

March 1987

LM387/LM387A Low Noise Dual Preamp

General Description

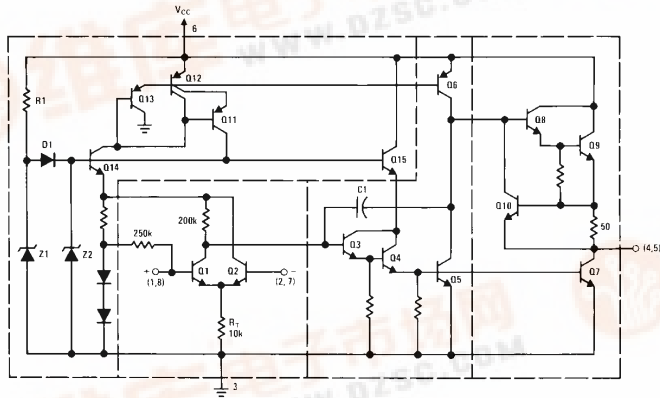
The LM387 is a dual preamplifier for the amplification of low level signals in applications requiring optimum noise performance. Each of the two amplifiers is completely independent, with an internal power supply decoupler-regulator, providing 110 dB supply rejection and 60 dB channel separation. Other outstanding features include high gain (104 dB), large output voltage swing ($V_{CC} - 2V$)p-p, and wide power bandwidth (75 kHz, 20 Vp-p). The LM387A is a selected version of the LM387 that has lower noise in a NAB tape circuit, and can operate on a larger supply voltage. The LM387 operates from a single supply across the wide range of 9V to 30V, the LM387A operates on a supply of 9V to 40V.

The amplifiers are internally compensated for gains greater than 10. The LM387, LM387A is available in an 8-lead dual-in-line package. The LM387, LM387A is biased like the LM381. See AN-64 and AN-104.

Features

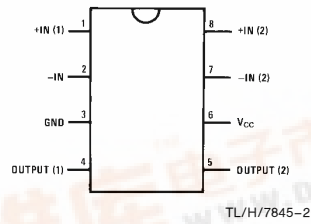
- Low noise 1.0 μ V total input noise
- High gain 104 dB open loop
- Single supply operation
- Wide supply range LM387 9 to 30V
LM387A 9 to 40V
- Power supply rejection 110 dB
- Large output voltage swing ($V_{CC} - 2V$)p-p
- Wide bandwidth 15 MHz unity gain
- Power bandwidth 75 kHz, 20 Vp-p
- Internally compensated
- Short circuit protected
- Performance similar to LM381

Schematic and Connection Diagrams



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Dual-In-Line Package

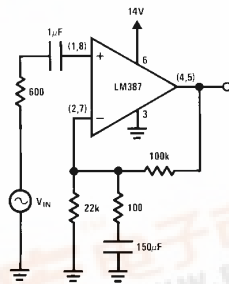


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Top View

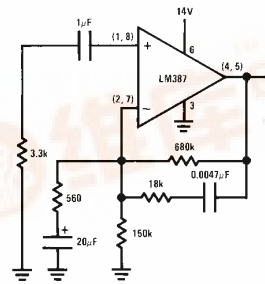
Order Number LM387N or LM387AN
See NS Package Number N08E

Typical Applications



TL/H/7845-3

FIGURE 1. Flat Gain Circuit ($A_V = 1000$)



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FIGURE 2. NAB Tape Circuit

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Absolute Maximum Ratings

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	
LM387	+30V
LM387A	+40V

Power Dissipation (Note 1)	1.5W
Operating Temperature Range	0°C to +70°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10 sec.)	260°C

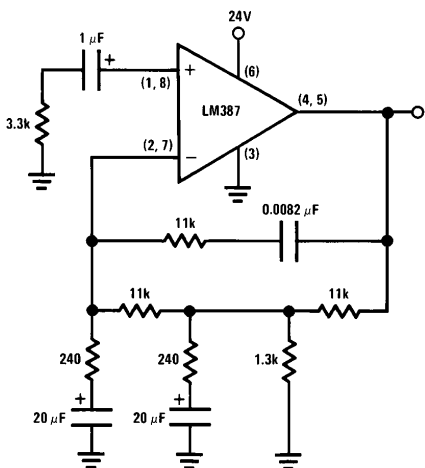
Electrical Characteristics $T_A = 25^\circ\text{C}$, $V_{CC} = 14\text{V}$, unless otherwise stated

