Ordering number : EN4930

Monolithic Linear IC

No. 4930

LA8670M

Double-Conversion Narrow-Band FM IF System

Overview

The LA8670M is a narrow band FM IF system for use in communication equipment. In addition to the functions required for FM reception, the LA8670M provides a rich set of additional functions including noise detection and field strength detection, and is thus optimal for cordless telephones.

Functions

- First mixer, first local oscillator, first local oscillator buffer output, second mixer, second local oscillator
- IF amplifier, limiter, quadrature detector
- Signal meter
- Noise detector, noise amplifier, noise wave detector, Schmitt trigger

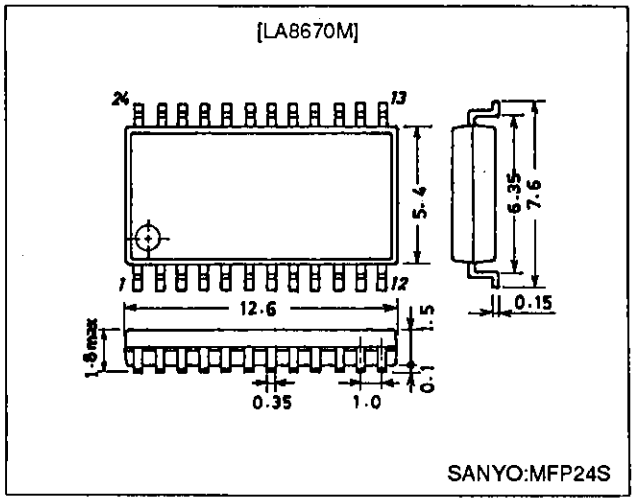
Features

- Low voltage operation: $V_{CC\ OP}$ = 1.8 to 6 V
- Signal meter linear over a wide range (70 dB typical)
- High sensitivity, high intercept point

Package Dimensions

unit: mm

3112-MFP24S



Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		7.0	V
Allowable power dissipation	Pd max	Ta ≤ 75°C	150	mW
Operating temperature	Topr		–20 to +75	°C
Storage temperature	Tstg		–40 to +125	°C

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		3.0	V
Operating supply voltage	$V_{CC\ OP}$		1.8 to 6.0	V

