

GENNUM
CORPORATION

DynamEQ® I
Dynamic Equalizer

GS3011 - HYB DATA SHEET

FEATURES

- handles high input levels (up to 100 mVRMS) cleanly
- low THD and IMD distortion
- unique twin average detectors
- dual channel signal processing
- adjustable AGC threshold levels
- highpass filter with adjustable corner frequency
- 2:1 compression of high frequencies
- no external capacitors or resistors required

STANDARD PACKAGING

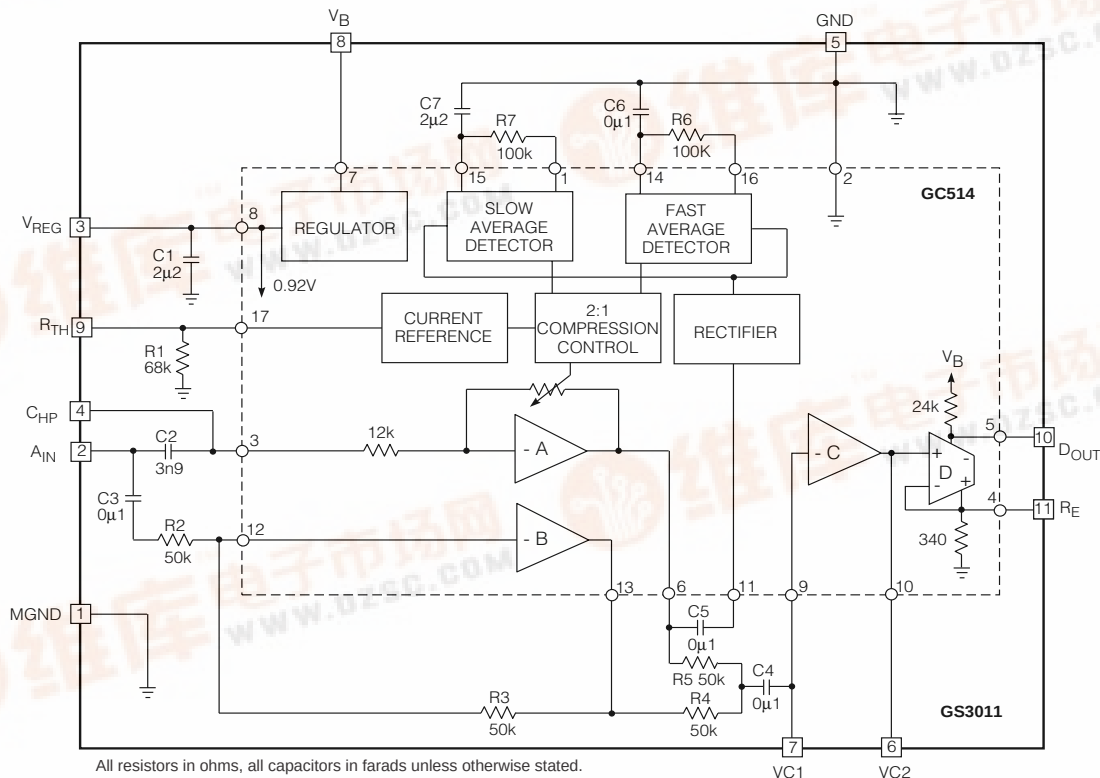
- Hybrid typical dimensions
0.260 in x 0.150 in x 0.120 in
(6.6 mm x 3.81 mm x 3.05 mm)

DESCRIPTION

The DynamEQ® I hybrid is a dynamically adaptive loudness growth equalizer. Its gain and frequency response is dependent on the user's environment, and is designed for level dependant frequency response providing treble increase at low levels (TILL). The unique twin averaging detector circuit dramatically reduces pumping effects and is optimized for mild to moderate hearing loss.

DynamEQ® I has two signal paths for dual channel processing incorporating 4 amplifying stages (A, B, C, D) and the AGC processing circuit.

