

STEREO DEMODULATOR WITH BLEND

LM1870

DESCRIPTION

The LM1870 combination FM Stereo Demodulator and Blend Circuit is a PLL circuit with a D.C. control pin whose purpose is to reduce switching noise by decreasing separation under low signal amplitude conditions. The part is designed specifically for automobile applications where fluctuating signal strength can cause demodulation noise.

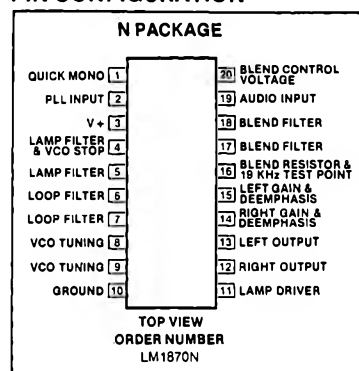
FEATURES

- Stereo blend control
- Wide input dynamic range
- Low total harmonic distortion
- VCO disable function
- Monophonic override pin
- Supply range 7V-15V

APPLICATIONS

- Auto radios
- High fidelity tuners
- High performance portable radios
- Electronic tuned radios

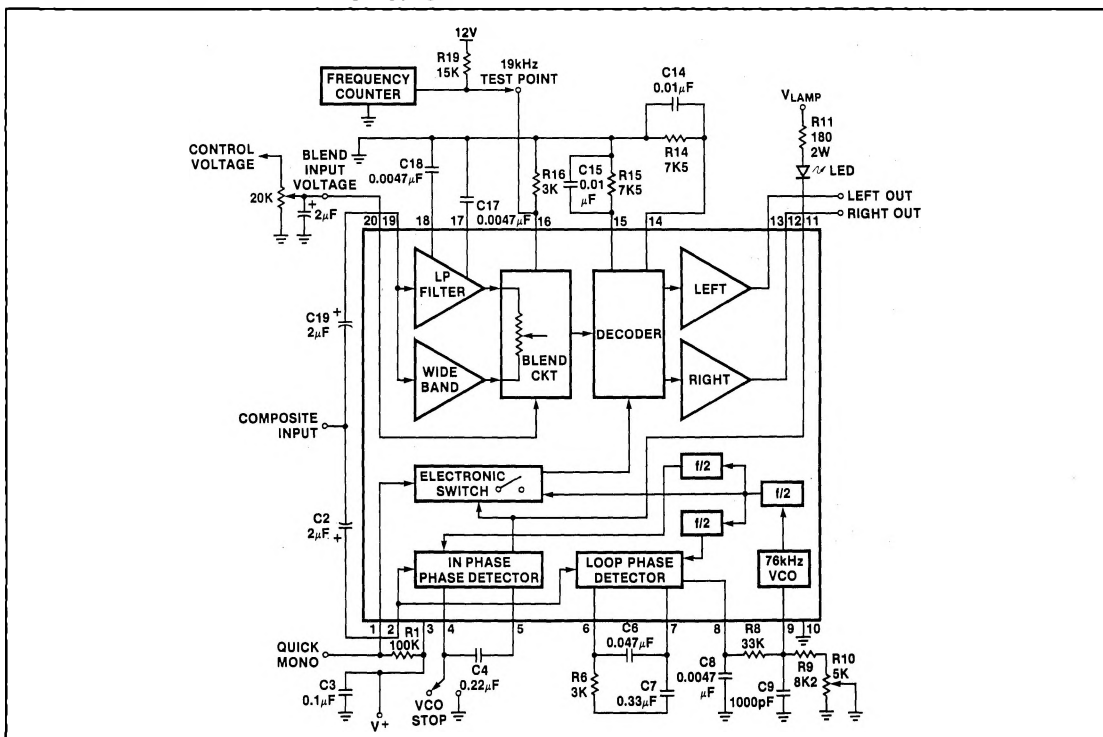
PIN CONFIGURATION



ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNIT
Supply voltage, pin 3	15	V
Lamp driver voltage, pin 11	18	V
Output voltage, pin 12, 13 supply off	7	V
Quick mono input (pin 20)	V + (pin 3)	
Blend input (pin 20)	15	V
Operating temperature range	0°C to +70°C	
Power dissipation (note 1)	1	W
Storage temperature	-65°C to +125°C	
Lead temperature (soldering, 10 seconds)	300°C	

TYPICAL APPLICATION AND TEST CIRCUIT



STEREO DEMODULATOR WITH BLEND**LM1870****DC ELECTRICAL CHARACTERISTICS** $T_A = 25^\circ\text{C}$, $V^+ = 8\text{V}$ unless otherwise noted (Figure 1)

