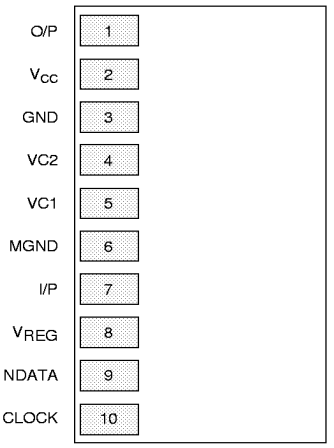
ABSOLUTE MAXIMUM RATINGS

PARAMETER	VALUE/UNITS
Supply Voltage	3 V DC
Pad 9,10	V_{CC} +200mV to GND -200mV
Pad 8, 7, 1	-0.1V to V_{CC} +0.1V
Pad 5, 4	-0.1V to 0.7V
Operating Temperature Range	0°C to 50° C

CAUTION
CLASS 1 ESD SENSITIVITY



PAD CONNECTION



ELECTRICAL CHARACTERISTICS

Conditions: Frequency = 3 kHz, Temperature = 25°C, Supply Voltage V_B = 1.3 VDC,
The programmable parameters are adjusted to the following set values unless otherwise specified :
G1 - 15 (Gain 1) G2 - 15 (Gain 2) RB - 15 (Receiver Bias Voltage) LP - 0 (Low Pass Filter)
HP - 15 (High Pass Filter) CL - 15 (Clipper) TR - 15 (AGC Threshold Level) RT - 15 (Release Time)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Minimum Battery Voltage	V_{BMIN}		1.1	-	-	V
Quiescent Supply Current	I_{TOT}	S1 - C	425	600	900	µA
Voltage Regulator	V_{REG}		0.88	-	1.0	V
Input Referred Noise	IRN	NFB 100 to 10 kHz at 12dB/oct	-	3.5	-	μV_{RMS}
Attack Time	t_A		-	3	-	ms
Distortion	THD	V_{IN} = -57 dBV,TR - 0	-	1	-	%
Low Level (Pad 9, 10)	V_L		-	-	200	mV
High Level (Pad 9, 10)	V_H		V_{CC} - 0.2	-	-	V
Programmable Data Rate		R_{PULLUP} = 10kΩ	-	10	-	kHz
Programmable Functions						
Electrical Gain	A_{3K}	V_{IN} = -79 dBV	56	60	64	dB
Electrical Gain Range	ΔA_{3K}	Note 1	27	31	36	dB
High Pass Filter Normalized Gain	$A_{N(850)}$	V_{IN} = -59dBV; f = 850Hz Note 2; HP - 0	-11	-17	-23	dB
High Pass Filter Relative Gain	$A_{R(120)}$	V_{IN} = -59dBV; f = 120Hz Note 3	-4	0	4	dB
Low Pass Filter Normalized Gain	$A_{N(25k)}$	V_{IN} = -61dBV; f = 25.5kHz Note 2;	-9.5	-15.5	-21.5	dB
Low Pass Filter Relative Gain	$A_{R(3k)}$	V_{IN} = -61dBV; f = 3.2kHz Note 3; LP - 15	-4	0	4	dB

ELECTRICAL CHARACTERISTICS continued

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
MPO Level	V_{MPO}	V_{IN} = -40dBV	-2.0	-0.5	1.0	dBV
MPO Range	ΔMPO	Note 4; CL - 0; SI - B	13.5	17	20.5	dB
MPO Range 2	ΔMPO2	Note 5; SI - B; CL - 7	9	11.5	14	dB
AGC Gain	A_{AGC}	V_{IN} = -40dBV; G1 - 7; G2 - 0	15	20	25	dB
AGC Range	ΔV_{AGC}	Note 6	11.5	14	17.5	dB
Receiver Bias Voltage	V_{RB}	V_{IN} = 0V; RB - 0 Note 7	80	92	120	mV
Receiver Bias Voltage Range	ΔV_{RB}	V_{IN} = 0V; Note 8; RB - 15	155	187	220	mV
Minimum Release Time	t_{REL}		-	30	-	ms
Release Time Factor	$Fact_{REL}$		-	15	-	factor

All switches are as shown in Test Circuit unless otherwise specified.