Stage A is a highpass channel with 2:1 compression, stage B is a wideband unity gain buffer. The sum of the two paths gives a high frequency boost to low level signals, which gradually compresses to a flat response at high input levels. Stage C is used for volume control adjustment, while stage D is a class A power amplifier with receiver bias current adjustment.



FUNCTIONAL BLOCK DIAGRAM



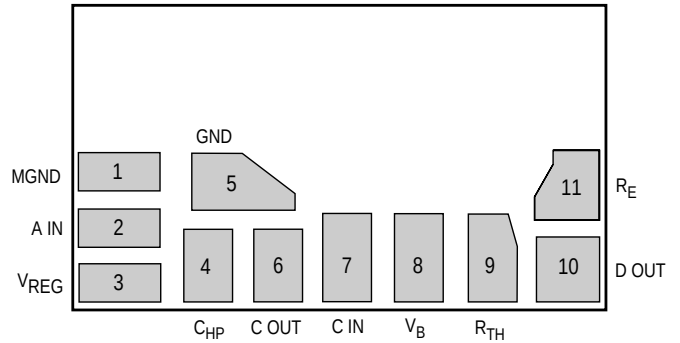
ABSOLUTE MAXIMUM RATINGS

PARAMETER	VALUE / UNITS
Supply Voltage	3 VDC
Power Dissipation	25 mW
Operating Temperature Range	-10° C to 40° C
Storage Temperature Range	-20° C to 70° C

CAUTION
CLASS 1 ESD SENSITIVITY



PAD CONNECTION



ELECTRICAL CHARACTERISTICS

Conditions: Input Level $V_{IN} = -97$ dBV, Frequency = 5 kHz, Temperature = 25°C, Supply Voltage $V_B = 1.3$ V

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Hybrid Current	I_{AMP}	$V_{IN} = 0$ VRMS	120	230	330	μ A
Minimum Voltage	V_B		1.1	-	-	V
Total Harmonic Distortion	THD	$R_{VC} = 15$ k Ω ; $V_{IN} = -40$ dBV	-	0.2	1	%
Input Referred Noise	IRN	NFB 0.2 to 10 kHz at 12 dB/oct	-	2.5	-	μ VRMS
Total System Gain	A_V		51	54	57	dB
AGC						
Compression Ratio	COMP	$V_{IN} = -70$ dBV and -80 dBV	1.74:1	1.95:1	2.11:1	Ratio
Threshold			-	-94	-	dBV
Compression Gain Range	A_{RANGE}	$R_{VC} = 15$ k Ω ; Note 1	26	27	-	dB
High Pass Corner Frequency	f_{HPC}		-	3.4	-	kHz
System Gain in Compression	A_{80}	$V_{IN} = -80$ dBV, $R_{VC} = 15$ k Ω	28	30	32	dB
OUTPUT STAGE						
Minimum Transducer Current	I_{TR}		130	160	190	μ A
Maximum Current Sink	I_{SINK}		3	9	-	mA
Output Impedance	Z_{OUT}		20	24	28	k Ω
R_E Voltage	V_{RE}		48	52	56	mV
REGULATOR						
Regulator Voltage	V_{REG}		0.89	0.92	0.97	V

All parameters and switches remain as shown in the Test Circuit unless otherwise stated in CONDITIONS column

V_{PX} actual voltage measured on the pin at given condition (X is pin number)

Notes: 1. $A_{RANGE} = V_{P10} [V_{IN} = -97 \text{ dBV}] - V_{P10} [V_{IN} = -20 \text{ dBV}] + 77 \text{ dBV}$