Parameter	Conditions	Min	Typ	Max	Units
Voltage Gain	Open Loop, $f = 100\text{ Hz}$		160,000		V/V
Supply Current	LM387, $V_{CC} 9\text{V}-30\text{V}$, $R_L = \infty$ LM387A, $V_{CC} 9\text{V}-40\text{V}$, $R_L = \infty$		10 10		 mA mA
Input Resistance					
Positive Input		50	100		k Ω
Negative Input			200		k Ω
Input Current					
Negative Input			0.5	3.1	μA
Output Resistance	Open Loop		150		Ω
Output Current	Source Sink		8 2		 mA mA
Output Voltage Swing	Peak-to-Peak		$V_{CC}-2$		V
Unity Gain Bandwidth			15		MHz
Large Signal Frequency Response	20 Vp-p ($V_{CC} > 24\text{V}$), THD $\leq 1\%$		75		kHz
Maximum Input Voltage	Linear Operation			300	mVrms
Supply Rejection Ratio	$f = 1\text{ kHz}$			110	dB
Input Referred					
Channel Separation	$f = 1\text{ kHz}$	40	60		dB
Total Harmonic Distortion	60 dB Gain, $f = 1\text{ kHz}$		0.1	0.5	%
Total Equivalent Input Noise (Flat Gain Circuit)	10 Hz-10,000 Hz LM387 Figure 1		1.0	1.2	μVrms
Output Noise NAB Tape Playback Circuit Gain of 37 dB	Unweighted LM387A Figure 2		400	700	μVrms

Note 1: For operation in ambient temperatures above 25°C, the device must be derated based on a 150°C maximum junction temperature and a thermal resistance of 80°C/W junction to ambient.

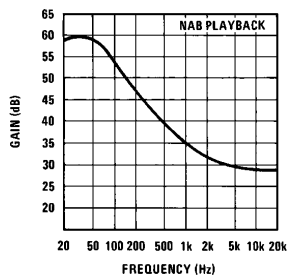
Typical Applications (Continued)

Two-Pole Fast Turn-ON NAB Tape Preamp



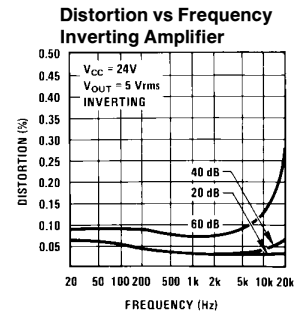
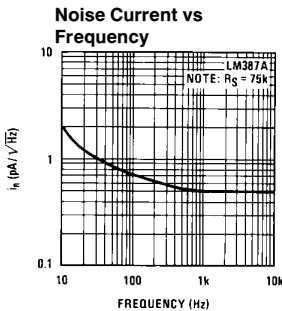
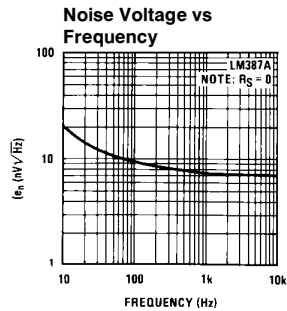
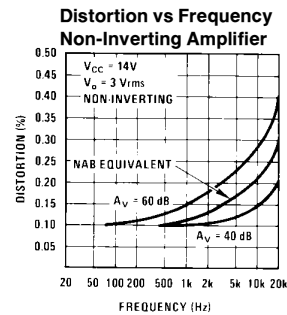
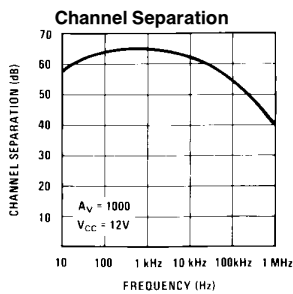
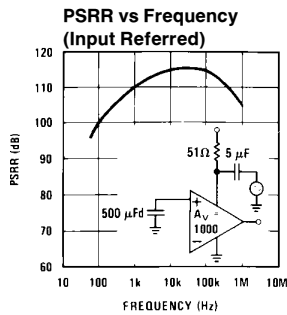
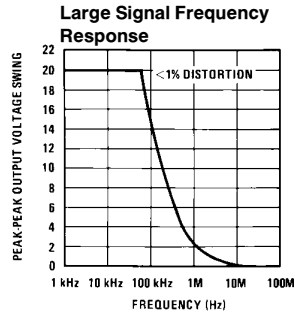
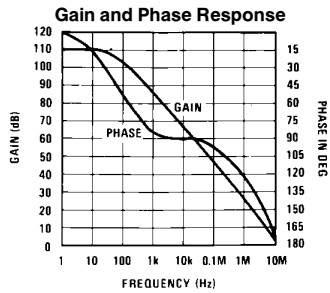
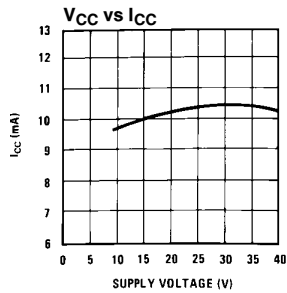
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Frequency Response of NAB Circuit of Figure 2



