

MN3005

4096-STAGE LONG DELAY BBD

General description

The MN3005 is a world's first 4096-stage long delay BBD, 8 times longer than 512-stage BBD manufactured by using a P-channel low noise silicon gate process.

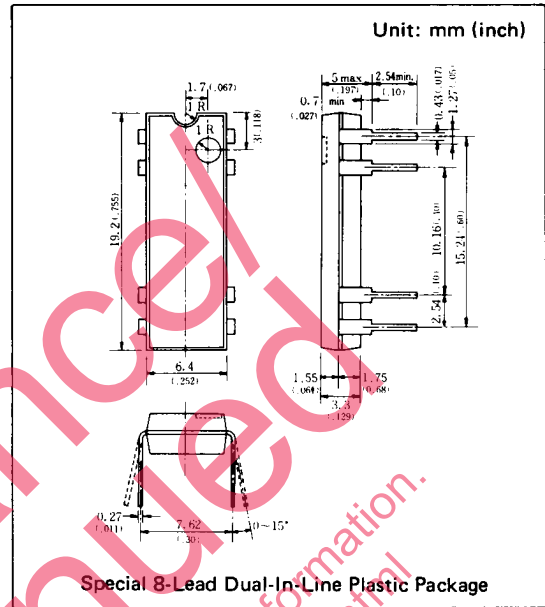
Long signal delay time 205ms can be obtained at clock frequency 10KHz. S/N is 75dB. S/N has been improved by more than 20dB in comparing with 8-connected 512-stage BBD's. The MN3005 is suitably used for reverberation and echo effects in electronic musical instruments such as electronic organ, guitar amplifier and music synthesizer which need long delay time.

Features

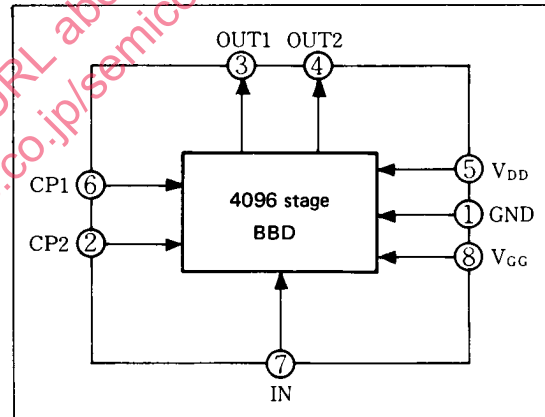
- 1 chip 4096 stage and wide range of variable delay times: 20.48 ~ 204.8ms.
- High S/N in spite of multi-stage and wide dynamic range: S/N \approx 75dB typ.
- No insertion loss since the loss occurring in the signal transfer is corrected by the MOS capacity of input and output. $L_i = 0$ dB.
- High integration and high reliability by using P channel low noise silicon gate process.
- Special 8 lead dual-in-line plastic package.

Applications

- Reverberation and echo effects in echo microphone and stereo equipment.
- Chorus effect in electronic musical instruments.
- Variable or fixed delay of analog signals.
- Telephone time compression and delay line for voice communication systems, etc.



Block Diagram



Quick Reference Data

Item	Symbol	Value	Unit
Supply Voltage	V_{DD}, V_{GG}	-15, $V_{DD} + 1$	V
Signal Delay Time	t_D	20.48~204.8	ms
Total Harmonic Distortion	THD	1	%
Signal to Noise Ratio	S/N	75	dB

■ Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Terminal Voltage	V _{DD} , V _{GG} , V _{CP} , V _I	-18~+0.3	V
Output Voltage	V _O	-18~+0.3	V
Operating Temperature	T _{opr}	-20~+60	°C
Storage Temperature	T _{stg}	-55~+125	°C

