

**LA3335M**
**PLL FM Multiplex Demodulator
for 3 V Headphone Stereos and
Radio-cassette Recorders**

Overview

The LA3335M is PLL FM stereo multiplex demodulator IC designed for use in headphone stereos, etc. which operate from a low supply voltage.

Applications

- FM Multiplex IC for 3 V headphones, radio-cassette recorders

Functions

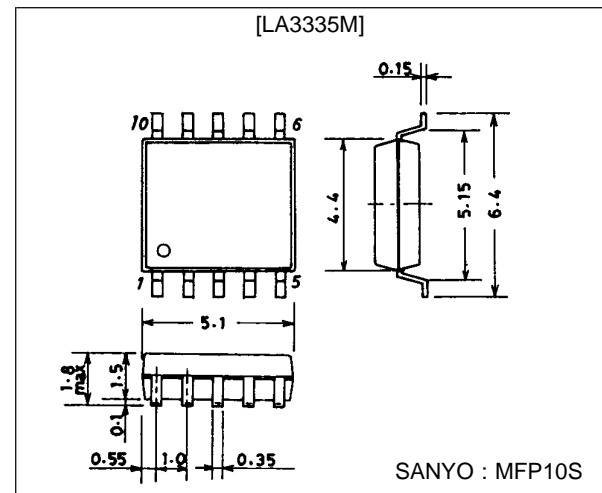
- PLL FM stereo decoder, VCO stop, stereo indicator

Features

- Wide operating voltage range : 1.8 to 6 V
- Low current dissipation : 1.6 mA
- Minimum number of external parts required

Package Dimensions

unit : mm

3086A-MFP10S

Specifications

Maximum Ratings at $T_a = 25\text{ }^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\text{ max}}$		8	V
Lamp drive current	$I_L\text{ max}$		10	mA
Allowable power dissipation	$P_d\text{ max}$	$T_a \leq 70\text{ }^\circ\text{C}$	50	mW
Operating temperature	T_{op}		-20 to +70	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +125	$^\circ\text{C}$

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

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		3	V
Operating voltage range	$V_{CC\text{ op}}$		1.8 to 6	V
Input signal voltage	V_{IN}		150	mV

