

# LM1800 Phase-Locked Loop FM Stereo Demodulator

## General Description

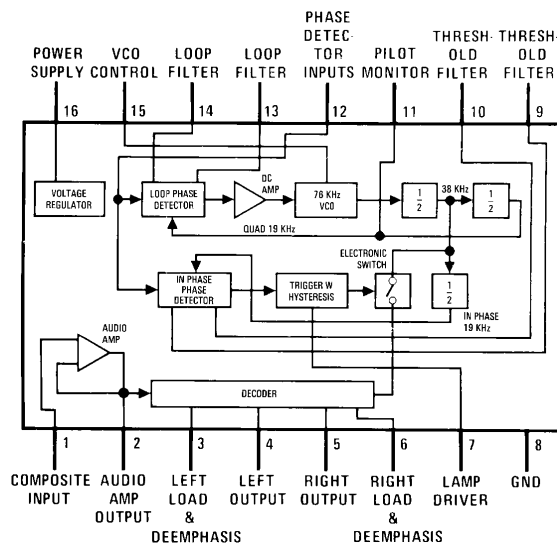
The LM1800 is a second generation integrated FM stereo demodulator using phase locked loop techniques to regenerate the 38 kHz subcarrier. The numerous features integrated on the die make possible a system delivering high fidelity sound while still meeting the cost requirements of inexpensive stereo receivers. More information available in AN-81.

## Features

- Automatic stereo/monaural switching
- 45 dB power supply rejection
- No coils, all tuning performed with single potentiometer
- Wide operating supply voltage range
- Excellent channel separation
- Emitter follower output buffers

## Connection Diagram

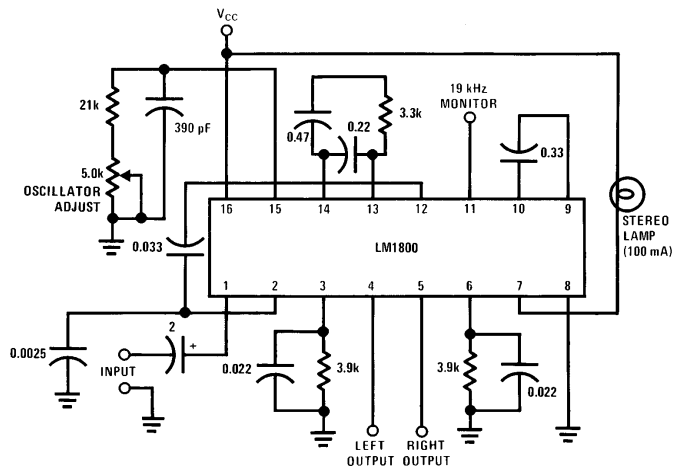
Order Number LM1800N  
See NS Package Number N16A



Top View

TL/H/7888-1

## Typical Application



TL/H/7888-2

## Absolute Maximum Ratings

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

Supply Voltage 18V  
Power Dissipation (Note 3) 1500 mW

Operating Temperature Range 0°C to +70°C  
Operating Supply Voltage Range +10V to +18V  
Storage Temperature Range –65°C to +150°C  
Lead Temperature (Soldering, 10 sec) 260°C

## Electrical Characteristics (Note 1)

Parameter	Conditions	Min	Typ	Max	Units
Supply Current	Lamp "Off"		21	30	mA
Lamp Driver Saturation	100 mA Lamp Current		1.3	1.8	V
Lamp Driver Leakage			1.0		nA
Pilot Level for Lamp "ON"	Pin 11 Adjusted to 19.00 kHz		15	20	mVrms
Pilot Level for Lamp "OFF"	Pin 11 Adjusted to 19.00 kHz	3.0	7.0		mVrms
Stereo Lamp Hysteresis		3.0	6.0		dB
Stereo Channel Separation	100 Hz (Note 2)	30	40		dB
	1000 Hz (Note 2)		45		dB
	10000 Hz (Note 2)		45		dB
Monaural Channel Unbalance	200 mVrms, 1000 Hz Input		0.3	1.5	dB
Monaural Voltage Gain	200 mVrms, 400 Hz Input	140	200	260	mVrms
Total Harmonic Distortion	500 mVrms, 1000 Hz Input		0.4	1.0	%
Total Harmonic Distortion	500 mVrms, 1000 Hz Input, 1800A Only		0.1	0.3	%
Capture Range	25 mVrms of Pilot	± 2.0		± 6.0	% of $f_o$
Supply Ripple Rejection	200 mVrms of 200 Hz Ripple	35	45		dB
Dynamic Input Resistance		20	45		k $\Omega$
Dynamic Output Resistance		900	1300	2000	$\Omega$
SCA Rejection	(Note 4)		70		dB
Ultrasonic Freq. Rejection	Combined 19 and 38 kHz, Ref. to Output		33		dB