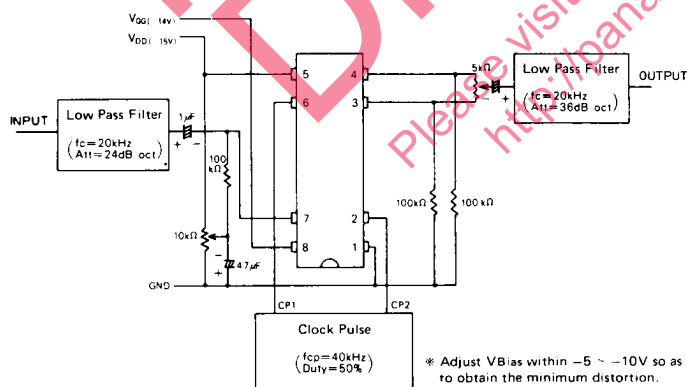
■ Operating Conditions (Ta = 25°C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain Supply Voltage	V _{DD}		-14	-15	-16	V
Gate Supply Voltage	V _{GG}			V _{DD} +1		V
Clock Voltage "H" Level	V _{CPH}		0		-1	V
Clock Voltage "L" Level	V _{CPL}			V _{DD}		V
Clock Input Capacitance	C _{CP}				2800	pF
Clock Frequency	f _{CP}		10		100	kHz
Clock Pulse Width *2	t _{cpw}	Test Circuit			0.5T*2	
Clock Rise Time *2	t _{cpr}	Test Circuit			500	ns
Clock Fall Time *2	t _{cpf}	Test Circuit			500	ns
Clock Cross Point	V _X		0		-3	V
Input DC Bias Voltage	V _{Bias}		-5		-10	V

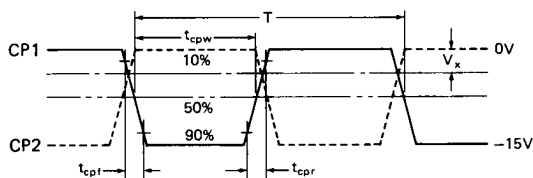
■ Electrical Characteristics (Ta = 25°C, V_{DD} = V_{CPL} = -15V, V_{CPH} = 0V, V_{GG} = -14V, R_L = 100kΩ)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Signal Delay Time	t _D		20.48		204.8	ms
Input Signal Frequency	f _i	f _{cp} = 40kHz, V _i = 1.0Vrms, Output Attenuation ≤ 3dB (0dB at f _i = 1kHz)	10			kHz
Input Signal Swing	V _i	f _{cp} = 40kHz, f _i = 1 kHz, THD = 2.5%	1.0			Vrms
Insertion Loss	L _i	f _{cp} = 40kHz, f _i = 1 kHz, V _i = 1.0Vrms	-4	0	4	dB
Total Harmonic Distortion	THD	f _{cp} = 40kHz, f _i = 1 kHz, V _i = 0.78Vrms		1	2.5	%
Noise Voltage	V _{no}	f _{cp} = 100kHz Weighted by "A" curve			0.4	mVrms
Signal to Noise Ratio	S/N			75		dB