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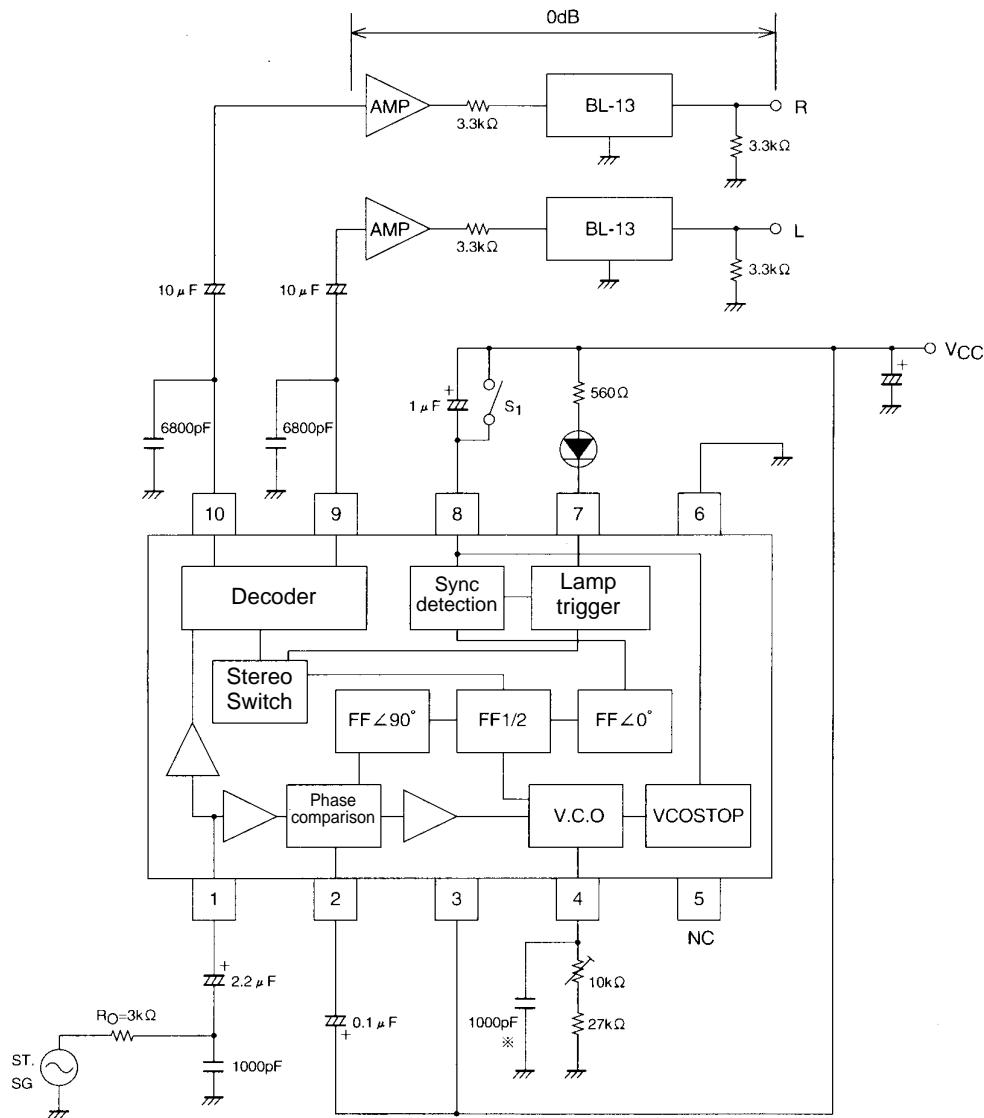
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Operating Characteristics at $T_a = 25\text{ }^\circ\text{C}$, $V_{CC} = 3\text{ V}$, input 150 mV , $L + R = 90\%$, pilot = 10% , $f = 1\text{ kHz}$, See specified Test Circuit.

Parameter	Symbol	Conditions	min	typ	max	Unit
Quiescent current	I_{CCO}	No input		1.6	2.5	mA
Input resistance	R_i		35	50	65	$k\Omega$
Output resistance	R_o		5.3	7.5	9.7	$k\Omega$
Channel separation	CHsep		30	45		dB
Total harmonic distortion	THD	Monaural		0.6	1.5	%
		Stereo main		0.3	1.5	%
Output voltage	V_O	Monaural	90	130	180	mV
Channel balance	CB	Monaural		0	1.5	dB
Lamp lighting level	V_L	Pilot	1.5	3.5	6	mV
Lamp hysteresis	hy			3.5		dB
Capture range	CR	Pilot 15 mV		± 3		%
Allowable input level	$V_{IN\text{ max}}$	Monaural, THD = 5%		350		mV
Signal to noise ratio	S/N	Monaural		82		dB

Equivalent Circuit Block Diagram and Test Circuit



S1: VCO STOP when ON

AMP: Bandwidth of 100 kHz or more, THD = 0.01% or less, input impedance of 330 $k\Omega$ or more

* Styrol capacitor


A06081

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External Parts

Part Name	Symbol	Kind	Value	Remarks
Resistor	R1	Carbon resistor	27 k Ω	VCO time constant
	R2	Carbon resistor	560 Ω	Limiting resistor
Semifixed resistor	VR1	Carbon resistor	10 k Ω	VCO OSC frequency adjust
Capacitor	C1	Electrolytic capacitor	2.2 μ F	DC blocking
	C2	Electrolytic capacitor	0.1 μ F	Loop filter
	C3	Polystyrol capacitor	1000 pF	VCO time constant
	C4	Electrolytic capacitor	1 μ F	Pilot detection
	C5	Ceramic capacitor	6800 pF	De-emphasis
	C6	Ceramic capacitor	6800 pF	De-emphasis
	C7	Electrolytic capacitor		Power supply ripple filter

