

MN3010

DUAL 512-STAGE LOW NOISE BBD

General description

The MN3010 is a dual 512-stage low noise BBD having a wide dynamic range that provides a signal delay of up to 25.5msec.

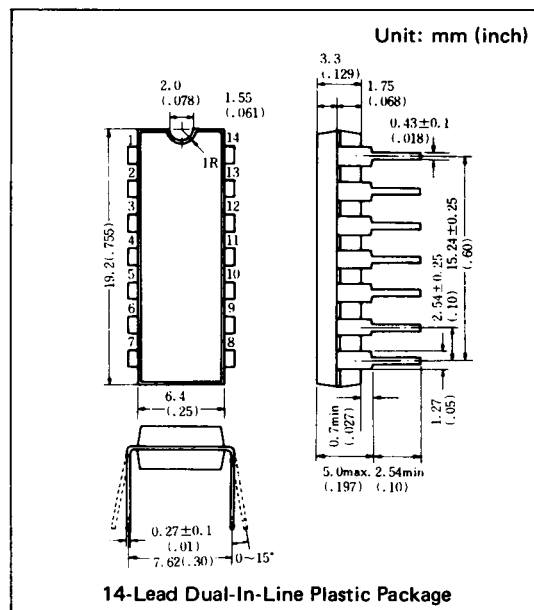
Two 512-stage BBDs are integrated on the same chip which offer uniform characteristics.

Features

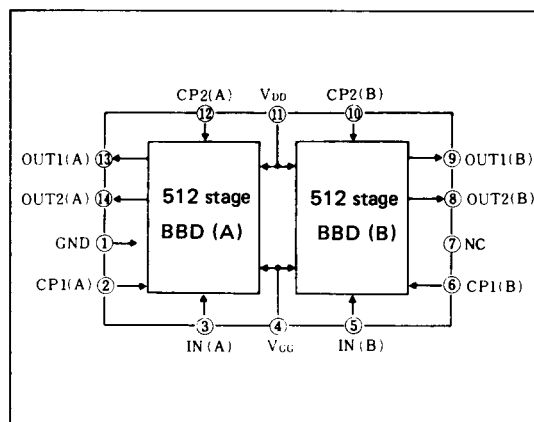
- Variable delay time of audio signals:
2.56 ~ 25.6ms (512-stage)
5.12 ~ 51.2ms (512-stage x 2)
- Clock component cancellation capability.
- No insertion loss: $L_i = 0\text{dB typ.}$
- Wide dynamic range: $S/N = 85\text{dB typ.}$
- Wide frequency response: $f_i \leq 12\text{KHz.}$
- Low distortion: $\text{THD} = 0.4\% \text{ typ. } (V_i = 0.78\text{Vrms}).$
- Clock frequency range: $10 \sim 100\text{KHz.}$
- 1024-stage in series connection, and twice as large output in parallel connection.
- P channel silicon gate process.
- 14-Lead Dual-In-Line Plastic Package.

Applications

- Vibrato and/or chorus effects in electronic musical instruments.
- Reverberation effect of electronic musical instruments.
- Variable or fixed delay of analog signals.



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	2.56~51.2	ms
Total Harmonic Distortion	THD	0.4	%
Signal to Noise Ratio	S/N	85	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)

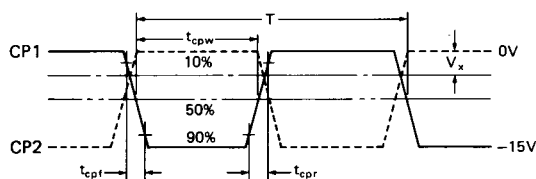
Item	Symbol	Min.	Typ.	Max.	Unit
Drain Supply Voltage	V_{DD}	-14	-15	-16	V
Gate Supply Voltage	V_{GG}		$V_{DD} + 1$		V
Clock Voltage "H" Level	V_{CPH}	0		-1	V
Clock Voltage "L" Level	V_{CPL}		V_{DD}		V
Clock Input Capacitance	C_{CP}			350	pF
Clock Frequency	f_{CP}	10		100	kHz
Clock Pulse Width *1	t_{cpw}			$0.5T^{*2}$	
Clock Rise Time *1	t_{cpr}			500	ns
Clock Fall Time *1	t_{cpf}			500	ns
Clock Cross Point *1	V_X	0		-3	V
Input DC Bias	V_{Bias}	-5		-10	V