■ Test Circuit

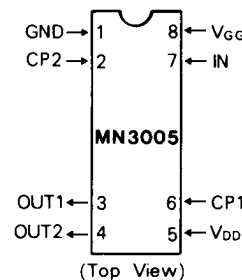


*1 Clock Pulse Waveforms

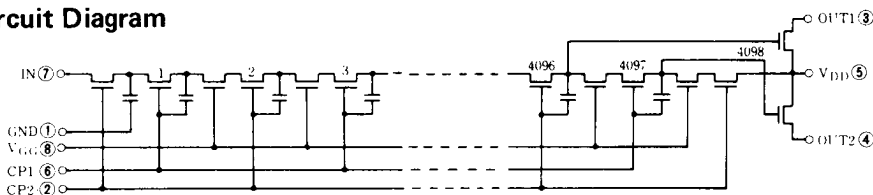


*2 T = 1/fcp

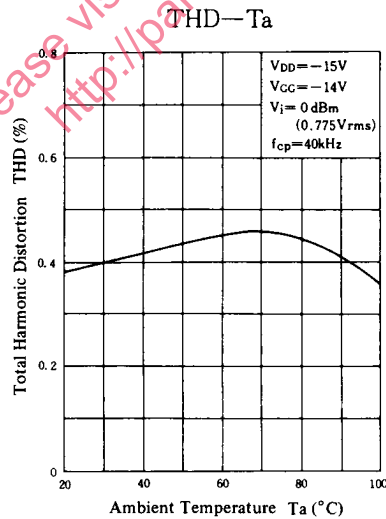
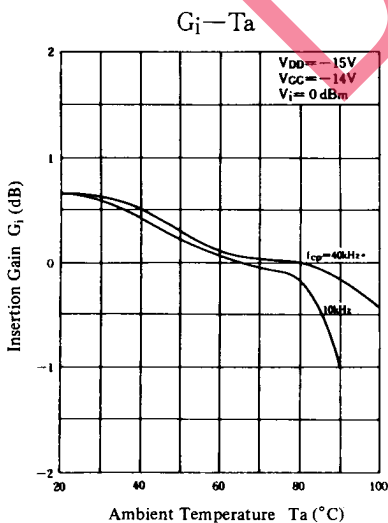
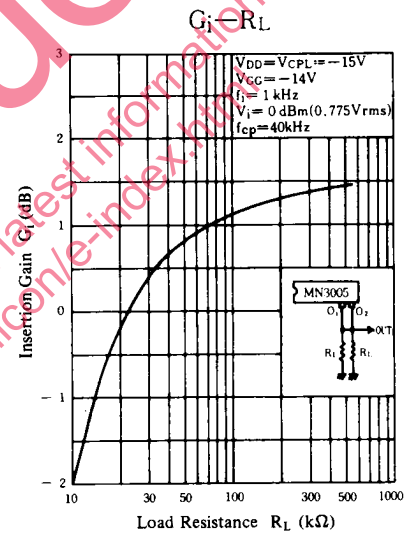
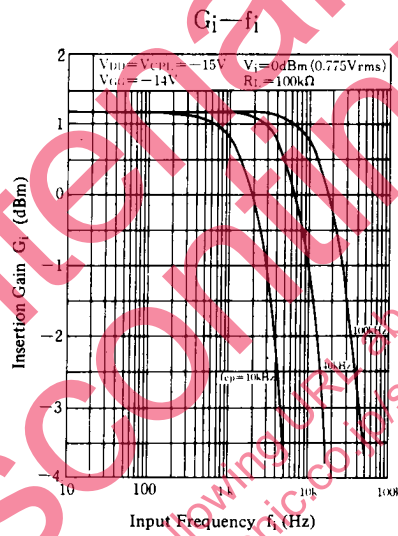
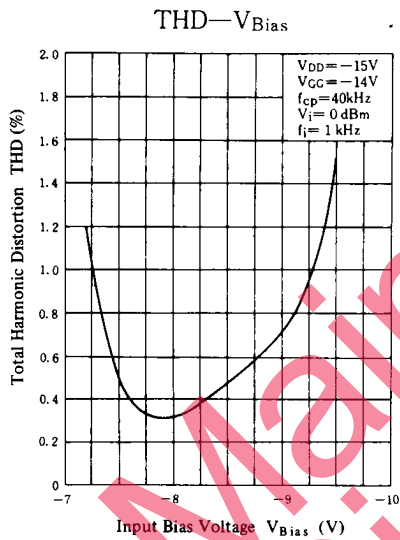
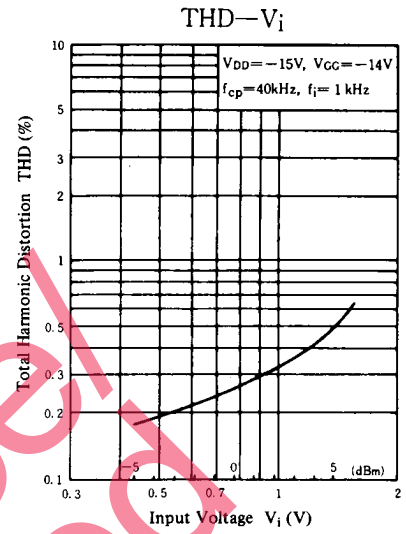
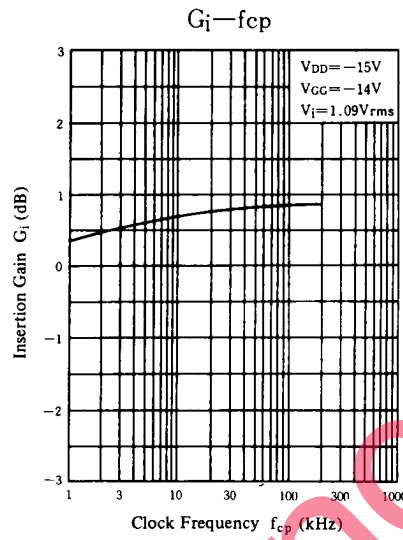
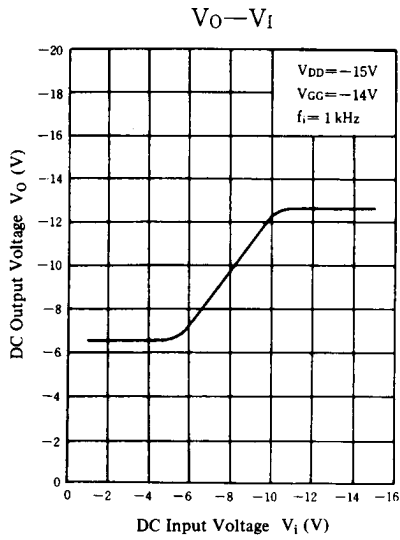
■ Terminal Assignments