Notes: **1.** $\Delta A_{3K} = A_{3K} - (|V_{OUT}| - |V_{IN}|)$ [V_{IN} = -59dBV; G1- 0; G2 - 0]

2. $A_N = A_{3K} - (|V_{OUT}| - |V_{IN}|)$

3. $A_R = A_N - (|V_{OUT}| - |V_{IN}|)$

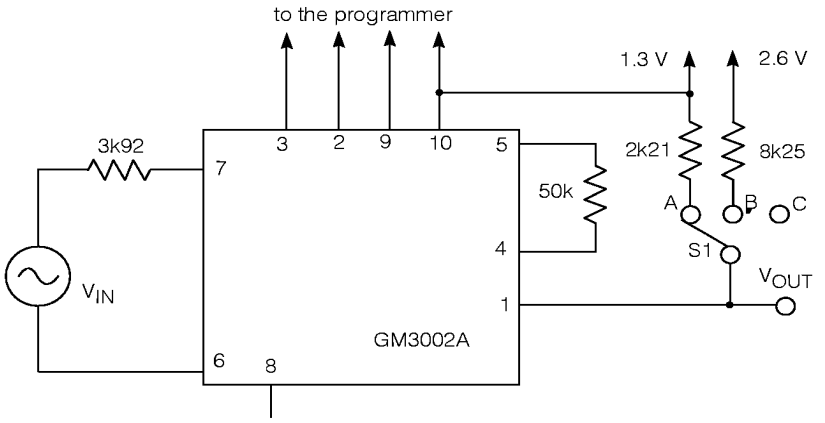
4. $\Delta MPO = V_{MPO} - V_{OUT}$ [V_{IN} = -40dBV; CL - 0]

5. $\Delta MPO2 = V_{MPO} - V_{OUT}$ [V_{IN} = -40dBV; CL - 7]

6. $\Delta V_{AGC} = A_{AGC} - V_{OUT}$ [V_{IN} = -40dBV; G1 - 7; G2 - 0; TR - 0]

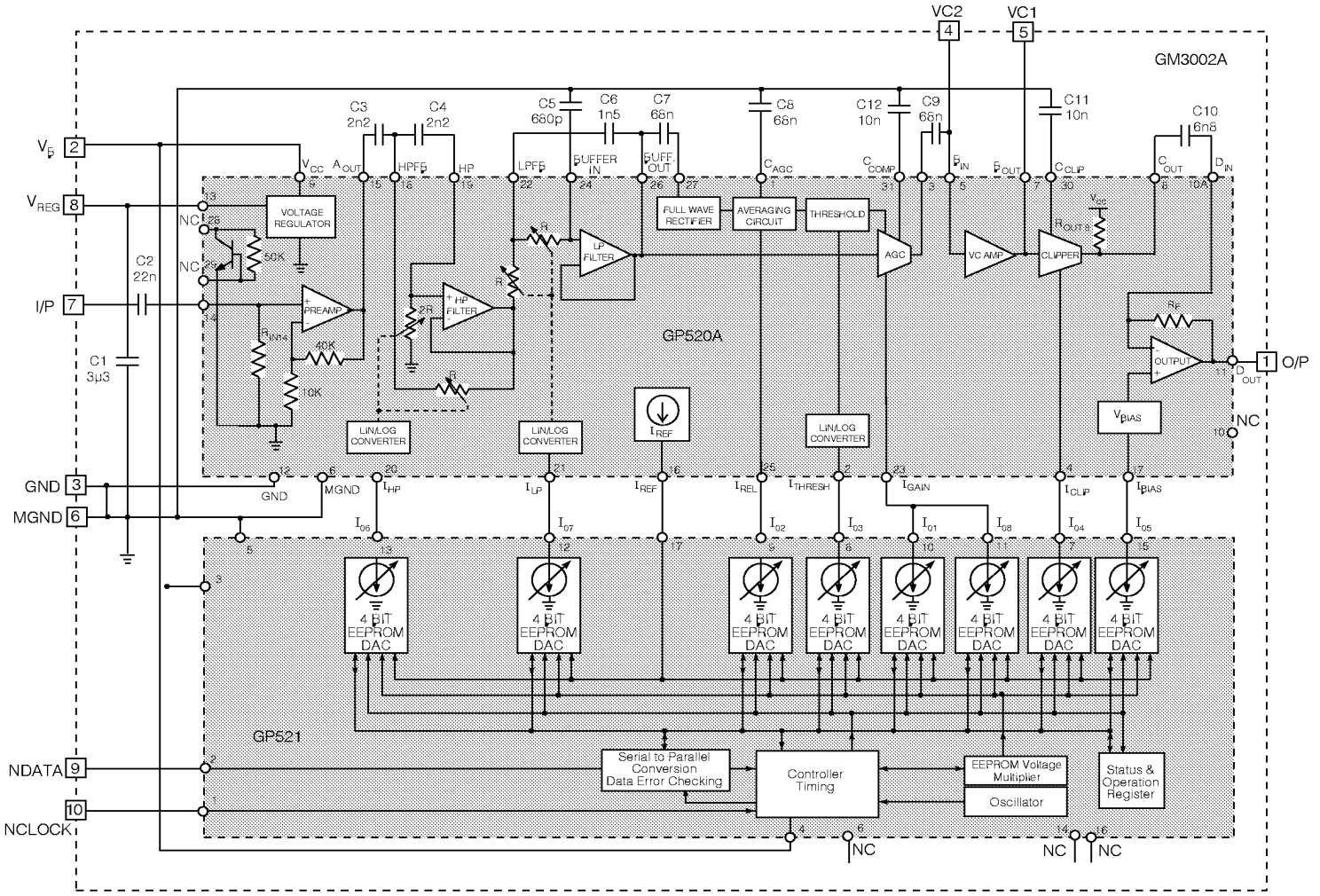
7. $V_{RB} = V_B - V_{OUT}$ [RB - 0]