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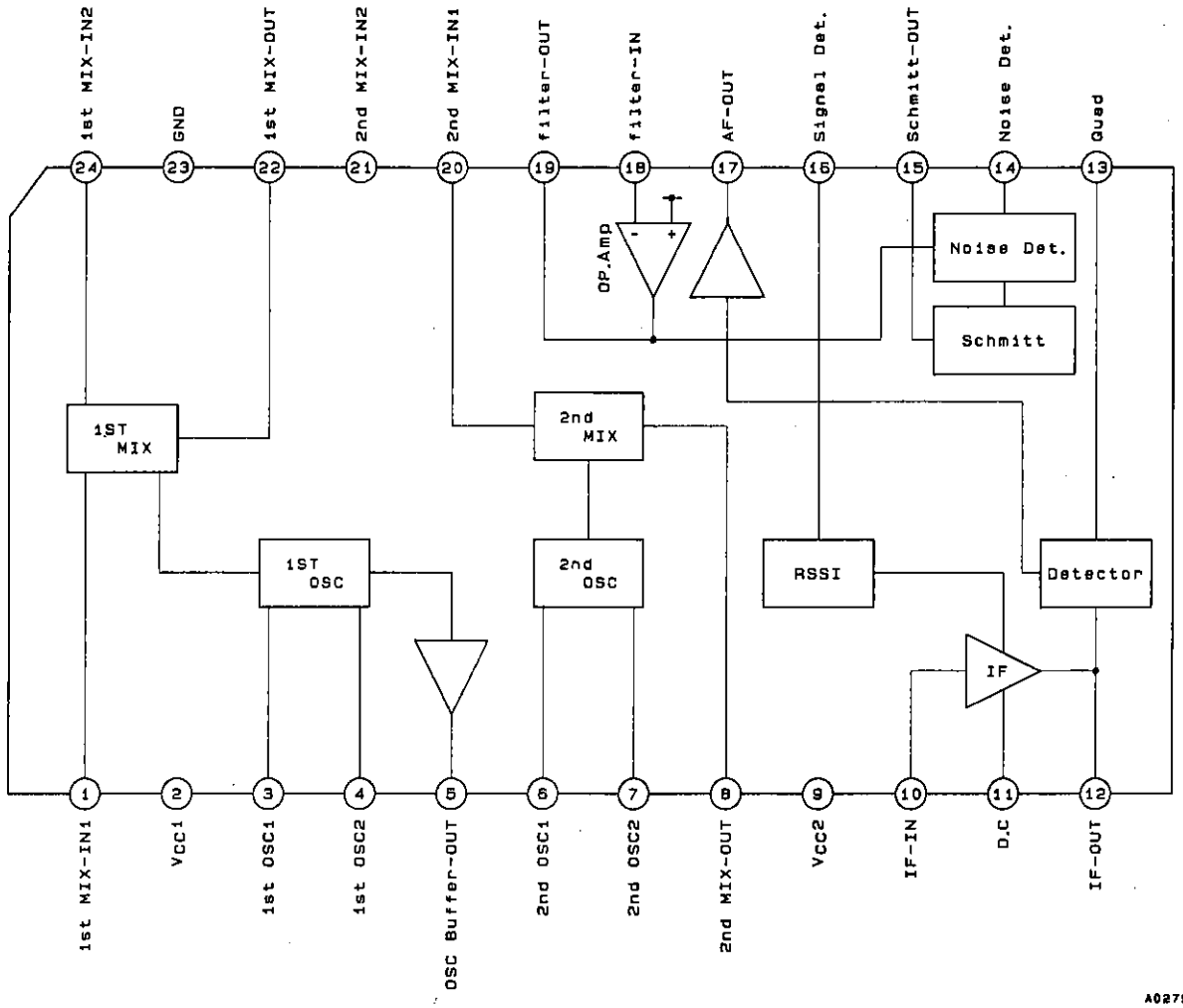
Operating Characteristics at Ta = 25°C, V_{CC} = 3 V, f_C (MIX) = 49.830 MHz, fmod = 1 kHz, Δf = ±3 kHz