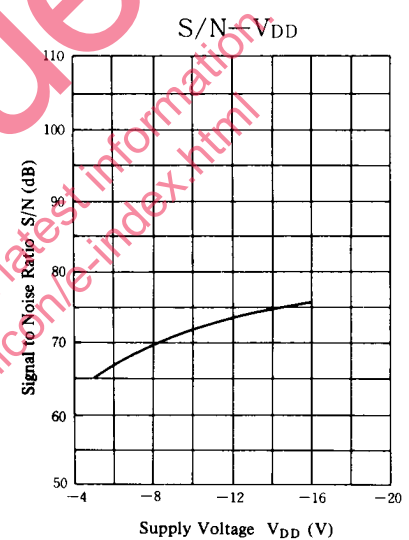
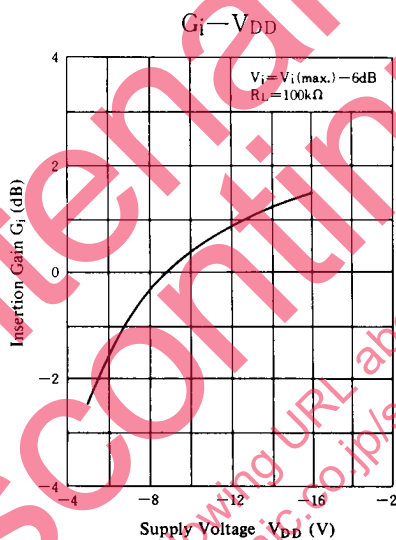
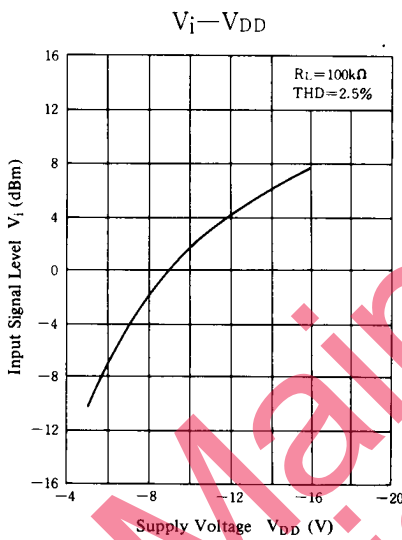
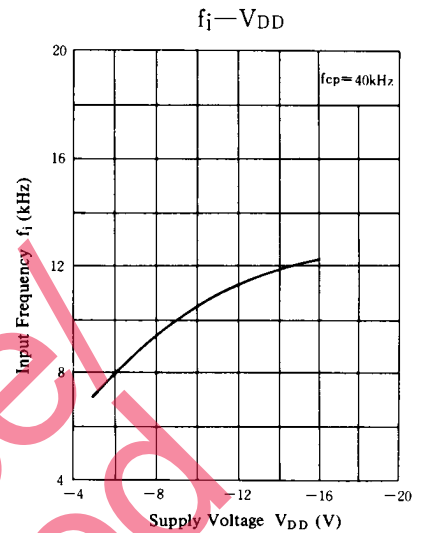
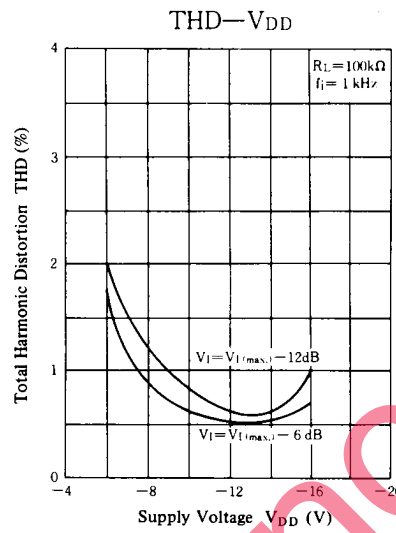
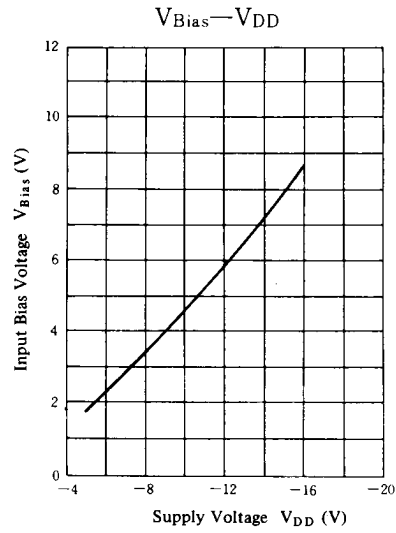
■ Circuit Diagram