8. $\Delta V_{RB} = (V_B - V_{OUT}$ [RB - 15]) - V_{RB}



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

Fig. 1 Production Test Circuit



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

Fig. 2 Detailed Functional Block Diagram

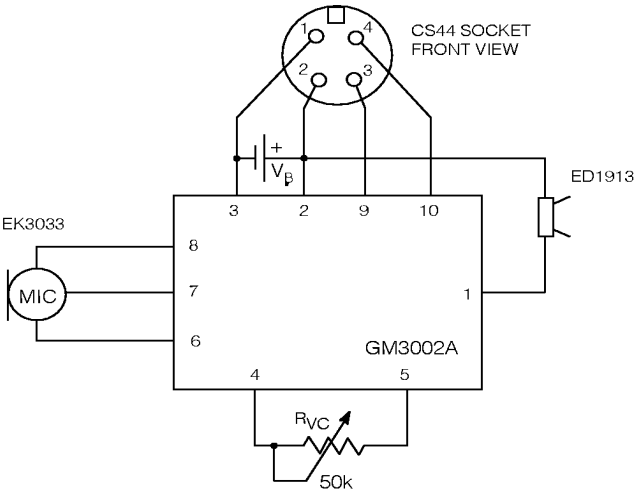


Fig. 3 Typical Hearing Instrument Application

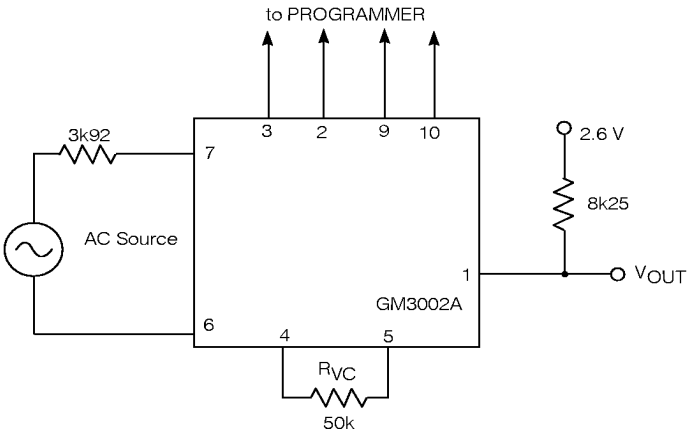


Fig. 4 Characterization Circuit

TYPICAL ELECTRICAL RESPONSES

Input Level - 68 dBV unless otherwise stated

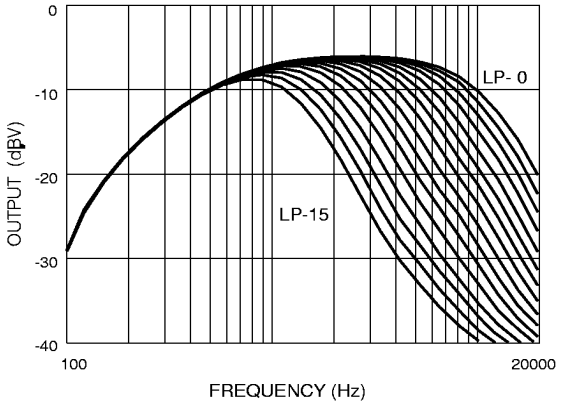