Typical Voltage and Name of Each Pin

Pin No.	Voltage	Name	Remarks
1	1.2 V	Input	
2	$V_{CC}-0.7$ V	PLL loop filter	
3	V_{CC}	Power supply	
4	—	VCO	 $V_{CC}-0.2$ V $0.65 V_{CC}$
5	—	NC	
6	0 V	GND	
7	—	Stereo indicator	Open collector
8	$V_{CC}-0.7$ V	Pilot sync detection filter	
9	1.3 V	Decoder output (low)	
10	1.3 V	Decoder output (high)	

Proper cares in using IC

1. VCO stop method
Short pin 7 and pin 3 (V_{CC} pin) to stop the VCO.
(Note) The maximum voltage to be applied to pin 7 must not exceed the voltage on pin 3.
2. Free-running frequency check method : Use either of the following two methods.
 - a) Connect pin 4 to a frequency counter through the high input impedance amplifier.

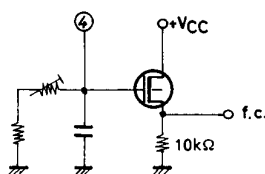


Figure 1

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- b) Connect the connection point of the semifixed resistor connected to pin 4 and the fixed resistor to a frequency counter through the R_X of 240 k Ω . Fig. 2 shows how the error changes as the R_X value is decreased.

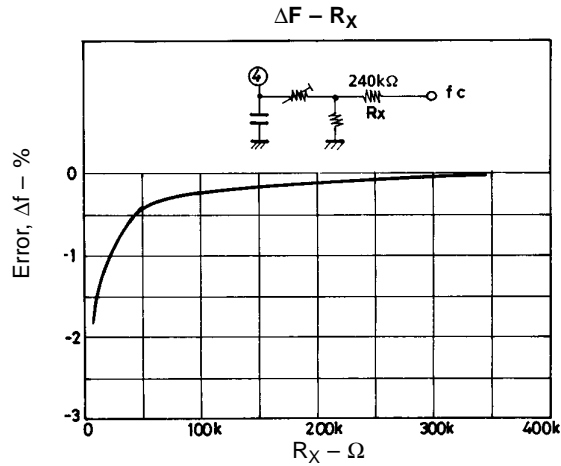


Figure 2

3. Separation setting method

The LA3335M is so designed that the sub-signal gain is approximately 1.25 times as high as the main signal gain. The separation can be set by attenuating the sub-signal of the FM detection output. (See Figure 3)

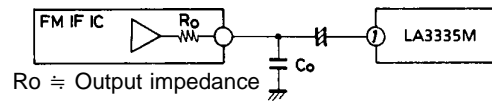


Figure 3

The value of capacitor C_o depends on the attenuation of the sub-signal of the FM detection output and the IF IC output impedance R_o . Fig. 4 shows the value of separation setting capacitor C_o when R_o is set to 3 k Ω .

For example, when the attenuation of sub-signal of the IF IC output is 0.9 time that of the main signal, it is seen from Figure 4 that the value of C_o is approximately 500 pF.