Typical Electrical Characteristic Curves

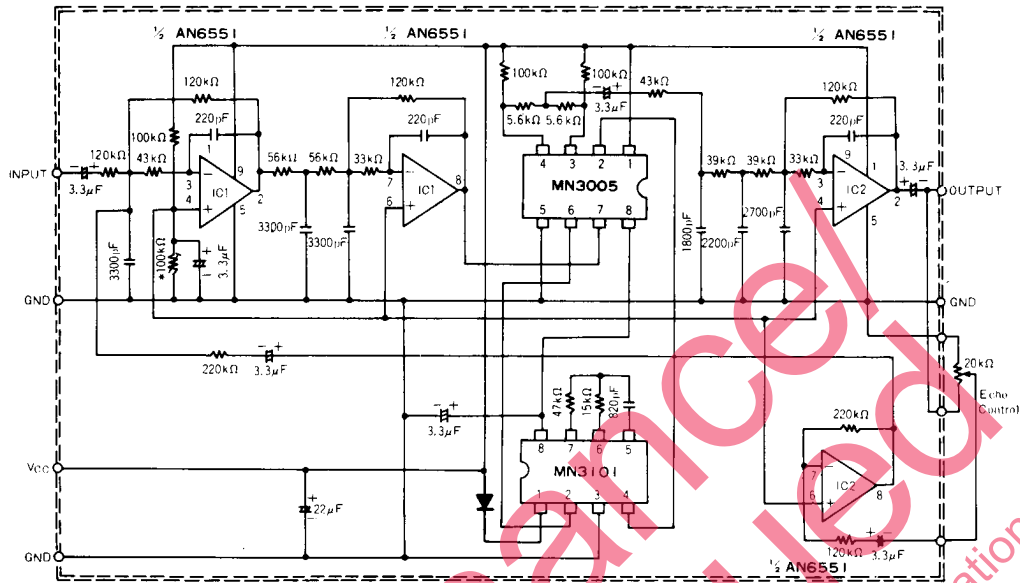


Supply Voltage Characteristics



Maintenance
 Please visit following URL about latest information
<http://panasonic.co.jp/semicon/e-index.html>

Application Circuit



* Adjust to minimize distortion (VR 100KΩ typ.)

Reverberation Effect Generation Circuit (Signal Delay Over 100msec.)

Pattern Drawing of the Printed Circuit Board (Real size)



Request for your special attention and precautions in using the technical information and semiconductors described in this book

- (1) If any of the products or technical information described in this book is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially, those with regard to security export control, must be observed.
- (2) The technical information described in this book is intended only to show the main characteristics and application circuit examples of the products, and no license is granted under any intellectual property right or other right owned by our company or any other company. Therefore, no responsibility is assumed by our company as to the infringement upon any such right owned by any other company which may arise as a result of the use of technical information described in this book.
- (3) The products described in this book are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).
Consult our sales staff in advance for information on the following applications:
 - Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
 - Any applications other than the standard applications intended.
- (4) The products and product specifications described in this book are subject to change without notice for modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.
- (5) When designing your equipment, comply with the range of absolute maximum rating and the guaranteed operating conditions (operating power supply voltage and operating environment etc.). Especially, please be careful not to exceed the range of absolute maximum rating on the transient state, such as power-on, power-off and mode-switching. Otherwise, we will not be liable for any defect which may arise later in your equipment.
 - Even when the products are used within the guaranteed values, take into the consideration of incidence of break down and failure mode, possible to occur to semiconductor products. Measures on the systems such as redundant design, arresting the spread of fire or preventing glitch are recommended in order to prevent physical injury, fire, social damages, for example, by using the products.
- (6) Comply with the instructions for use in order to prevent breakdown and characteristics change due to external factors (ESD, EOS, thermal stress and mechanical stress) at the time of handling, mounting or at customer's process. When using products for which damp-proof packing is required, satisfy the conditions, such as shelf life and the elapsed time since first opening the packages.
- (7) This book may be not reprinted or reproduced whether wholly or partially, without the prior written permission of Matsushita Electric Industrial Co., Ltd.