*1 $T = 1/f_{CP}$

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

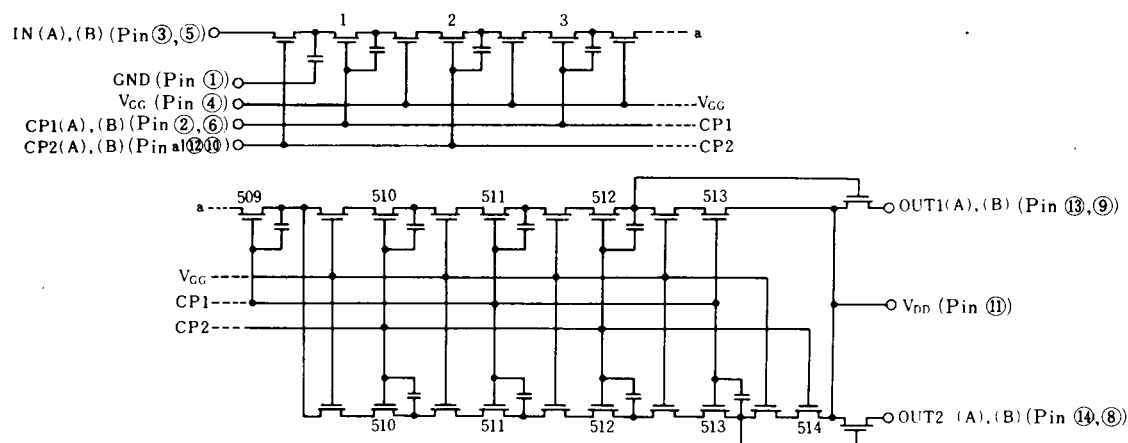
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Signal Delay Time	t_D		2.56		25.6	ms
Input Signal Frequency	f_i	$f_{CP} = 40kHz$, $V_i = 1.8V_{rms}$, 3dB down (0 dB at $f_i = 1kHz$)	12			kHz
Input Signal Swing	V_i	$f_{CP} = 40kHz$, $f_i = 1kHz$, THD=2.5%	1.8			Vrms
Insertion Loss	L_i	$f_{CP} = 40kHz$, $f_i = 1kHz$, $V_i = 1.8V_{rms}$	-4	0		dB
Total Harmonic Distortion	THD	$f_{CP} = 40kHz$, $f_i = 1kHz$, $V_i = 0.78V_{rms}$		0.4		%
Noise Voltage	V_{no}	$f_{CP} = 100kHz$, weighted by "A" curve			0.21	mVrms
Signal to Noise Ratio	S/N	Maximum output voltage to noise voltage		85		dB

*1 Clock Pulse Waveforms

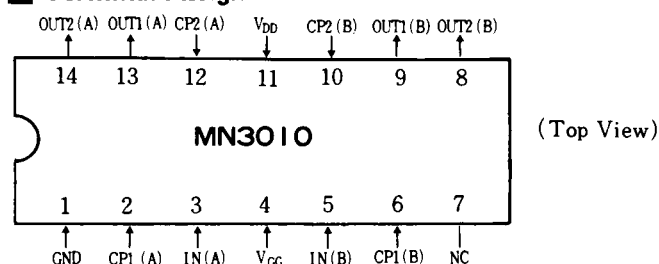


*2 $T = 1/f_{CP}$ (Clock period)