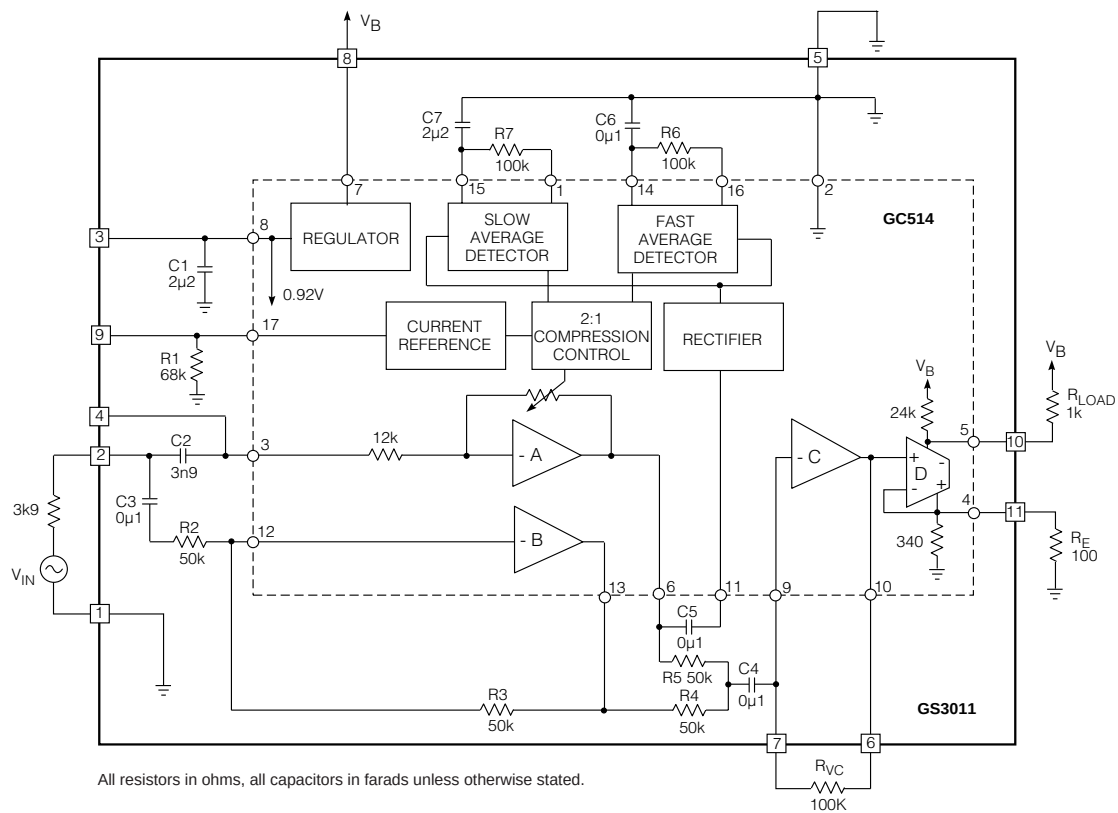


Fig.1 Production Test Circuit

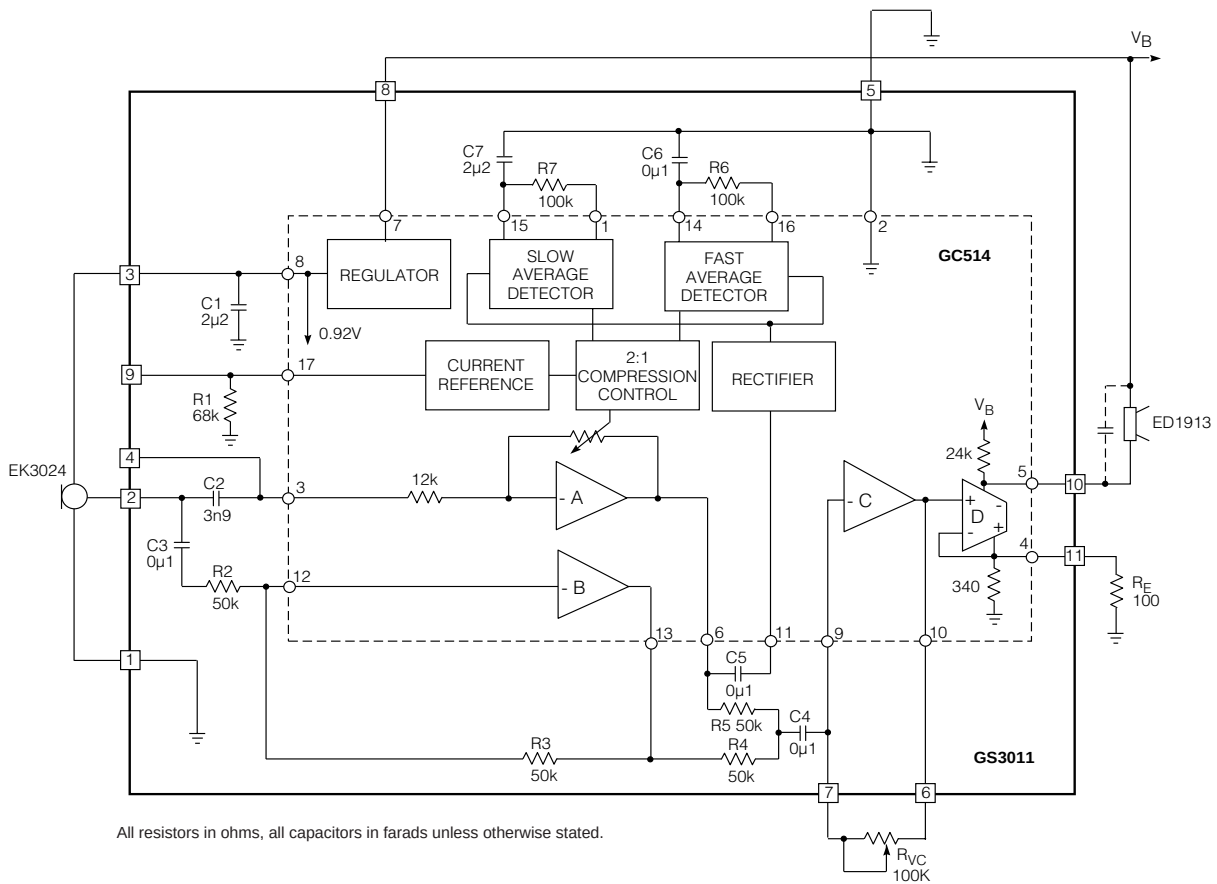


Fig. 2 Typical Hearing Instrument Application