**Note 1:**  $T_A = 25^\circ\text{C}$  and  $V^+ = 12\text{V}$  unless otherwise stated.

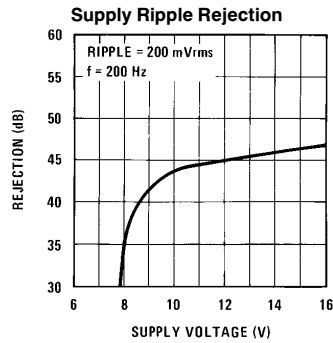
**Note 2:** The stereo input signal is made by summing 123 mVrms LEFT or RIGHT modulated signal with 25 mVrms of 19 kHz pilot tone, measuring all voltages with an average responding meter calibrated in rms. The resulting waveform is about 800 mVp-p.

**Note 3:** For operation in ambient temperatures above  $25^\circ\text{C}$ , the device must be derated based on a  $150^\circ\text{C}$  maximum junction temperature and a thermal resistance of  $80^\circ\text{C/W}$  junction to ambient.

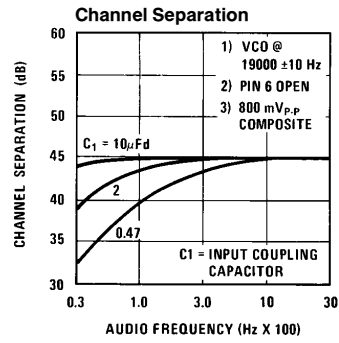
**Note 4:** Measured with a stereo composite signal consistency of 80% stereo, 10% pilot and 10% SCA as defined in the FCC Rules on Broadcasting.

**Note 5:** VCO "OFF" curve represents the distortion attainable using good 19 kHz and 38 kHz filters.

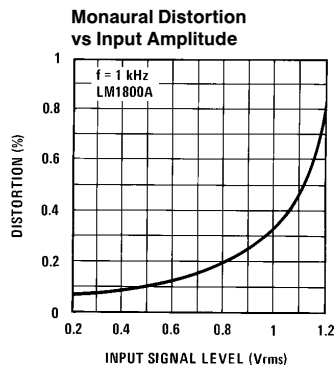
## Typical Performance Characteristics



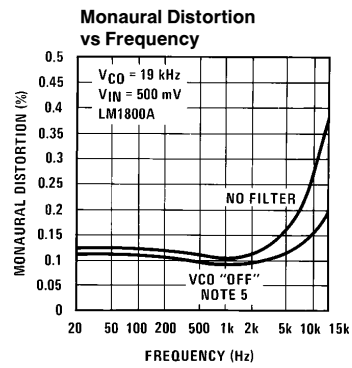
TL/H/7888-3



TL/H/7888-4



TL/H/7888-5



TL/H/7888-6


**Molded Dual-In-Line Package (N)**  
**Order Number LM1800N**  
**NS Package Number N16A**

N16A (REV F)

## LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
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.

 <b>National Semiconductor Corporation</b> 1111 West Bardin Road Arlington, TX 76010 Tel: (800) 272-9959 Fax: (1800) 737-7018	<b>National Semiconductor Europe</b> Fax: (+49) 0-180-530 85 86 Email: <a href="mailto:cnjw@tev2m2.nsc.com">cnjw@tev2m2.nsc.com</a> Deutsch: Tel: (+49) 0-180-530 85 85 English: Tel: (+49) 0-180-532 78 32 Français: Tel: (+49) 0-180-532 93 58 Italiano: Tel: (+49) 0-180-534 16 80	<b>National Semiconductor Hong Kong Ltd.</b> 13th Floor, Straight Block, Ocean Centre, 5 Canton Rd. Tsimshatsui, Kowloon Hong Kong Tel: (852) 2737-1600 Fax: (852) 2736-9960	<b>National Semiconductor Japan Ltd.</b> Tel: 81-04-299-2309 Fax: 81-04-299-2408
--	---	--	--