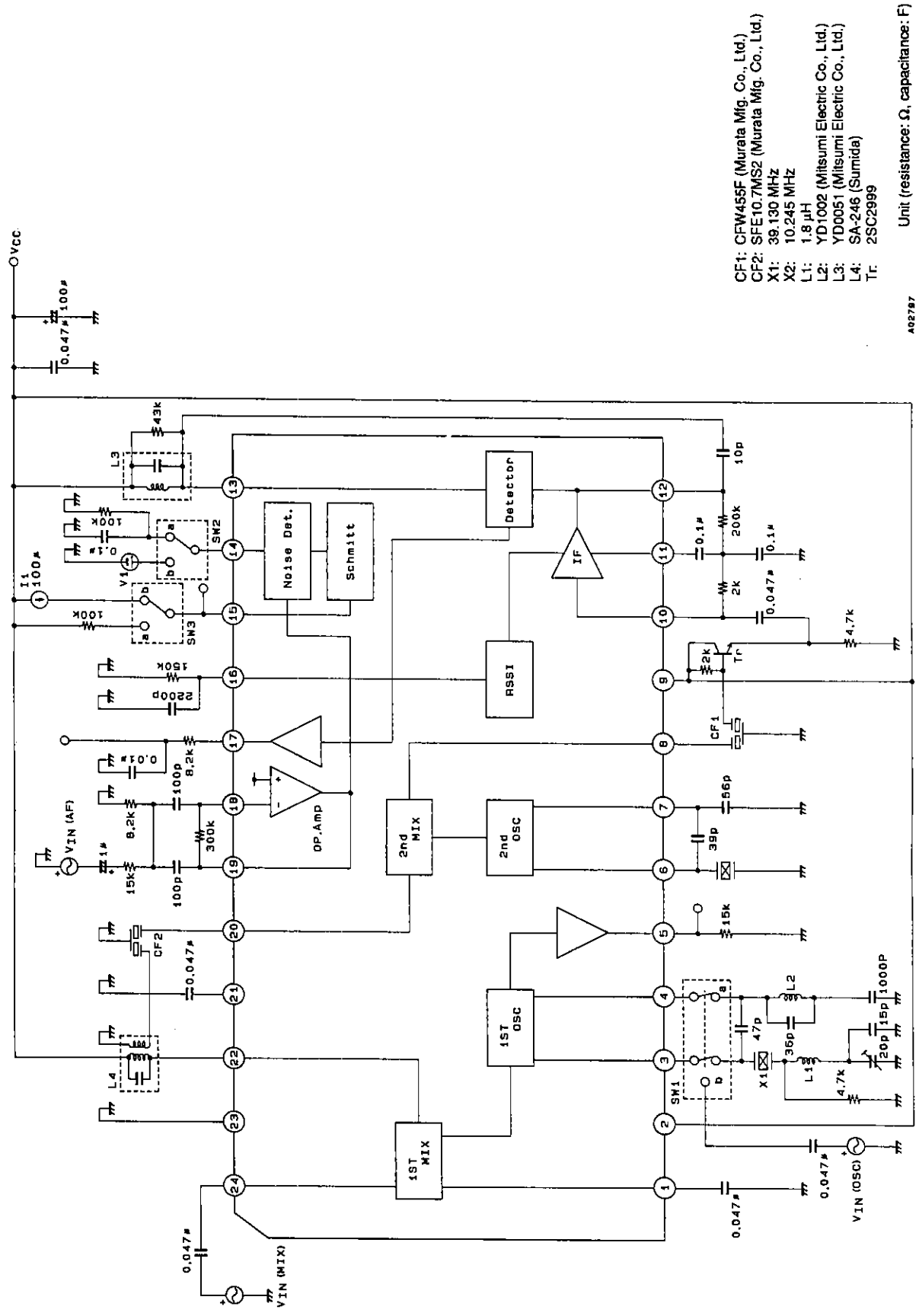
Parameter	Symbol	Conditions	min	typ	max	Unit
Quiescent current	I_{CCO}	No input		7.3	9.5	mA
Mixer intercept point	Ip3	First mixer		−4.8		dBm
12 dB sensitivity	12dB S/N	No input matching		3.2	5.0	dBμ
Demodulator output	V_O	Vin = 80 dBμ	143	180	227	mVrms
Signal-to-noise ratio	S/N	No modulation, Vin = 80 dBμ	60	67		dB
AM rejection ratio	AMR	AM 30% modulation	35	43		dB
Total harmonic distortion	THD	Vin = 80 dBμ		2.2	3.0	%
Signal meter output	$V_{SM\,(1)}$	Vin = 0 dBμ	0.05	0.30	0.65	V
	$V_{SM\,(2)}$	Vin = 40 dBμ	0.60	0.90	1.40	V
	$V_{SM\,(3)}$	Vin = 80 dBμ	1.05	1.40	1.85	V
Noise detector output	$V_{ND\,(1)}$	fi = 40 kHz, Vi = −50 dBV		0.10	0.25	V
	$V_{ND\,(2)}$	fi = 40 kHz, Vi = −30 dBV	1.10	1.40	1.70	V
Noise detector level	$V_{14\,(1)}$	Schmitt on	0.53	0.63	0.73	V
	$V_{14\,(2)}$	Schmitt off	0.33	0.43	0.53	V
Schmitt output level	$V_{SH\,(1)}$	V_{14} = 0.8 V			0.3	V
	$V_{SH\,(2)}$	V_{14} = 0.2 V	2.8			V
Mixer conversion gain	G_{M1}	First mixer		19		dB
	G_{M2}	Second mixer		24		dB
Mixer input frequency					90	MHz
Mixer input resistance		First mixer		5		kΩ
		Second mixer		330		Ω
Mixer output resistance		First mixer		330		Ω
		Second mixer		2.0		kΩ
FM detector output impedance				520		Ω

Note: AC levels are all indicated for open (EMF) circuits.