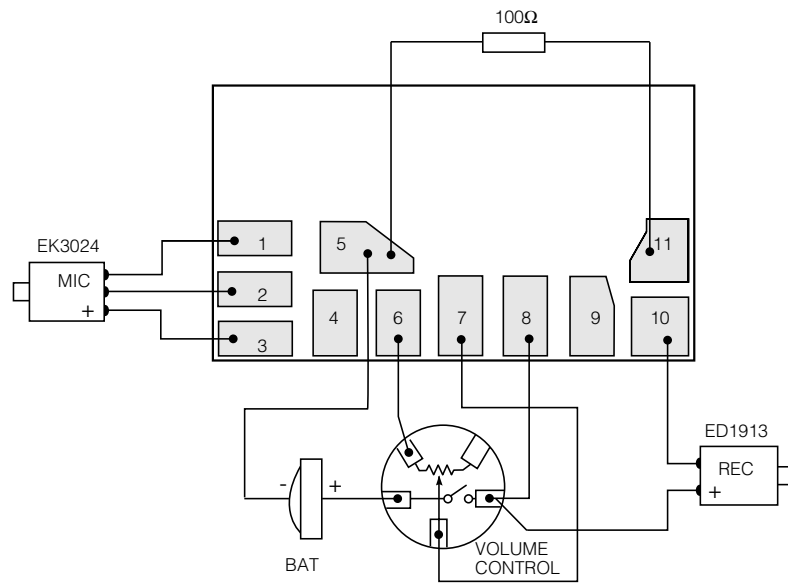


Fig. 3 Typical Hearing Instrument Assembly Diagram

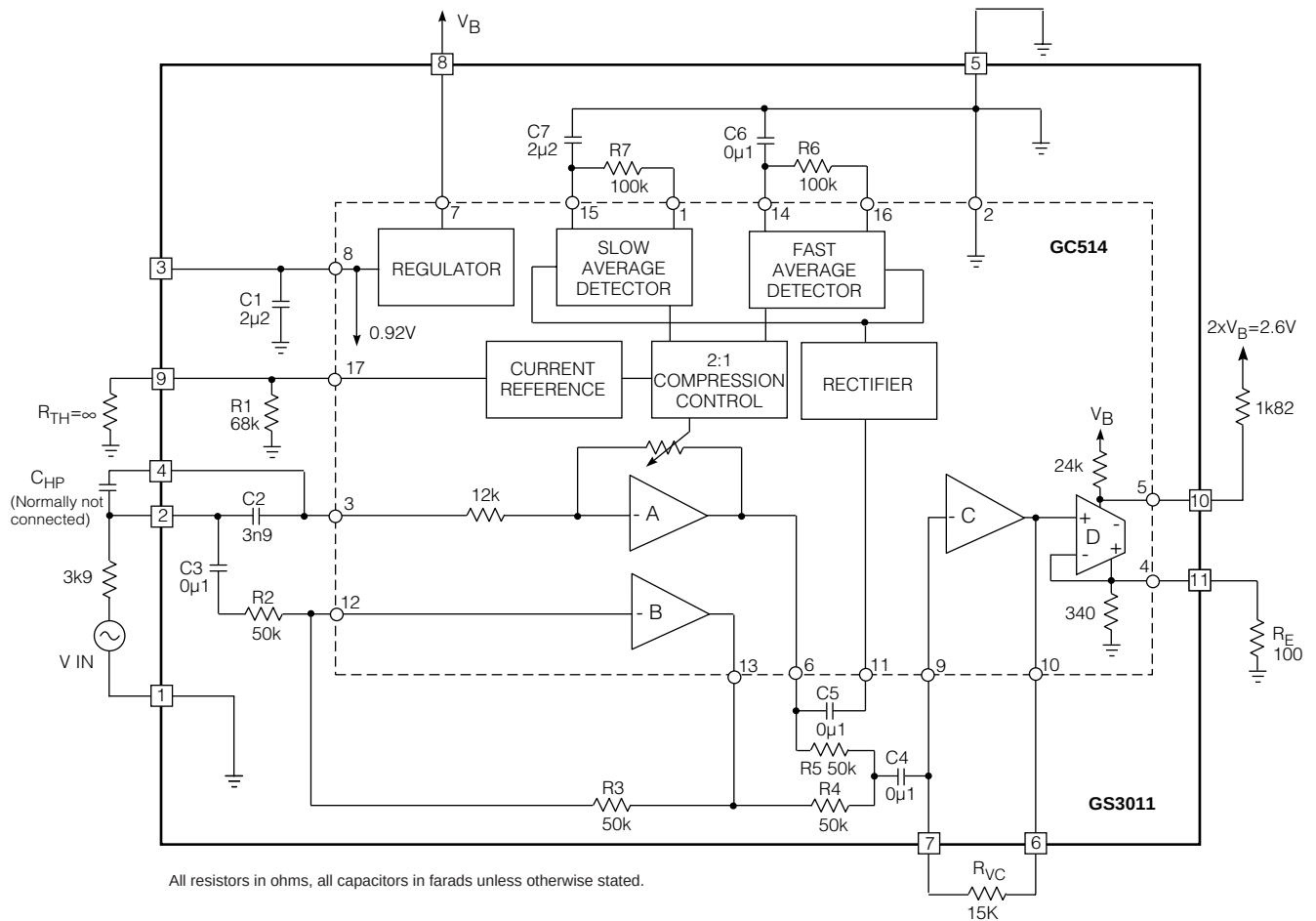


Fig. 4 Characterization Circuit (used to generate typical curves)
(Equivalent RMS pink noise used as V_{IN} for all frequency responses)

