NTE ELECTRONICS, INC.
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NTE894M & NTE894SM
Integrated Circuit
Low Noise Operational Amplifier

Description:

The NTE891M and NTE891SM are single, high–performance, low noise operational amplifiers. Compared to other operational amplifier, these devices show better noise performance, improved output drive capability and considerably higher small–signal and power bandwidths.

This makes the devices especially suitable for applications in high quality and professional audio equipment, in instrumentation and control circuits and telephone channel amplifiers. The OP amps are internally compensated for gain equal to, or higher than, three.

Features:
- Small–Signal Bandwidth
- Large Supply Voltage Range
- Available in 8–Lead Mini DIP (NTE894M) and Surface Mount SOIC–8 (NTE894SM)

Applications:
- Audio Equipment
- Instrumentation and Control Circuits
- Telephone Channel Amplifiers
- Medical Equipment

Absolute Maximum Ratings:

Supply Voltage, V_S . . . . ±22V
Differential Input Voltage (Note 1), V_{DIFF} . . . . ±0.5V
Input Voltage, V_{IN} . . . . ±V supply V
Power Dissipation (T_A = +25°C, Note 2), P_D 1150mW
Output Short–Circuit Duration (Note 3) . . . . Indifinite
Operating Temperature Range, T_{opr} . . . . 0° to +70°C
Storage Temperature Range, T_{stg} . . . . –65° to +150°C
Lead Soldering Temperature (10 seconds), T_L . . . . +300°C

Note 1. Diodes protect the inputs against over voltage. Therefore, unless current limiting resistors are used, large currents will flow if the differential input voltage exceeds 0.6V. maximum current should be limited to ±10mA.
Note 2. For operation at elevated temperature, derate packages based on the following junction–to–ambient thermal resistance: NTE894M 105°C/W; NTE894SM 160°C/W.
Note 3. Output may be shorted to GND at V_S = 15V, T_A = +25°C. Temperature and/or supply voltages must be limited to ensure dissipation rating is not exceeded.

DC Electrical Characteristics: (T_A = +25°C, V_S = ±15V, unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Input Offset Voltage	V_{OS}			–	0.5	4	mV
		T_A = 0° to +70°C		–	–	5	mV
	$\Delta V_{OS}/\Delta T$			–	5	–	µV/°C
Input Offset Current	I_{OS}			–	20	300	nA
		T_A = 0° to +70°C		–	–	400	nA
	$\Delta I_{OS}/\Delta T$			–	200	–	pA/°C
Input Bias Current	I_B			–	500	1500	nA
		T_A = 0° to +70°C		–	–	2000	nA
	$\Delta I_B/\Delta T$			–	5	–	nA/°C
Supply Current	I_{CC}			–	4	8	mA
		T_A = 0° to +70°C		–	–	10	mA
Input Common–Mode Range	V_{CM}			±12	±13	–	V
Common–Mode Rejection Ratio	CMRR			70	100	–	dB
Power Supply Rejection Ratio	PSRR			–	10	100	µV/V
Large–Signal Voltage Gain	A_{VOL}	$R_L \geq 600\Omega$, V_O = ±10V		25	100	–	V/mV
			T_A = 0° to +70°C	15	–	–	V/mV
Output Voltage Swing	V_{OUT}	$R_L \geq 600\Omega$		±12	±13	–	V
			T_A = 0° to +70°C	±10	±12	–	V
		$R_L \geq 600\Omega$, V_O = ±18V		±15	±16	–	V
		$R_L \geq 2k\Omega$		±13	±13.5	–	V
			T_A = 0° to +70°C	±12	±12.5	–	V
Input Resistance	R_{IN}			50	100	–	kΩ
Output Short–Circuit Current	I_{SC}			–	38	–	mA

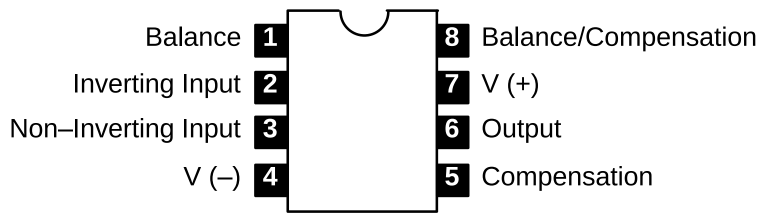
AC Electrical Characteristics: (T_A = +25°C, V_S = ±15V unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Resistance	R_{OUT}	A_V = 30dB, Closed–Loop, f = 10kHz, R_L = 600Ω, C_C = 22pF	–	0.3	–	Ω
Transient Response		Voltage Follower, V_{IN} = 50mV, R_L = 600Ω, C_C = 22pF, C_L = 100pF				
Rise Time	t_R		–	20	–	ns
Overshoot			–	20	–	%
Transient Response		V_{IN} = 50mV, R_L = 600Ω, C_C = 47pF, C_L = 500pF				
Rise Time	t_R		–	50	–	ns
Overshoot			–	35	–	%
Gain	A_V	f = 10kHz, C_C = 0	–	6	–	V/mV
		f = 10kHz, C_C = 22pF	–	2.2	–	V/mV
Gain Bandwidth Product	GBW	C_C = 22pF, C_L = 100pF	–	10	–	MHz
Slew Rate	SR	C_C = 0	–	13	–	V/µs
		C_C = 22pF	–	6	–	V/µs
Power Bandwidth		V_{OUT} = ±10V, C_C = 0	–	200	–	kHz
		V_{OUT} = ±10V, C_C = 22pF	–	95	–	kHz
		V_{OUT} = ±14V, R_L = 600Ω, C_C = 22pF, V_{CC} = ±18V	–	70	–	kHz