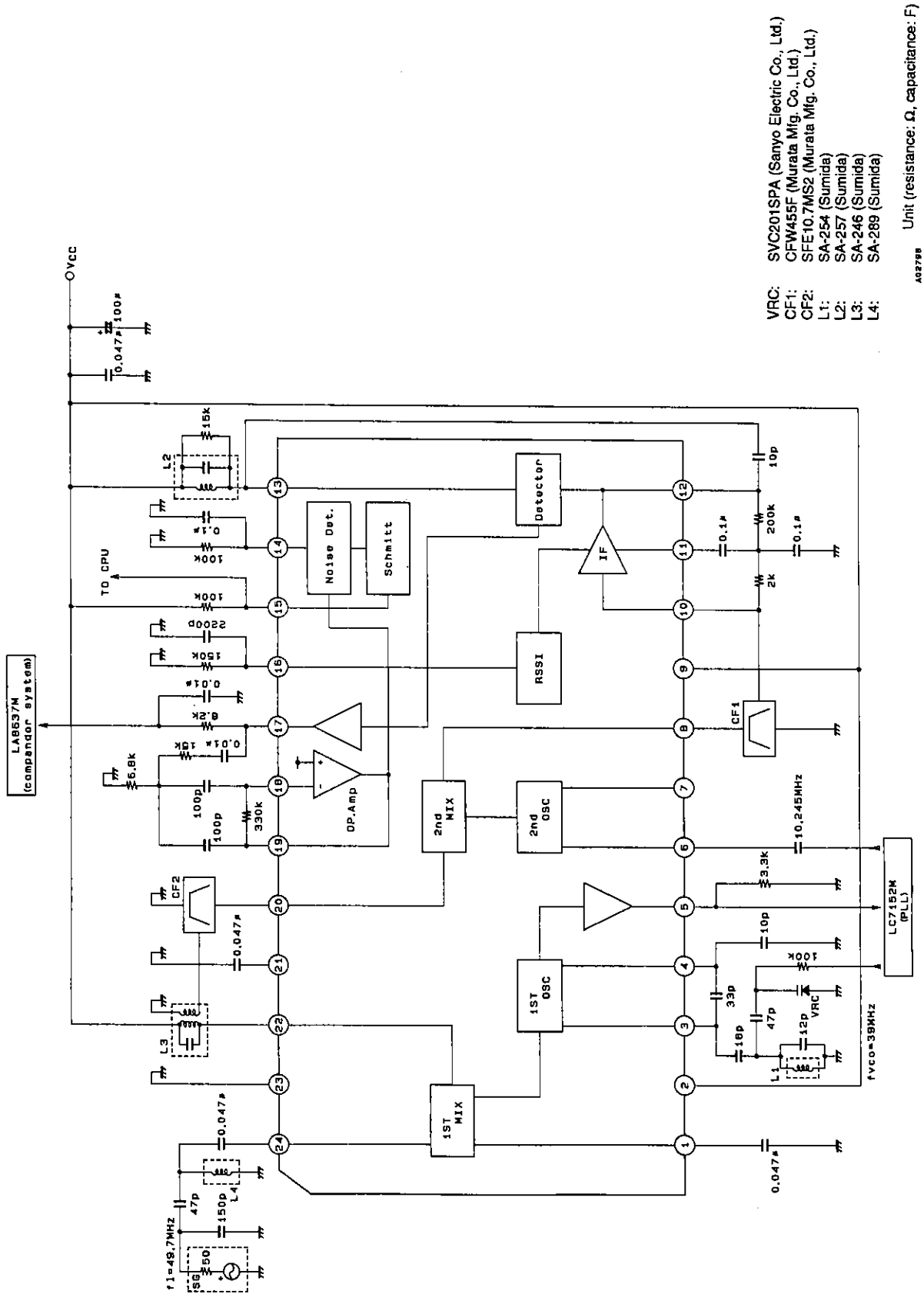
Equivalent Circuit Block Diagram



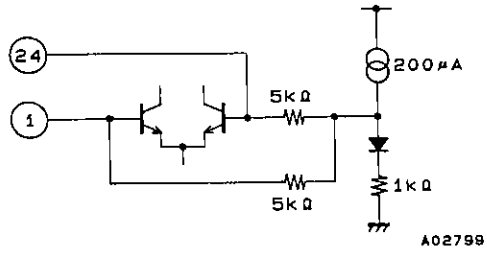
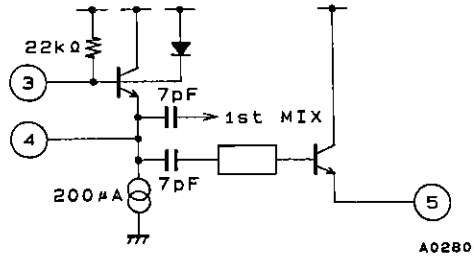
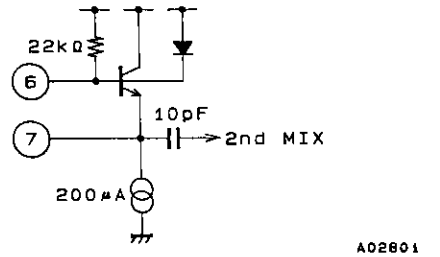
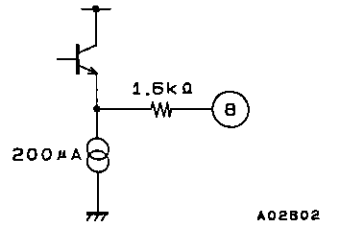
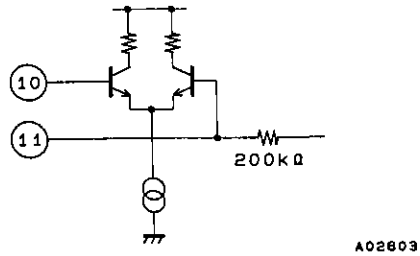
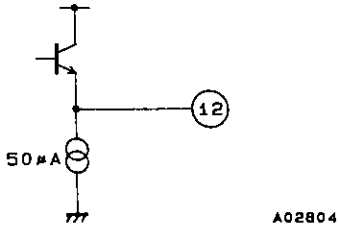
Test Circuit



Sample Application Circuit



Pin Functions

Pin No.	Symbol	Internal equivalent circuit	Note
24	1st MIX-IN 2		First mixer inputs
1	1st MIX-IN 1		
2	$V_{CC}1$		Power supply for the first mixer
3	1st OSC 1		Local oscillator inputs
4	1st OSC 2		
5	OSC Buffer-OUT		Local oscillator buffer output
6	2nd OSC 1		Local oscillator inputs When external insertion is used, input the signal to pin 6 and leave pin 7 open.
7	2nd OSC 2		
8	2nd MIX-OUT		Second mixer output