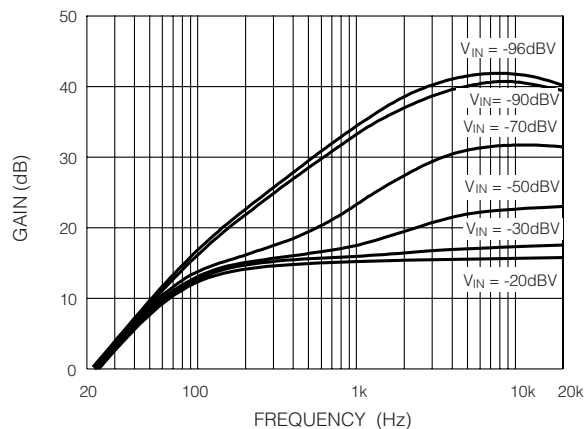


Fig. 5 Frequency Response for Different Input Levels

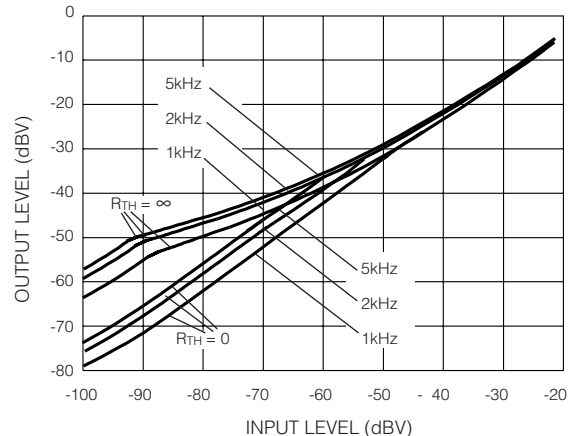


Fig. 6 I/O Transfer Function for Different Test Frequencies. Shown for Min/Max R_{TH} Resistors Values