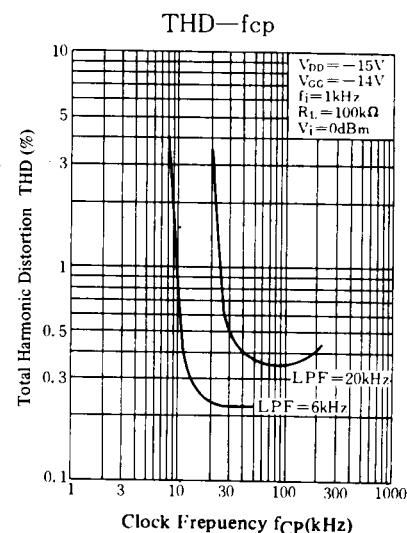
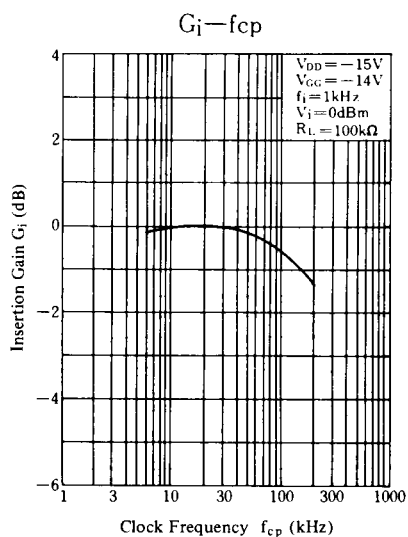
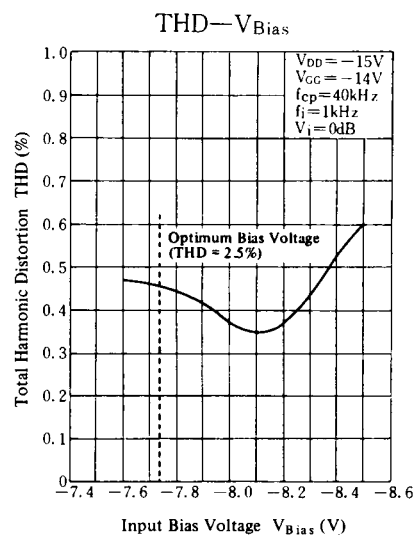
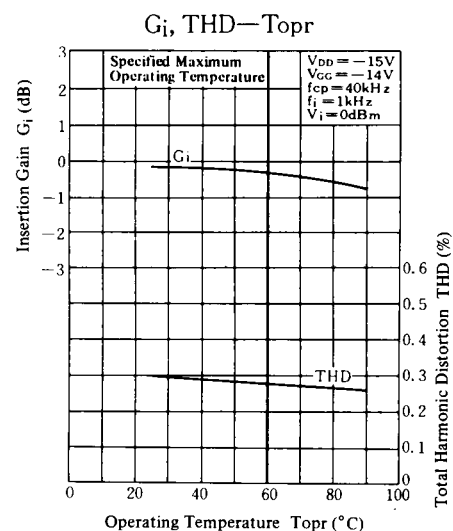
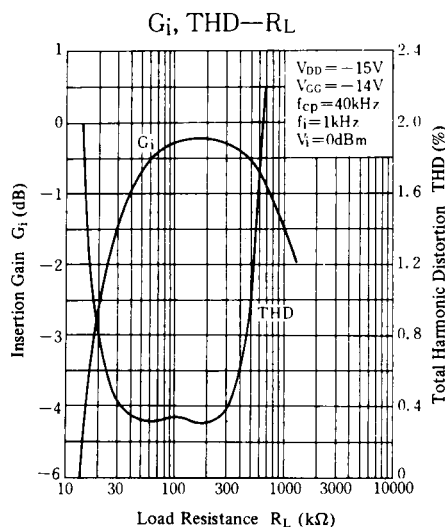
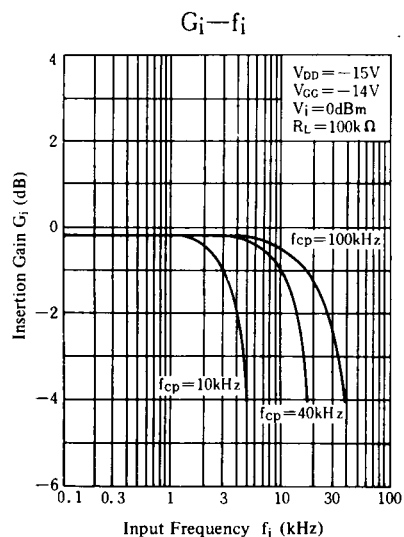
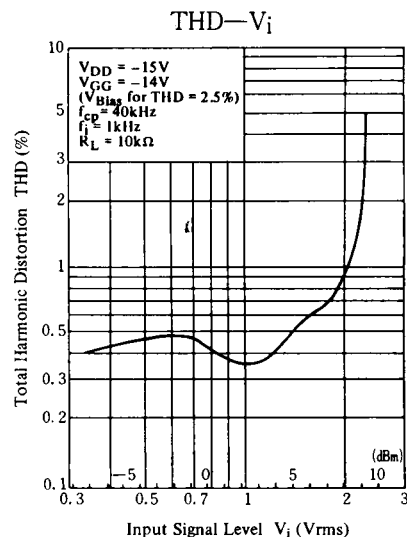
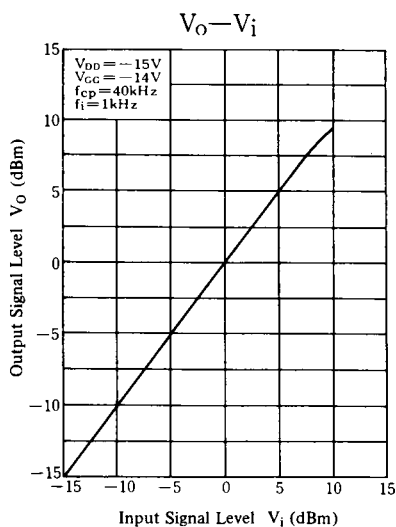
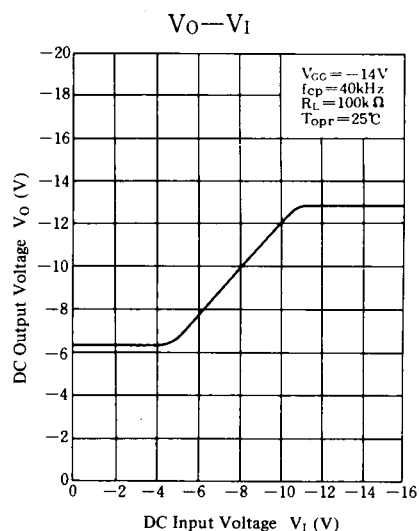
Circuit Diagram