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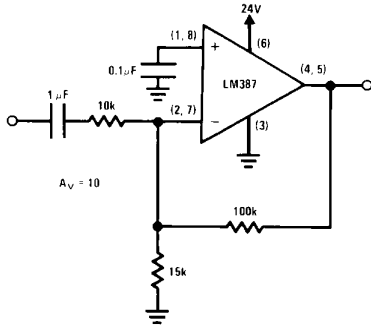
Typical Performance Characteristics



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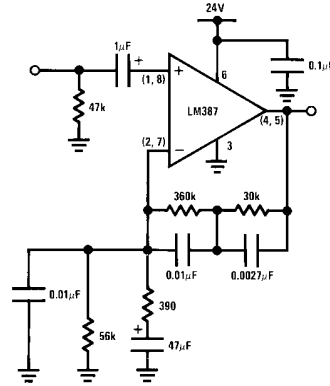
Typical Applications (Continued)

Inverting Amplifier Ultra-Low Distortion



TL/H/7845-8

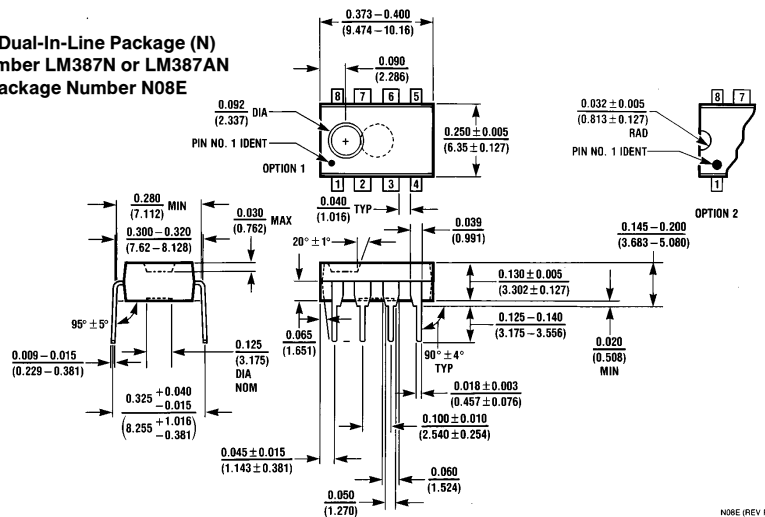
Typical Magnetic Phono Preamplifier



TL/H/7845-9

Physical Dimensions inches (millimeters)

Molded Dual-In-Line Package (N)
Order Number LM387N or LM387AN
NS Package Number N08E



N08E (REV F)

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



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