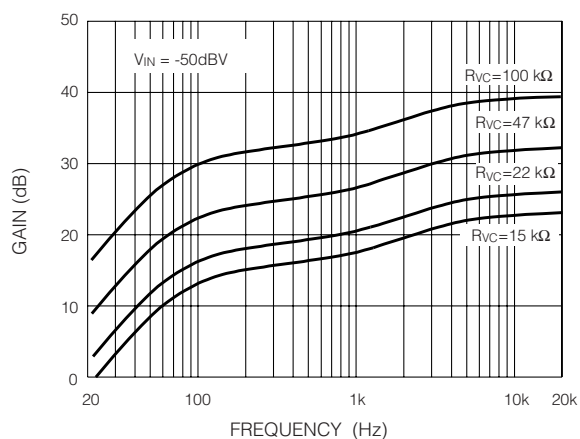


Fig. 7 Frequency Response for Different R_{VC} Values

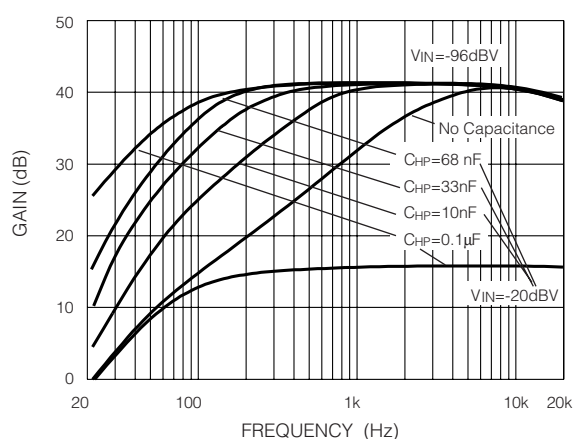


Fig. 8 Corner Frequency vs C_{HP} Capacitor Value

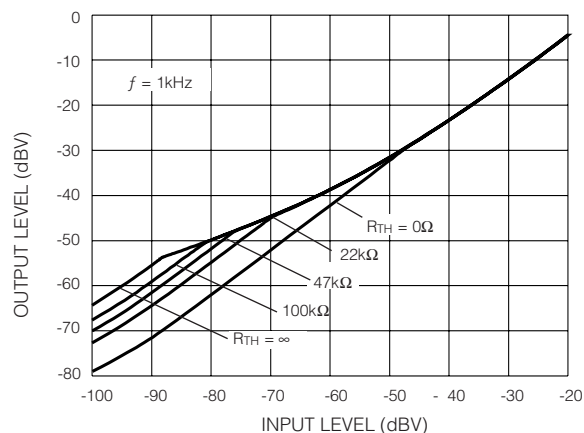


Fig. 9 I/O Transfer Function for Different R_{TH} Resistors

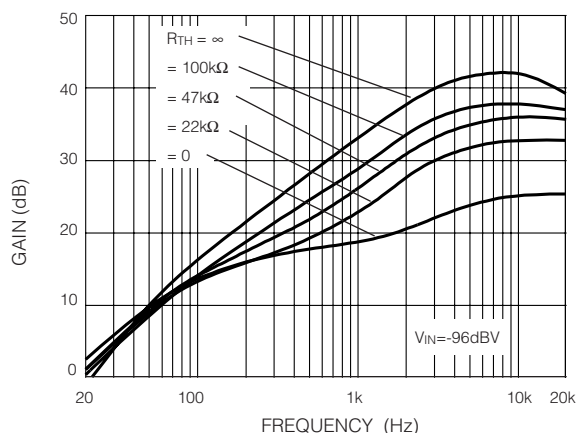


Fig. 10 Frequency Characteristics for Different R_{TH} Values

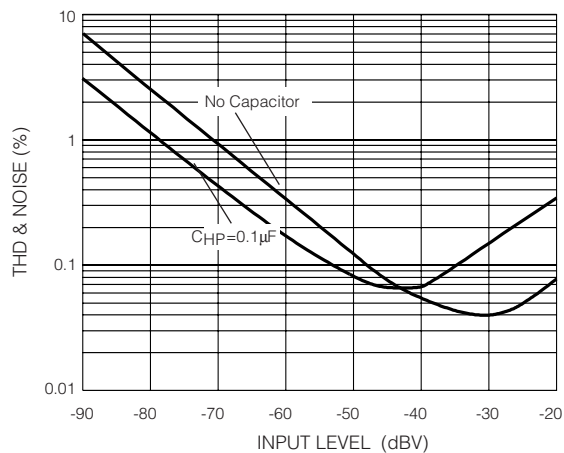


Fig. 11 THD & Noise vs Input Level

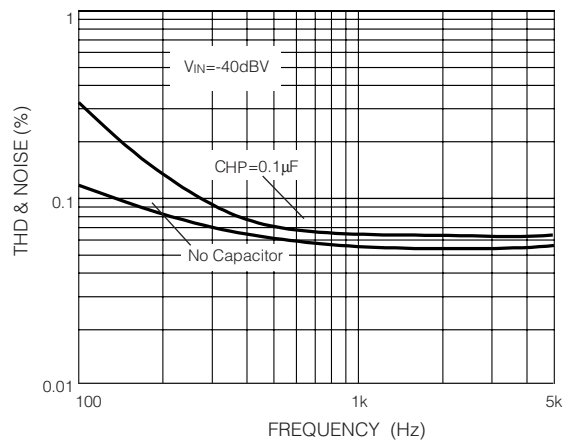


Fig. 12 THD & Noise vs Frequency

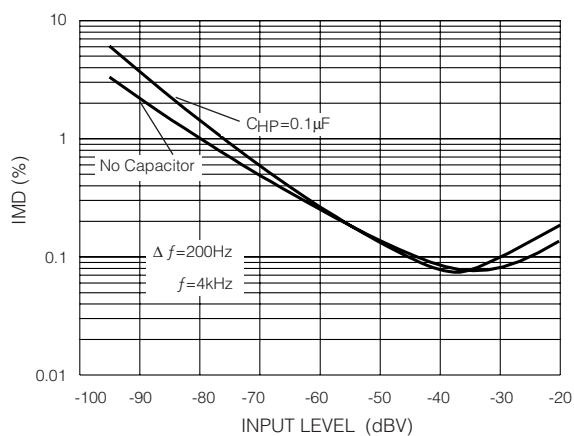


Fig. 13 Intermodulation Distortion (CCIF) vs Input Level