SYMBOL AND PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Operating supply voltage		7	8	15	V
Supply current			26	45	mA
Input DC voltage	Pin 19		4		V
Input DC voltage	Pin 2		1.8		V
Supply rejection		15	30		dB
Lamp leakage current	Lamp off, pin 11 = 16V		0.1	100	μA
Lamp saturation voltage	Lamp on, pin 11 @ 75mA		1.4	2.0	V
VCO stop voltage	Voltage @ pin 4 to stop VCO	0.2	0.4		V
VCO stop current	Pin 4 = 0.2V		-30	-100	μA
Blend input bias current			-2	-20	μA
Quick mono switch voltage			4		V
Quick mono bias current	Pin 1 = 8V		2		μA
Output leakage	Pin 12 or 13 = 6.5V, pin 3 = 0V		0.1	20	μA

AUDIO ELECTRICAL CHARACTERISTICS

SYMBOL AND PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Mono gain	1kHz	-4	-1	+2	dB
Mono THD	1kHz @ 200mVrms		0.05	0.25	%
Channel balance			± 0.4	± 1.5	dB
Gain shift	Mono to stereo		± 0.1	± 1.0	dB
Channel separation	Pin 20 $\geq 1.1\text{V}$	30	45		dB
Output DC shift	Mono to stereo		± 15	± 100	mV
Input resistance	Pin 19	20	40		k Ω
Output resistance	Pin 12, 13		65	200	Ω
Ultrasonic rejection	19kHz + 38kHz		30		dB
SCA rejection	(Note 2)		70		dB
Signal to noise	1kHz @ 200mVrms MONO		68		dB

PLL ELECTRICAL CHARACTERISTICS

SYMBOL AND PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Lamp ON voltage	19kHz on pin 2		15	20	mV
Lamp OFF voltage	19kHz on pin 2	2.5	5		mV
Lamp hysteresis			10		dB
Capture range	25mVrms on pin 2	± 2	± 4	± 6	%
Hold in range	25mVrms on pin 2		± 12		%
Input resistance	Pin 2	8	14		k Ω

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BLEND ELECTRICAL CHARACTERISTICS

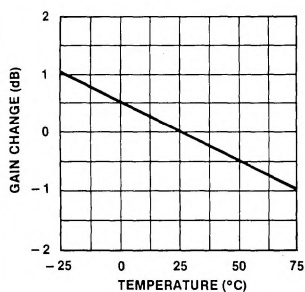
SYMBOL AND PARAMETER	TEST CONDITIONS (Pin 20 from 1.1V to 0.2V)	MIN	TYP	MAX	UNIT
Stereo gain change	1kHz L = - R input	- 25	- 35		dB
Mono gain change	1kHz L = R input	- 1.5	- 0.5	0.5	dB
	10kHz L = R input	- 8	- 14	- 20	dB
Output DC shift			± 40	± 100	mV

NOTES

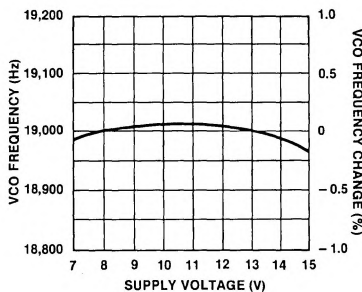
- For operation in ambient temperatures above 25°C, the device must be derated based on a 150°C maximum junction temperature and a thermal resistance of 125°C/W junction to ambient.
- Input is 10% SCA (74.5kHz), 9% pilot and 1kHz left or right. Rejection is ratio of 1kHz output to 1.5kHz output.

