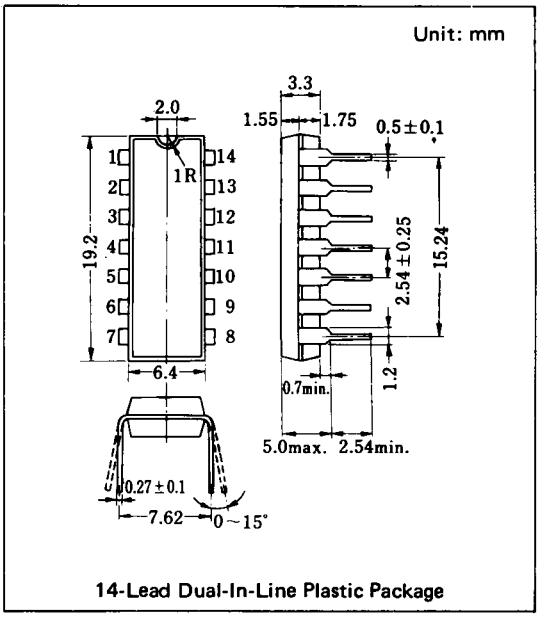
MN3210

DUAL 512-STAGE LOW VOLTAGE OPERATION LOW NOISE BBD

■ General description

The MN3210 is a dual 512-stage BBD that provides a signal delay of up to 51.2ms and is particularly suitable as a device for generation of reverberation effect of audio equipments such as low voltage operation portable stereo and radio cassette recorders, etc.



14-Lead Dual-In-Line Plastic Package

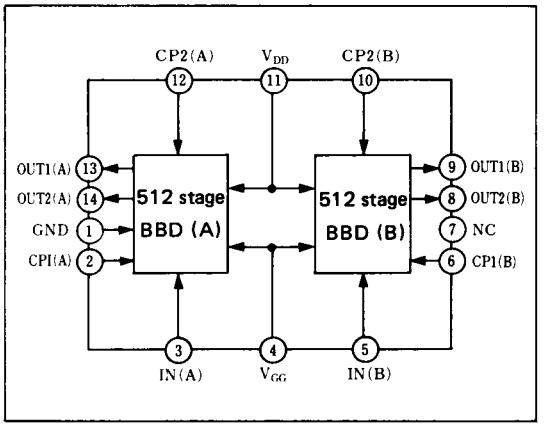
■ Features

- Variable delay of audio signals:
  1.28ms ~ 25.6ms (512-stage)
  2.56ms ~ 51.2ms (512-stage x 2)
- Wide supply voltage: 4 ~ 10V.
- No insertion loss: L_i = 0dB typ.
- Wide dynamic range: S/N = 77dB typ.
- Low distortion: THD = 0.4% typ. (V_i = 0.25Vrms).
- Clock frequency range: 10KHz ~ 200 KHz.
- N-channel silicon gate process.
- 14-lead dual-in-line plastic package.

■ Applications

- Reverberation and echo effect of audio equipment such as radio cassette recorder, car radio, portable radio, portable stereo, echo microphone and pre-taped musical accompaniment (Karaoke), etc.
- Sound effect in 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}	+5, $\frac{14}{15}V_{DD}$	V
Signal Delay Time	t_D	1.28~25.6, 2.56~51.2	ms
Total Harmonic Distortion	THD	0.4	%
Signal to Noise Ratio	S/N	77	dB

■ Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Termainl Voltage	V_{DD}, V_{GG}, V_{CP}, V_I	−0.3~+11	V
Output Voltage	V_O	−0.3~+11	V
Operating Temperature	Topr	−20~+60	℃
Storage Temperature	Tstg	−55~+125	℃

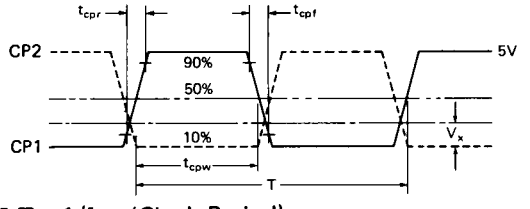
■ Operating Condition (Ta = 25°C)

