

MIN3009

256-STAGE LOW NOISE BBD

General Description

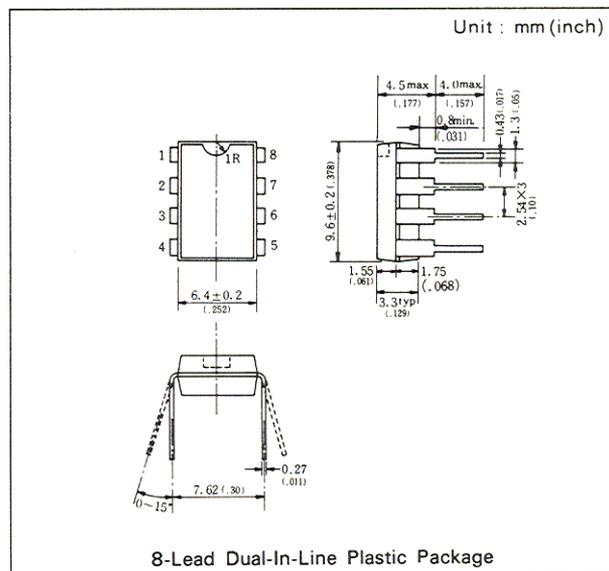
The 3009 is a 256-stage BBD (Bucket Brigade Device) having a wide dynamic range and low distortion characteristics. The 3009 provides a signal delay of up to 12.8msec and is particularly suitable as a device for generation of vibrato and / or chorus effects in electronic musical instruments.

Features:

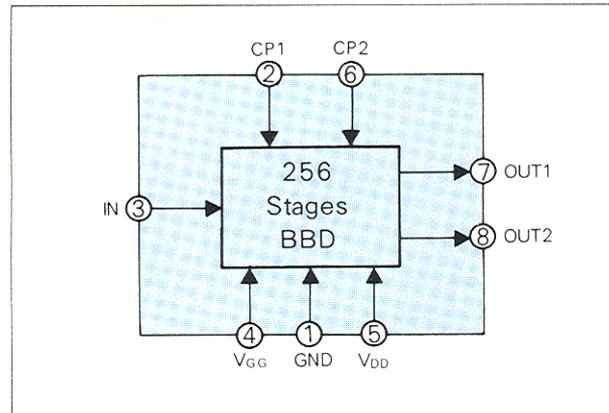
- Variable delay time: 0.64~12.8msec.
- Clock component cancellation capability.
- Low insertion loss: $L_i \approx 0$ dB typ.
- Wide dynamic range: $S/N \approx 88$ dB typ.
- Wide frequency response: $f_i < 14$ kHz.
- Total harmonic distortion: $THD = 0.3\%$ typ. ($V_i = 0.78V_{rms}$)
- Clock frequency range: 10~200kHz.
- P-channel silicon gate, tetrode MOS transistors configuration.
- 8-lead dual-in-line plastic package.

Applications:

- Vibrato and / or chorus effects in electronic organs and 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	0.64~12.8	msec
Total Harmonic Distortion	THD	0.3	%
Signal to Noise Ratio	S/N	88	dB

Absolute Maximum Ratings ($T_a=25^\circ\text{C}$)

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	$^\circ\text{C}$
Storage	T_{stg}	-55 ~ +125	$^\circ\text{C}$

Operating Conditions ($T_a=25^\circ\text{C}$)

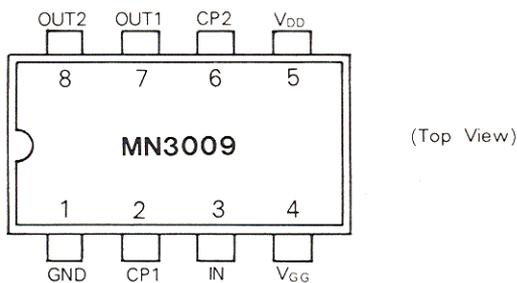
Item	Symbol	Min.	Typ.	Max.	Unit
Drain Supply Voltage	V_{DD}	-14	-15	-16	V
Gate Supply Voltage	V_{GG}		$V_{DD}+1$		V
Clock Voltage "H" Level	V_{CPH}	0		-1	V
Clock Voltage "L" Level	V_{CPL}		V_{DD}		V
Clock Input Capacitance	C_{CP}			200	pF
Clock Frequency	f_{CP}	10		200	kHz
Clock Pulse Width *2	t_{cpw}			$0.5T$ *1	
Clock Rise Time *2	t_{cpr}			500	nsec
Clock Fall Time *2	t_{cpf}			500	nsec
Clock Cross Point	V_x	0		-3	V

*1 $T=1/f_{CP}$ *2 Clock Pulse Waveforms

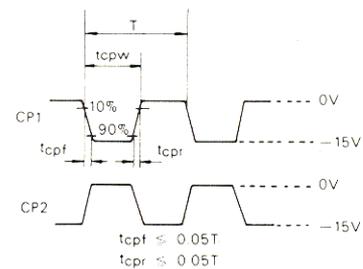
Electrical Characteristics ($T_a=25^\circ\text{C}, V_{DD}=V_{CPL}=-15\text{V}, V_{CPH}=0\text{V}, V_{GG}=-14\text{V}, R_L=100\text{k}\Omega$)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Signal Delay Time	t_d		0.64		12.8	msec
Input Signal Frequency	f_i	$f_{CP}=40\text{kHz}, V_i=1.8\text{Vrms}$ 3dB down (0dB at $f_i=1\text{kHz}$)			14	kHz
Input Signal Swing	V_i	$f_{CP}=40\text{kHz}, f_i=1\text{kHz}, \text{THD}=2.5\%$			1.7	Vrms
Insertion Loss	L_i	$f_{CP}=40\text{kHz}, f_i=1\text{kHz}, V_i=1.8\text{Vrms}$		0		dB
Total Harmonic Distortion	THD	$f_{CP}=40\text{kHz}, f_i=1\text{kHz}, V_i=0.78\text{Vrms}$		0.3		%
Noise	V_{no}	$f_{CP}=100\text{kHz}$ Weighted by "A" curve			150	μVrms
Signal to Noise Ratio	S/N	Maximum output voltage to noise voltage		88		dB

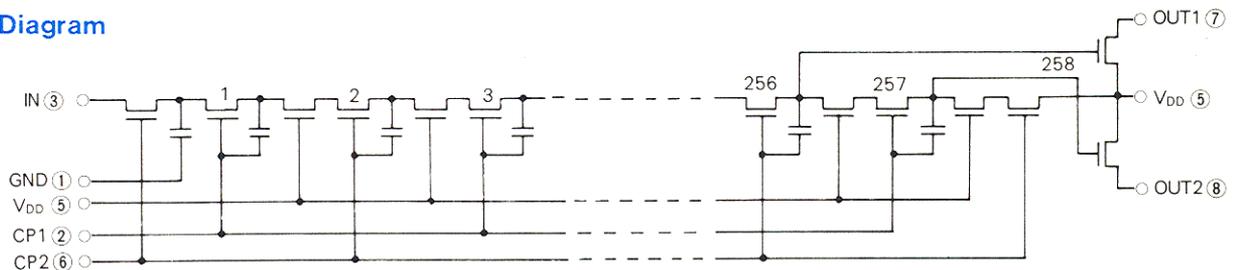
Terminal Assignments



Clock Pulse Waveforms



Circuit Diagram



Typical Electrical Characteristic Curves