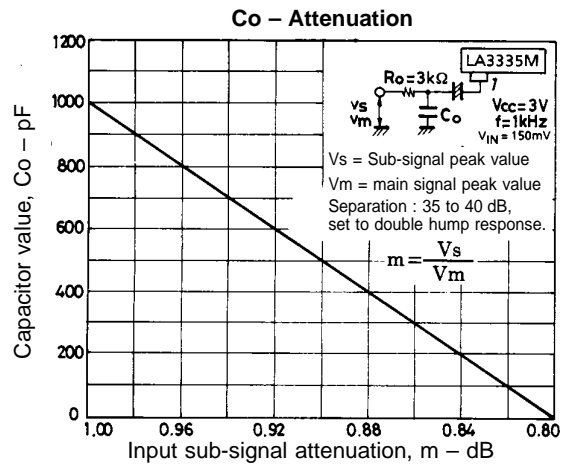
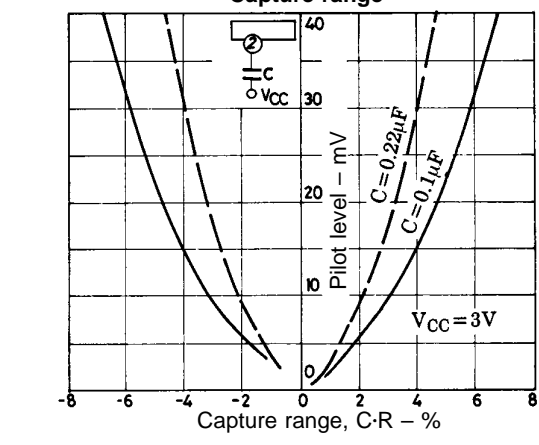
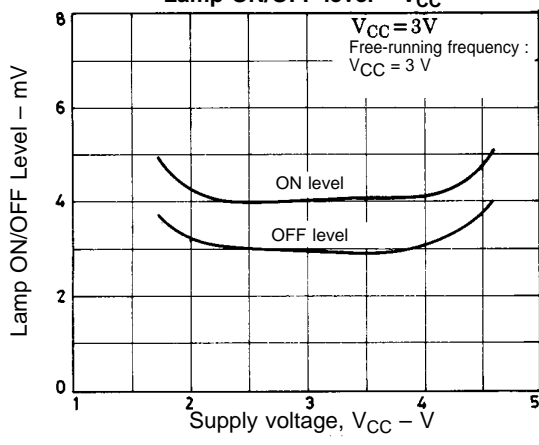
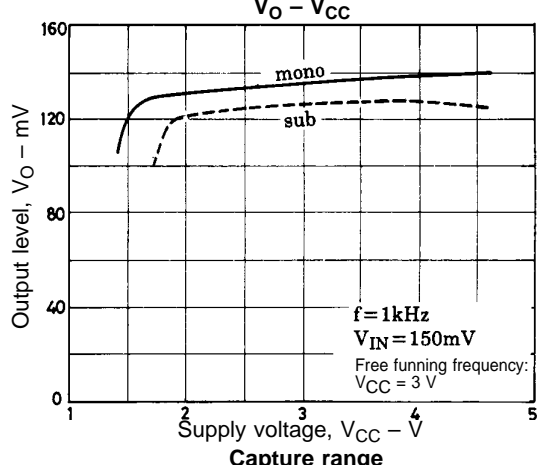
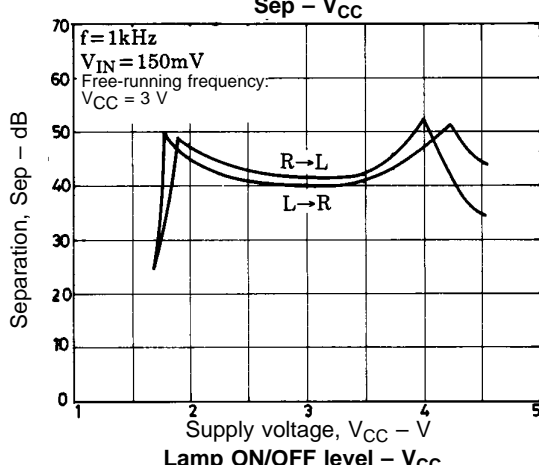
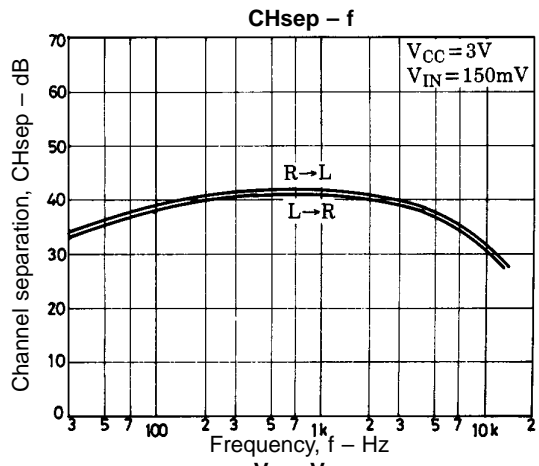