Item	Symbol	Conditon	Min.	Typ.	Max.	Unit
Drain Supply Voltage	V_{DD}		+4	+5	+10	V
Gate Supply Voltage	V_{GG}			$\frac{14}{15}V_{DD}$		V
Clock Voltage "H" Level	V_{CPH}			V_{DD}		V
Clock Voltage "L" Level	V_{CPL}		0		+1	V
Clock Frequency	f_{CP}		10		200	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 Input Capacitance	C_{CP}				350	pF
Clock Cross Point *1	V_X		0		$0.3V_{CPH}$	V

■ Electrical Characteristics (Ta = 25°C, $V_{DD} = V_{CPH} = 5V$, $V_{CPL} = 0V$, $V_{GG} = 14/15\ V_{DD}$, $R_L = 100k\Omega$)

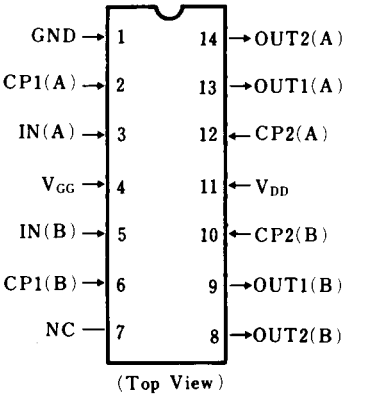
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Signal Delay Time	t_D	512 stage	1.28		25.6	ms
		512 stage x 2	2.56		51.2	ms
Input Signal Frequency	f_i	f_{cp} = 40kHz, Output Attenuation ≦ 3dB	12			kHz
Input Signal Swing	V_i	THD=2.5%	0.5			Vrms
Insertion Loss	L_i	f_{CP}=40kHz, f_i=1kHz	−4	0	4	dB
Total Harmonic Distortion	THD	f_{CP}=40kHz, f_i=1kHz, V_i=0.25Vrms		0.4	2.5	%
Noise Voltage	V_{no}	f_{cp} = 100kHz, Weighted by "A" curve			0.14	mVrms
Signal to Noise Ratio	S/N			77		dB

*1 Clock Pulse Waveforms



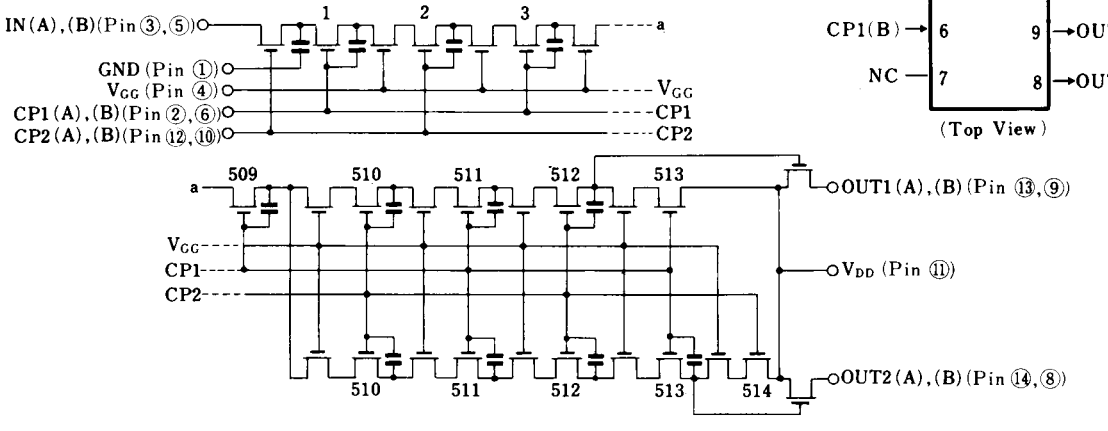
*2 T = $1/f_{CP}$ (Clock Period)