Fig. 5 Frequency Response for Low Pass Filter Settings (LP = 0 to 15)

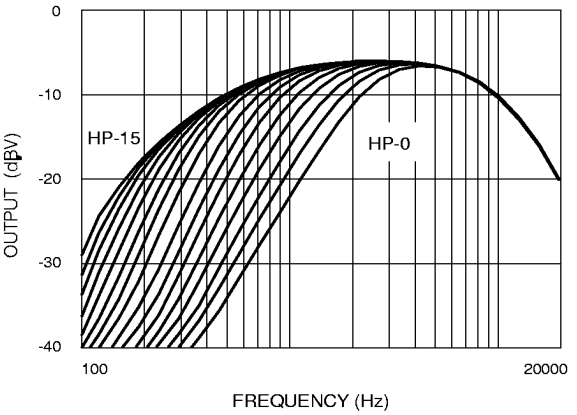


Fig. 6 Frequency Response for Different High Pass Filter Settings (HP = 0 to 15)

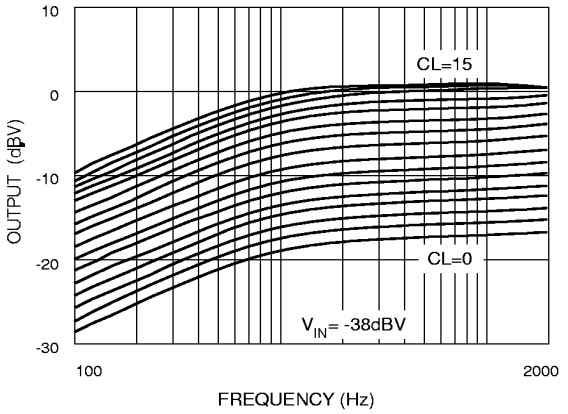


Fig. 7 Frequency Response for Different MPO Settings (CL = 0 to 15)

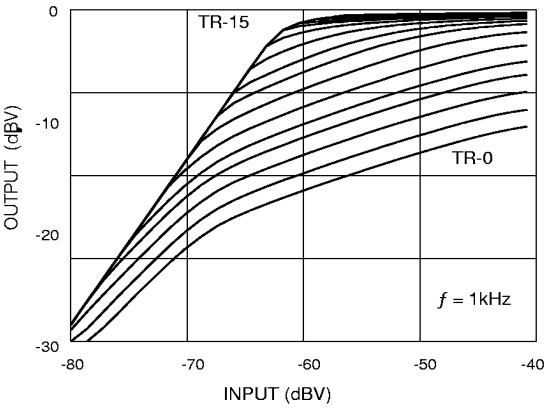


Fig. 8 I/O Response for Different Threshold Settings (TR = 0 to 15)

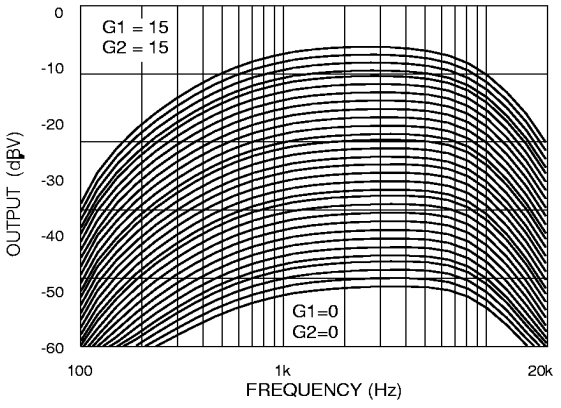


Fig. 9 Frequency Response for Different Gain Settings (G1, G2 = 0 to 15)