9	$V_{CC}2$		Power supply
10	IF-IN		IF amplifier input
11	D.C		IF amplifier DC feedback
12	IF-OUT		Limiter amplifier output

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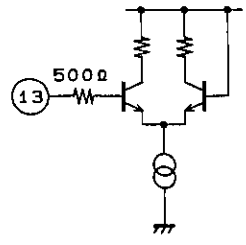
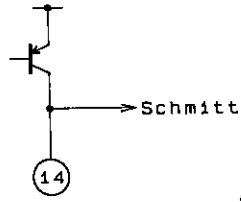
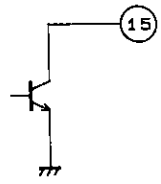
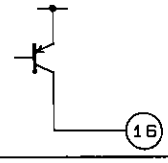
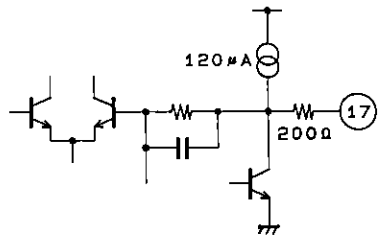
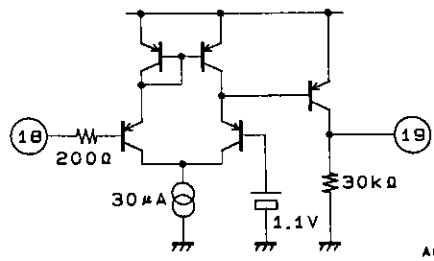
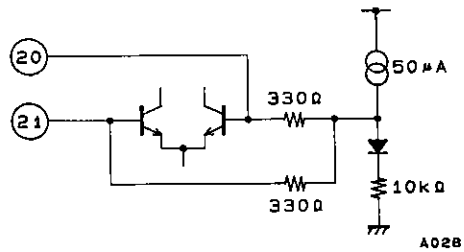
Pin No.	Symbol	Internal equivalent circuit	Note
13	Quad.		Discriminator connection
14	Noise det.		Noise detector
15	Schmitt-OUT		Noise Schmitt output
16	Signal DET.		Field strength signal output
17	AF-OUT		FM detector output
18	Filter-IN		Noise filter input
19	Filter-OUT		Noise filter output
20	2nd MIX-IN 1		Second mixer input
21	2nd MIX-IN 2		