■ Terminal Assignments



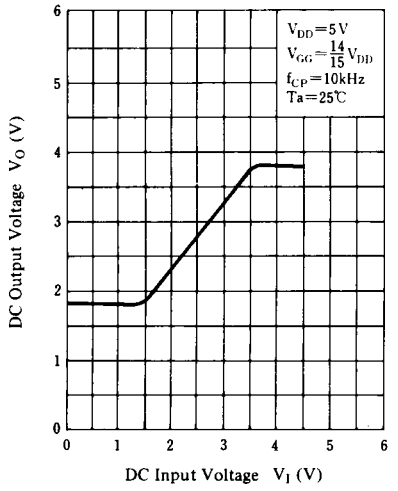
(Top View)

■ Circuit Diagram

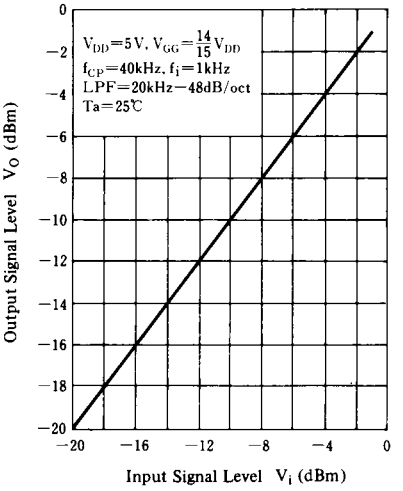


■ Typical Electrical Characteristic Curves

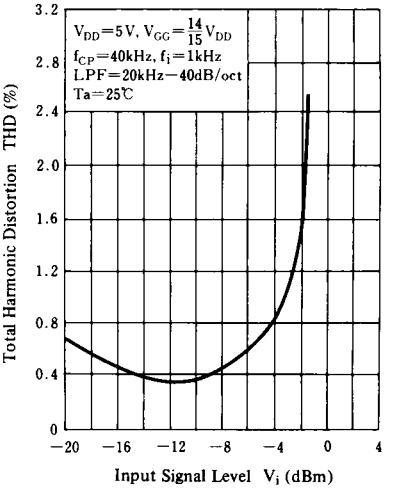
$V_O - V_I$



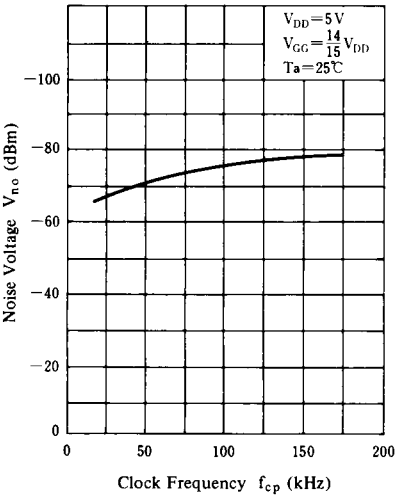
$V_o - V_i$



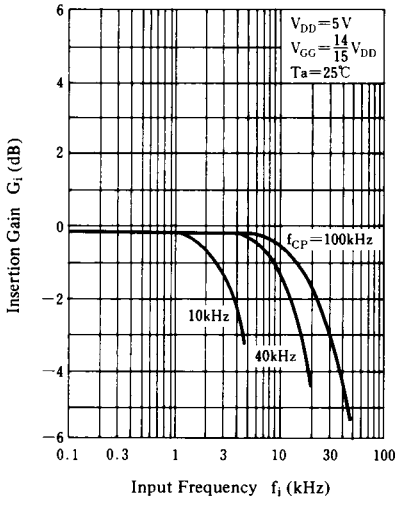