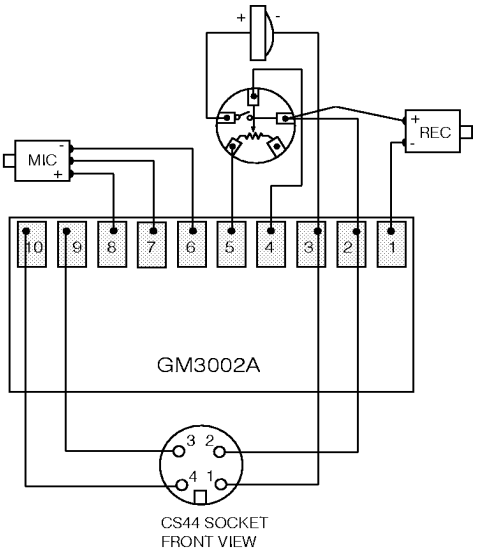
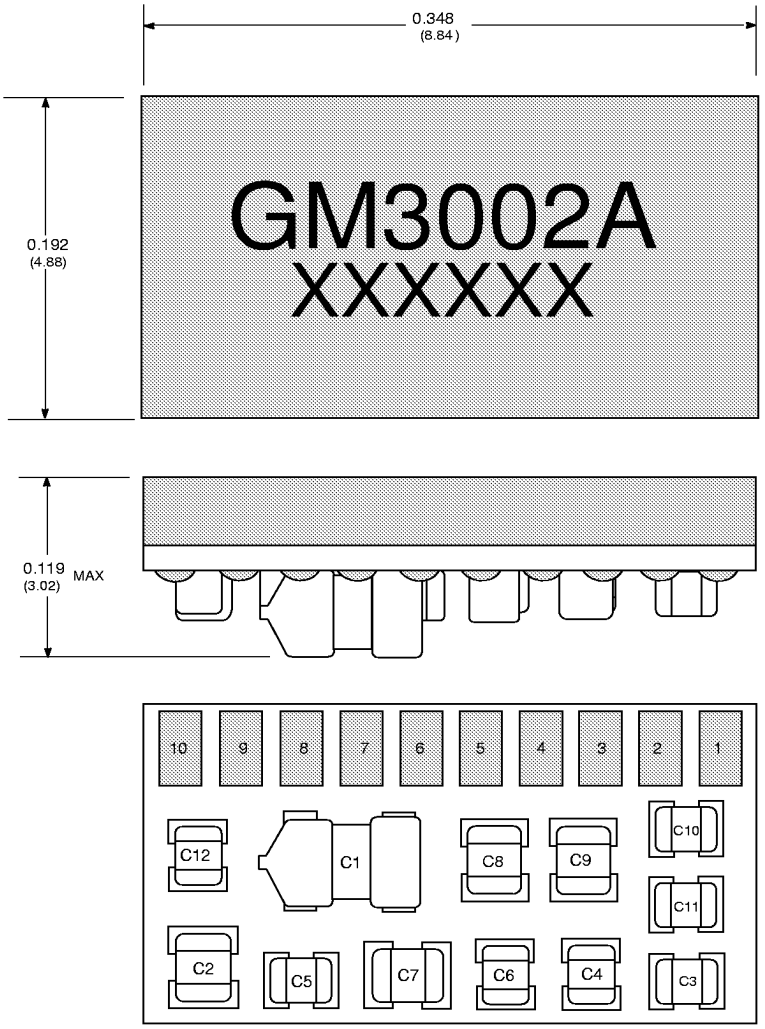


Fig. 10 Assembly Diagram



Dimension units are inches.

Dimensions in parenthesis are in millimetres converted from inches and include minor round off errors.

1.000 inches = 25.40 mm.

Pad size 0.045 x 0.025 (1.14 x 0.64).

Dimension tolerances: ±0.005 (+0.13) unless otherwise stated.

Pad numbers and capacitor numbers for illustration only.

XXXXXX - work order number.

This hybrid is designed for point to point manual soldering.

Fig. 11 Hybrid Layout & Dimensions

DOCUMENT IDENTIFICATION: DATA SHEET
The product is in production. Gennum reserves the right to make changes at any time to improve reliability, function or design, in order to provide the best product possible.

REVISION NOTES:

- Change on product marking from YYWW (date of manufacturing) to XXXXXX (work order number).