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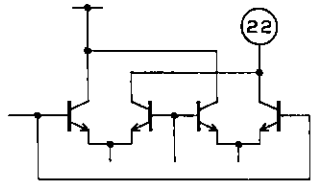
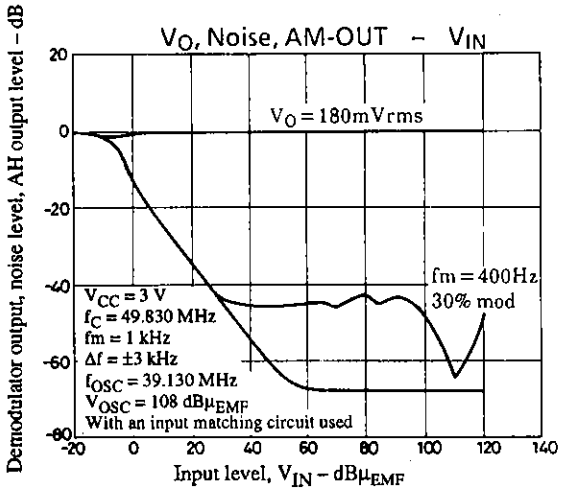
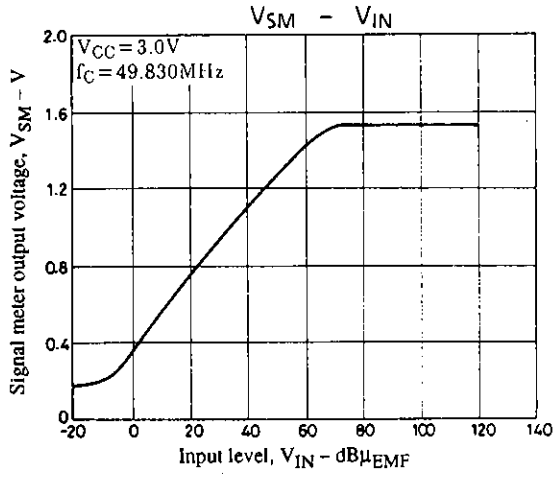
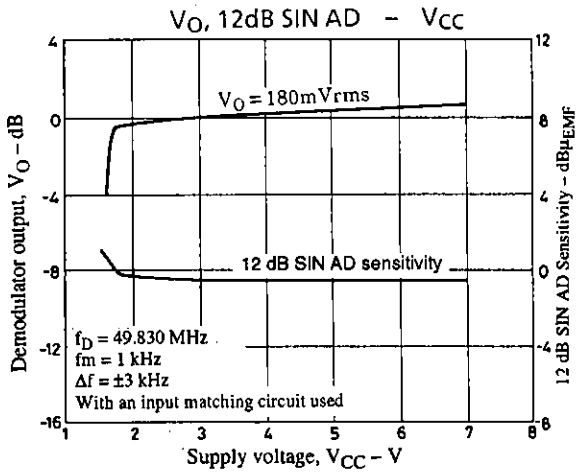
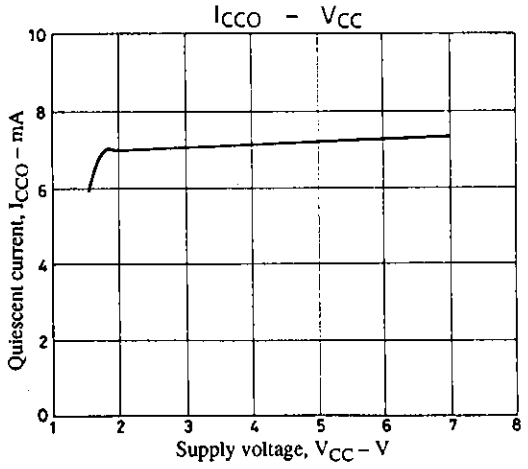
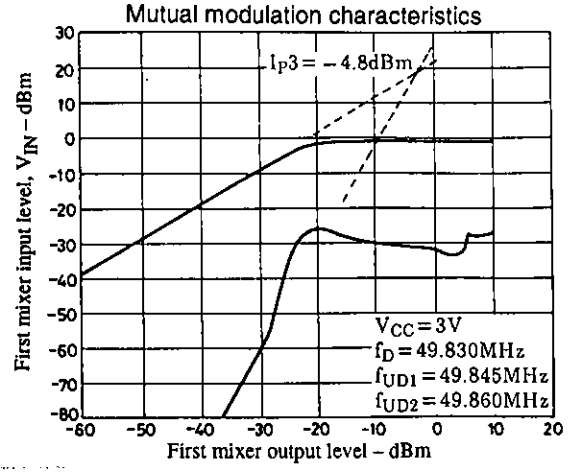
Pin No.	Symbol	Internal equivalent circuit	Note
22	1st MIX-OUT		First mixer output
23	GND		Ground