THD − V_i



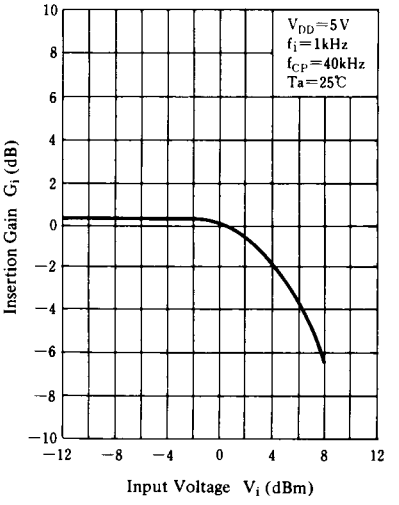
$V_{no} - f_{CP}$



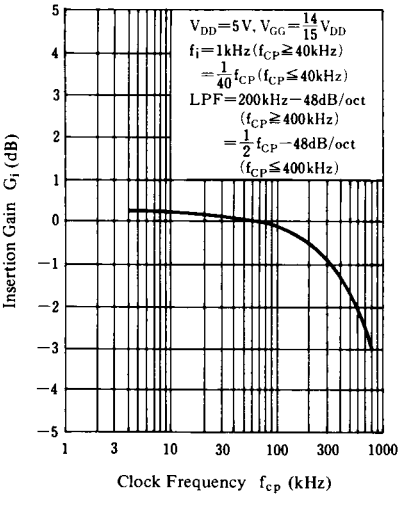
$G_i - f_i$



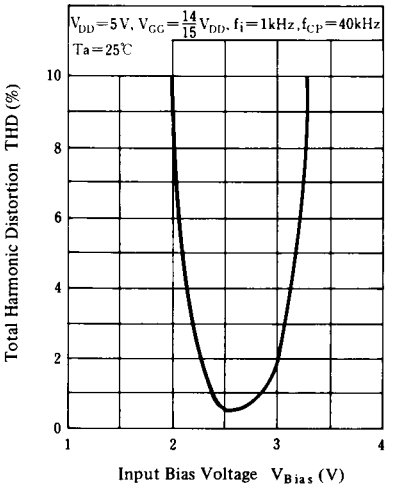
$G_i - V_i$



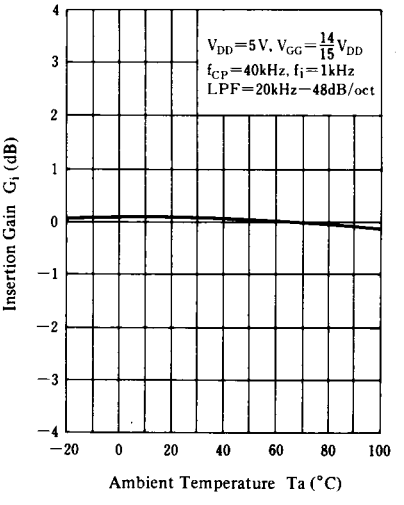
$G_i - f_{CP}$



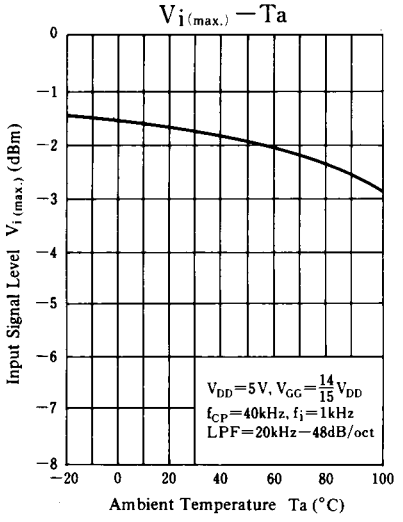
THD − V_{Bias}