Terminal Assignments

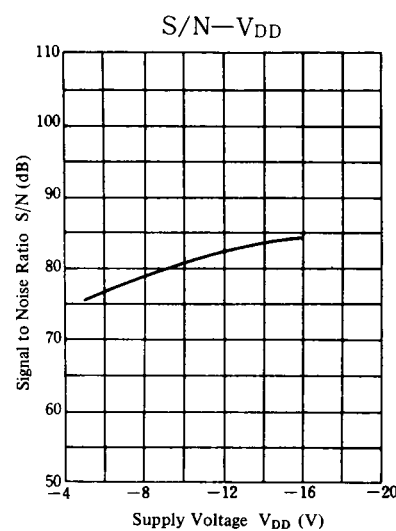
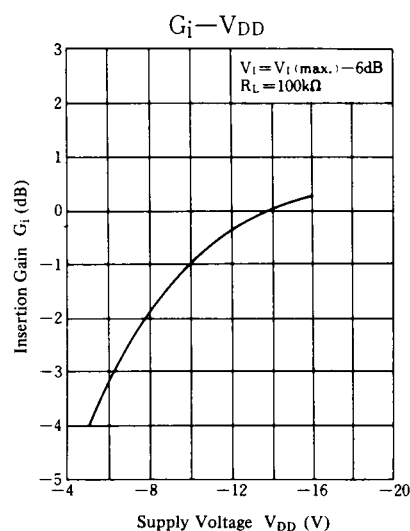
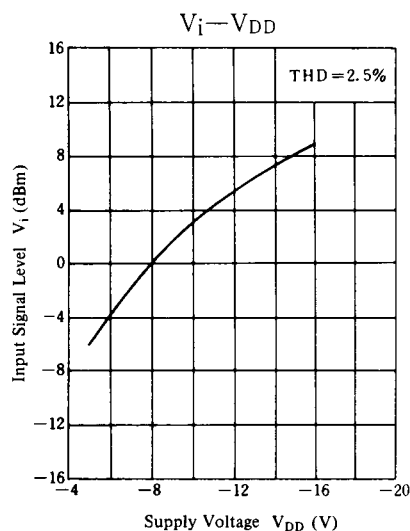
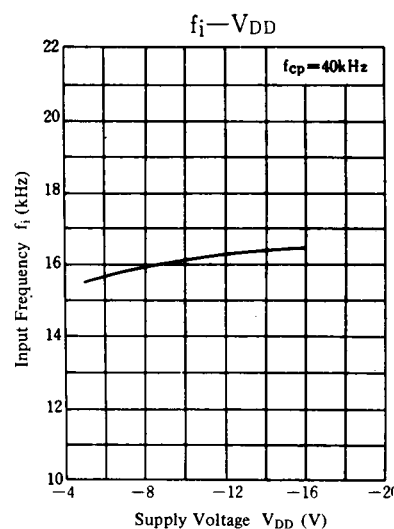
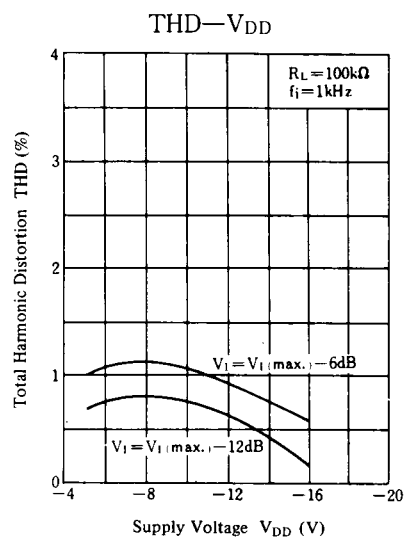


■ Typical Electrical Characteristic Curves



$V_{Bias} - V_{DD}$

Supply Voltage V_{DD} (V)	Input Bias Voltage V_{iBias} (V)
-4	-2.0
-6	-2.5
-8	-3.2
-10	-4.2
-12	-5.5
-14	-7.0
-16	-8.0

[illegible]

Chorus Effect Generation Circuit (Incorporating Clock Generator)