TYPICAL CHARACTERISTICS

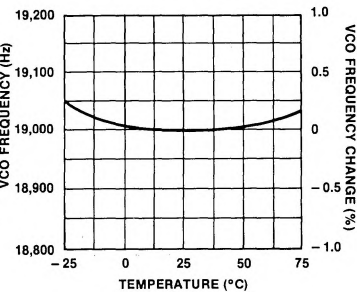
GAIN CHANGE vs TEMPERATURE



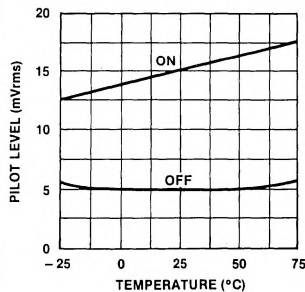
VCO SUPPLY SENSITIVITY



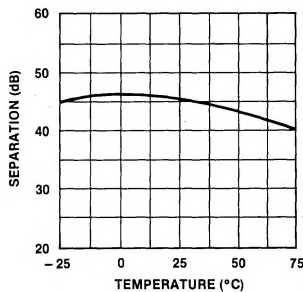
VCO TEMPERATURE STABILITY



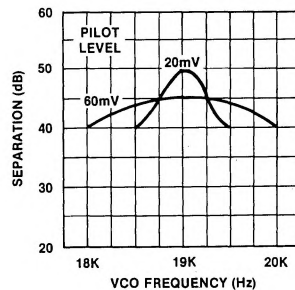
LAMP ON/OFF vs TEMPERATURE



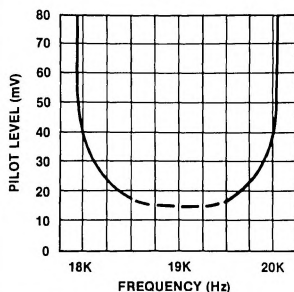
SEPARATION vs TEMPERATURE



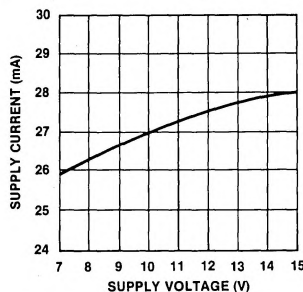
SEPARATION vs VCO TUNING



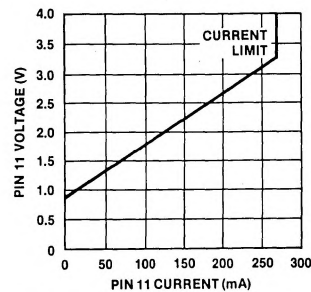
CAPTURE RANGE vs PILOT LEVEL



SUPPLY CURRENT vs SUPPLY VOLTAGE



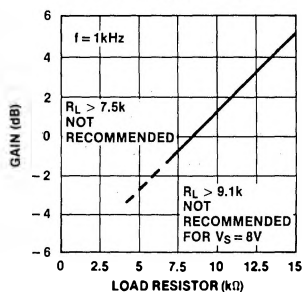
LAMP DRIVER VOLTAGE vs CURRENT



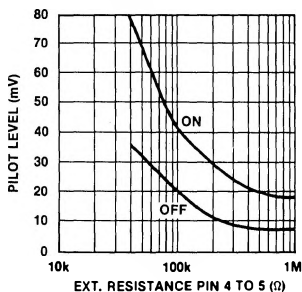
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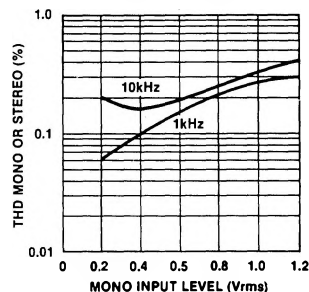
GAIN vs R_L (PIN 14, 15)



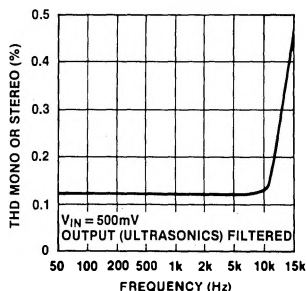
**LAMP ON/OFF vs RESISTANCE
PIN 4 TO 5**



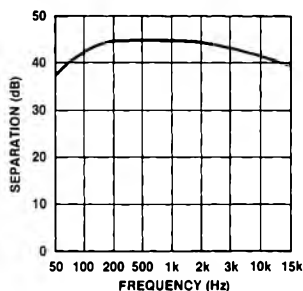
**TOTAL HARMONIC DISTORTION
vs INPUT LEVEL**



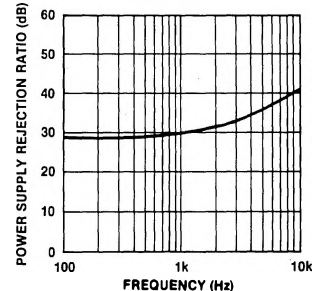
**TOTAL HARMONIC DISTORTION
vs FREQUENCY**



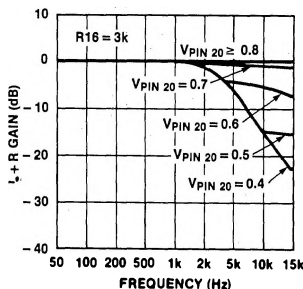
SEPARATION vs FREQUENCY



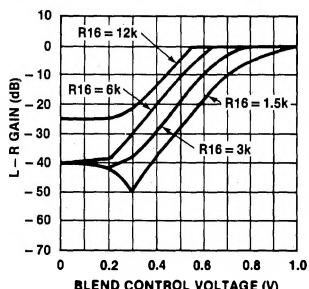
**POWER SUPPLY REJECTION RATIO
vs FREQUENCY**



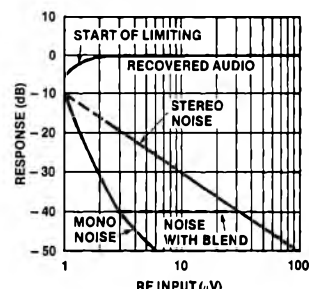
**L + R FREQUENCY RESPONSE WITH
BLEND CONTROL**



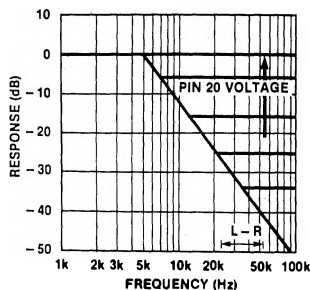
L - R GAIN vs BLEND CONTROL



**TYPICAL RADIO QUIETING
CHARACTERISTIC**



BLEND FILTER RESPONSE



**L - R GAIN AND SEPARATION vs
RF INPUT LEVEL WITH BLEND**