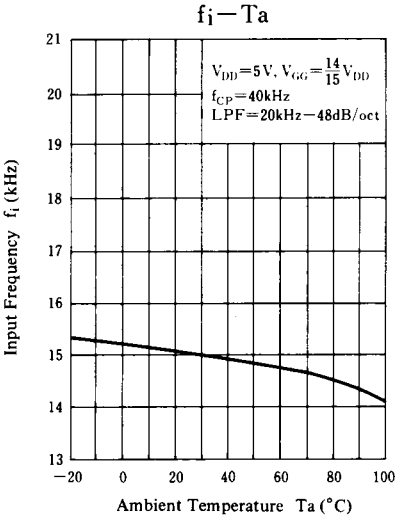
G_i − Ta



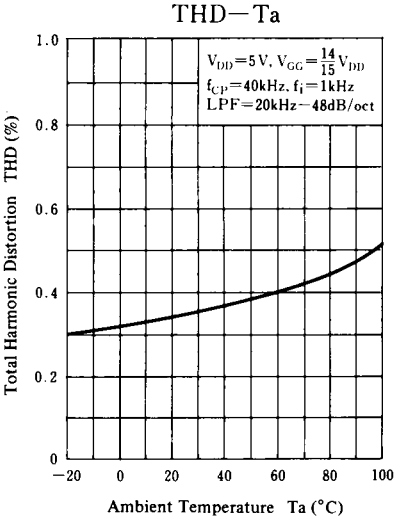
$V_{i(max.)}$ — Ta



f_i — Ta

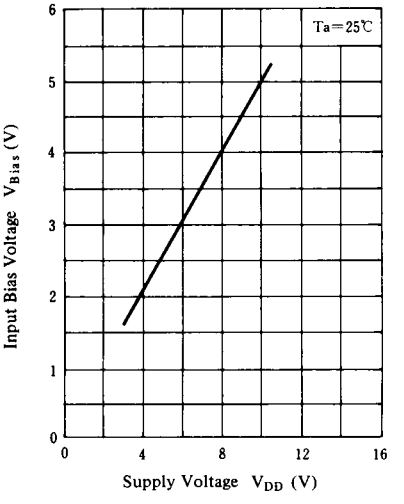


THD — Ta

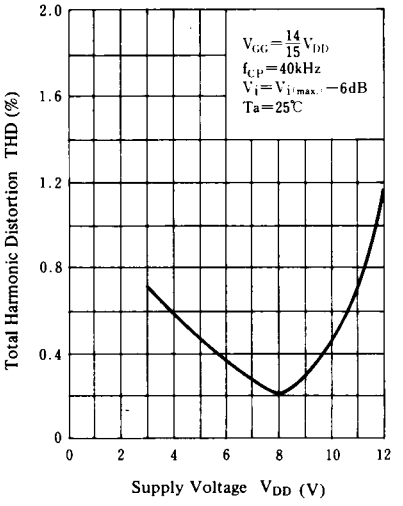


■ Supply Voltage Characteristics

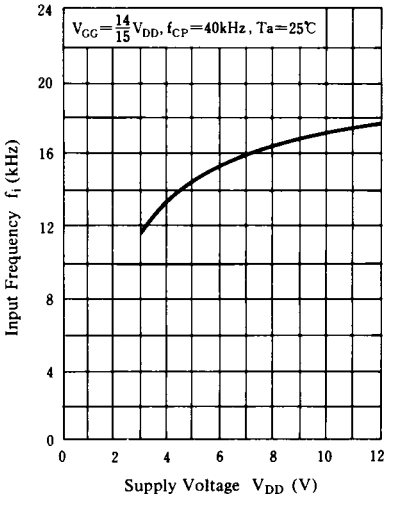
V_{Bias} — V_{DD}