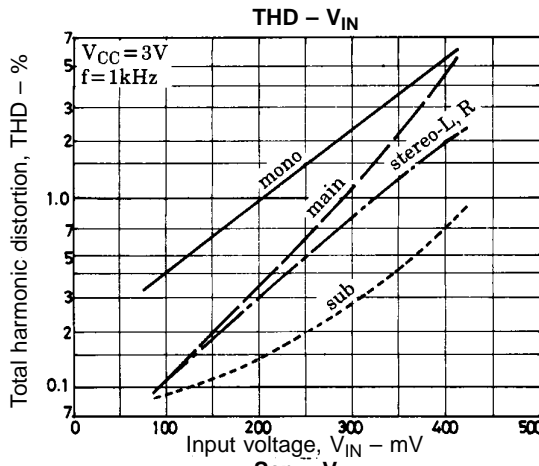
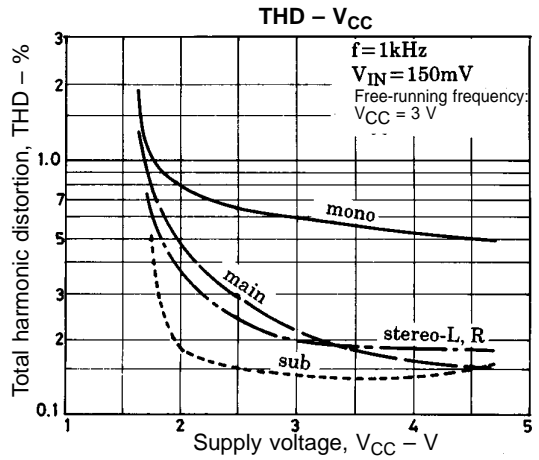
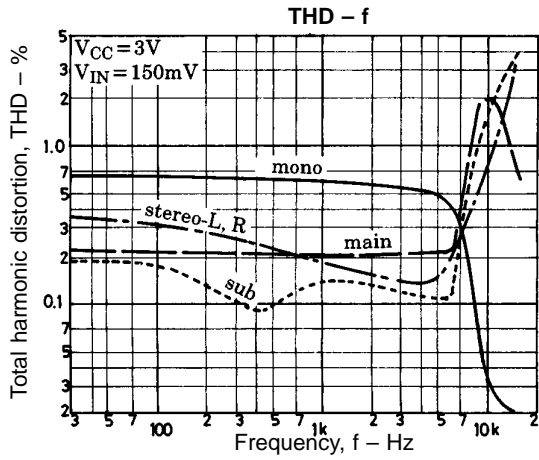
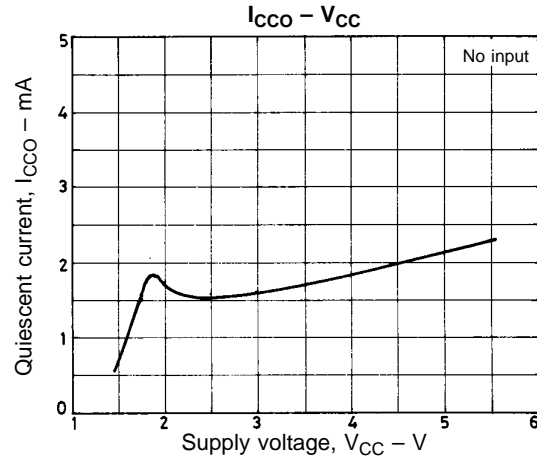
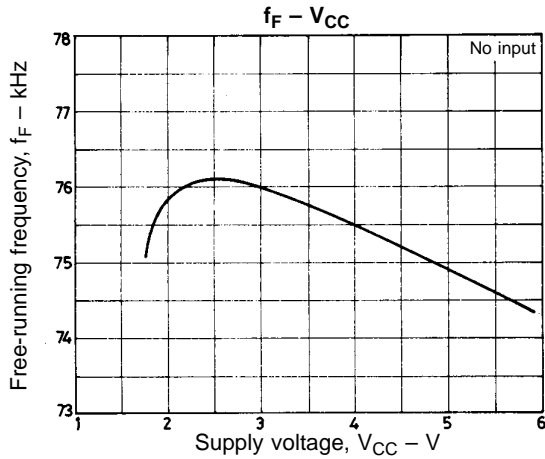


Figure 4





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