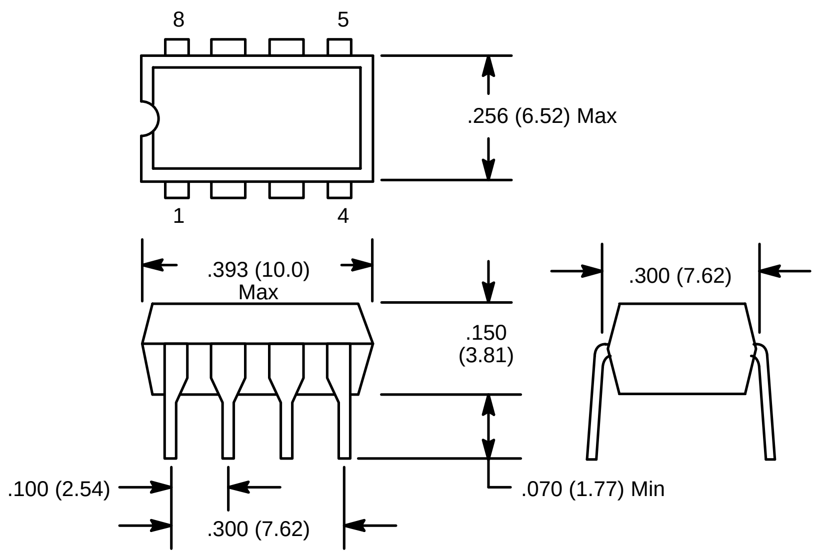
Electrical Characteristics: (T_A = +25°C, V_S = 15V unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Noise Voltage	V_{NOISE}	f_O = 30Hz	–	5.5	7.0	$nV\sqrt{Hz}$
		f_O = 1kHz	–	3.5	4.5	$nV\sqrt{Hz}$
Input Noise Current	I_{NOISE}	f_O = 30Hz	–	1.5	–	$pA\sqrt{Hz}$
		f_O = 1kHz	–	0.4	–	$pA\sqrt{Hz}$
Broadband Noise Figure		f = 10Hz to 20kHz, R_S = 5kΩ	–	0.9	–	dB
Channel Separation		f = 1kHz, R_S = 5kΩ	–	110	–	dB

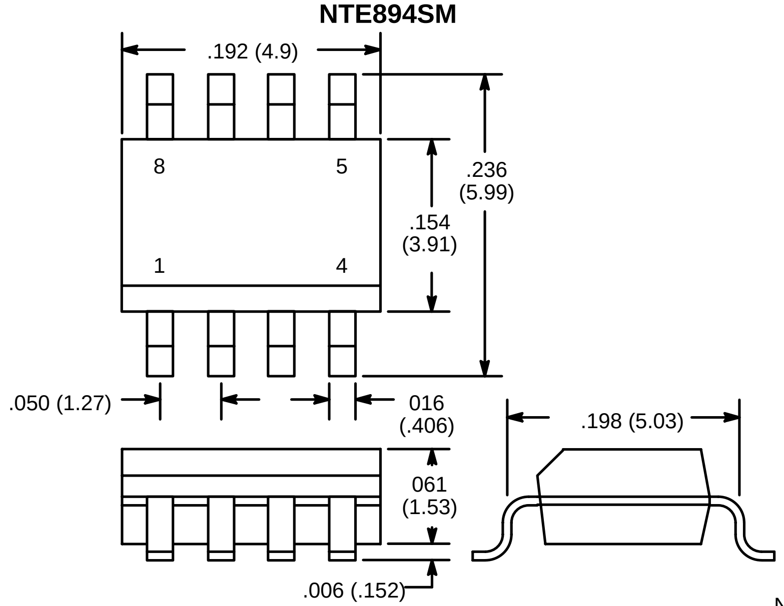
Pin Connection Diagram



NTE894M



NTE894SM



NOTE: Pin1 on Beveled Edge