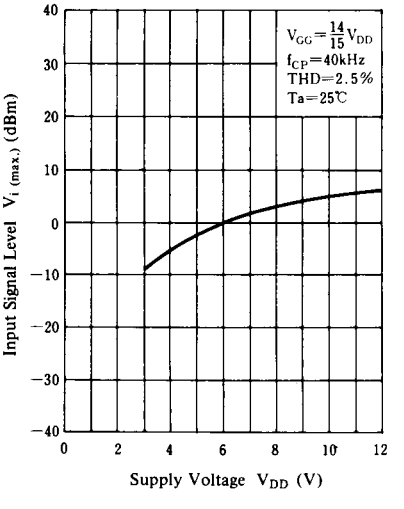
THD — V_{DD}



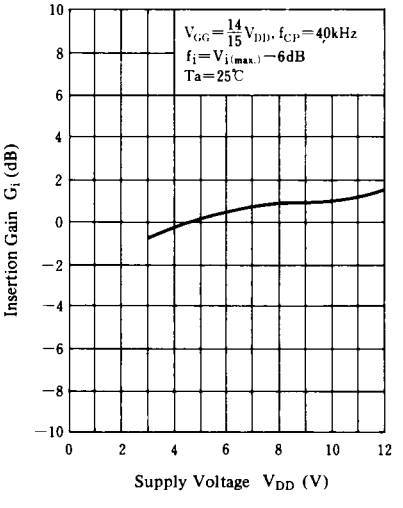
f_i — V_{DD}



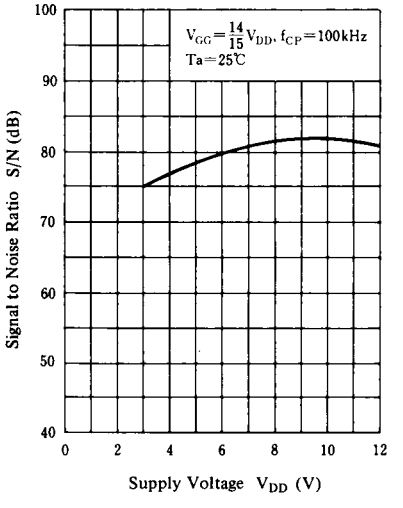
$V_{i(max.)}$ — V_{DD}



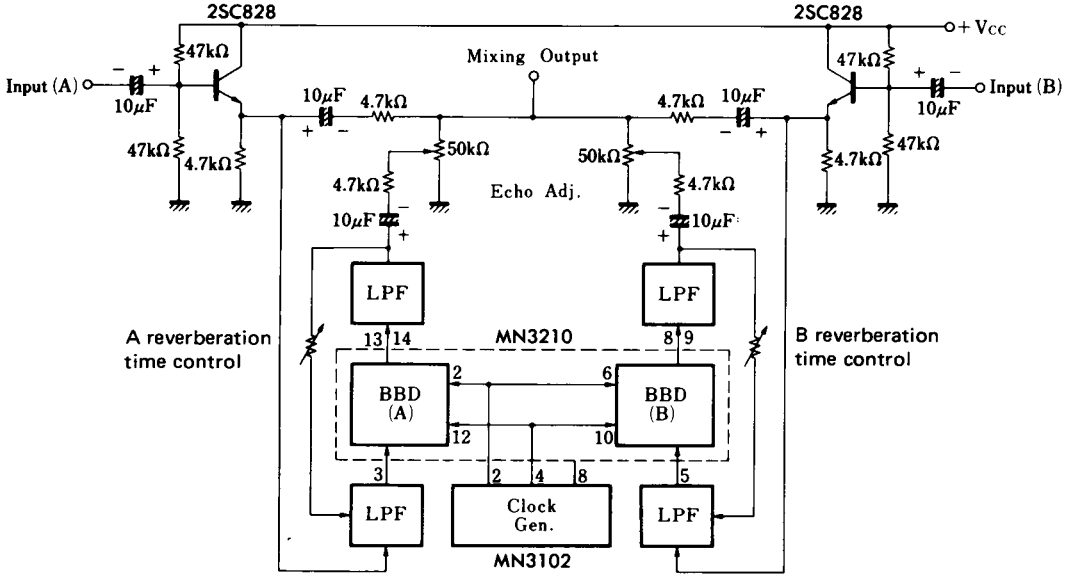
G_i — V_{DD}



S/N — V_{DD}



■ Application Circuit



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