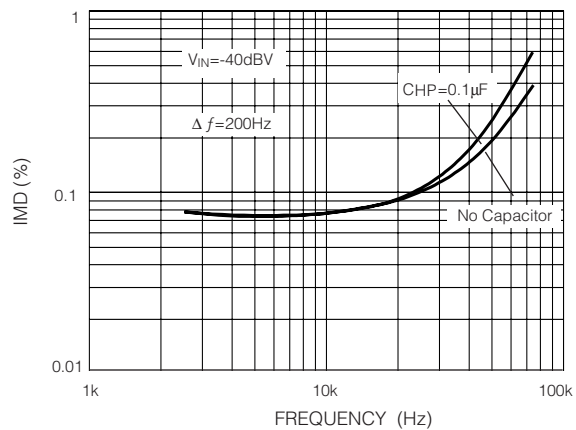
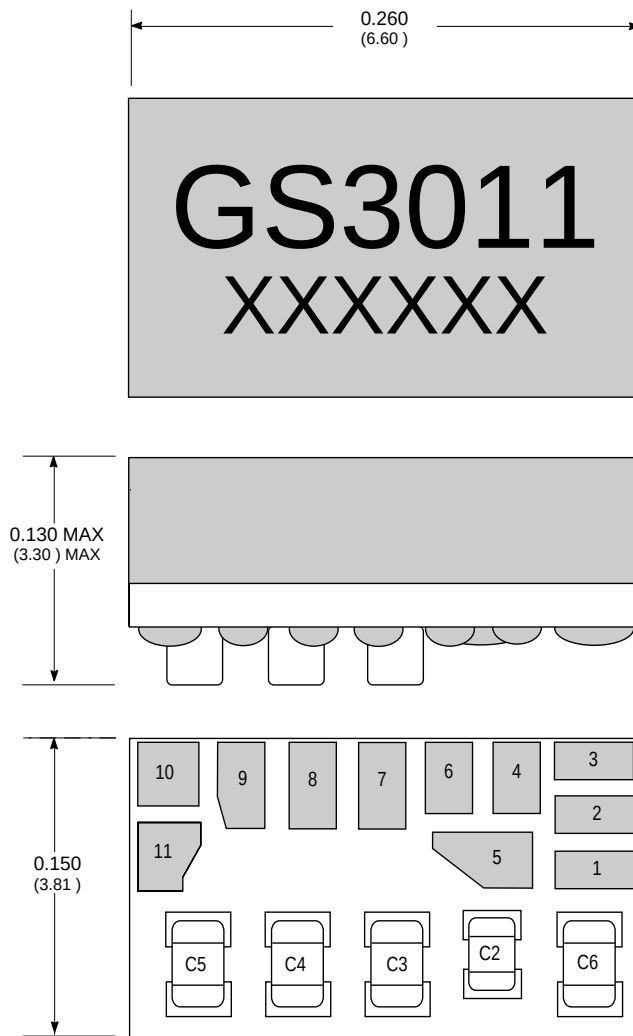


Fig. 14 Intermodulation Distortion (CCIF) vs Frequency



Dimension units are in inches.
 Dimensions shown in parenthesis are in millimetres, converted from inches and include minor round-off errors.
 1.0000 inches = 25.40mm.
 Dimensions ± 0.005 (± 0.13) unless otherwise stated.
 Pad numbers for illustration purposes only.
 Smallest pad 0.035" x 0.020" (pad 2)
 Largest pad 0.043" x 0.028" (pad 8)
 XXXXXX - work order number.
 This hybrid is designed for point to point manual soldering

Fig. 15 Hybrid Layout and 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:

Updated to Data sheet