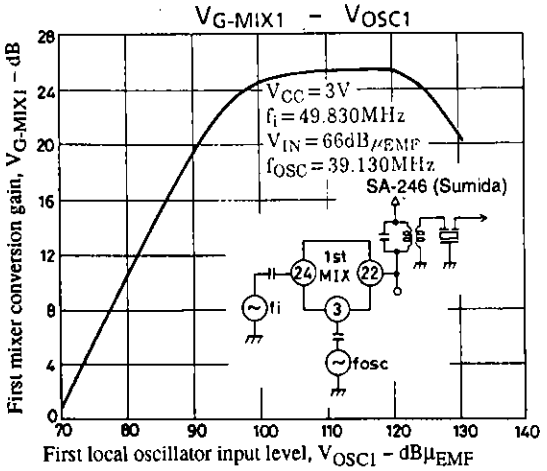




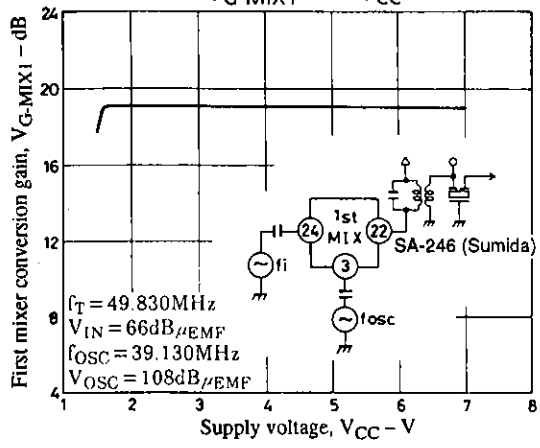




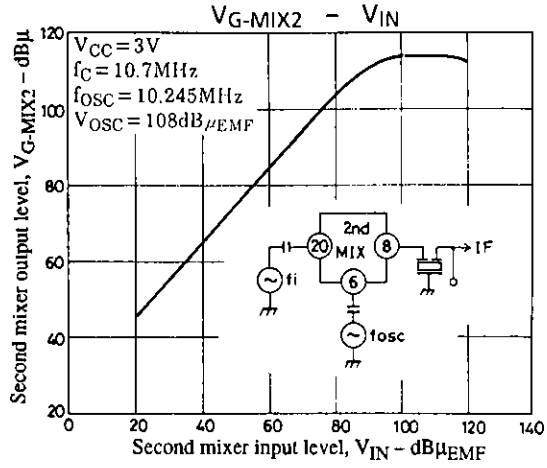




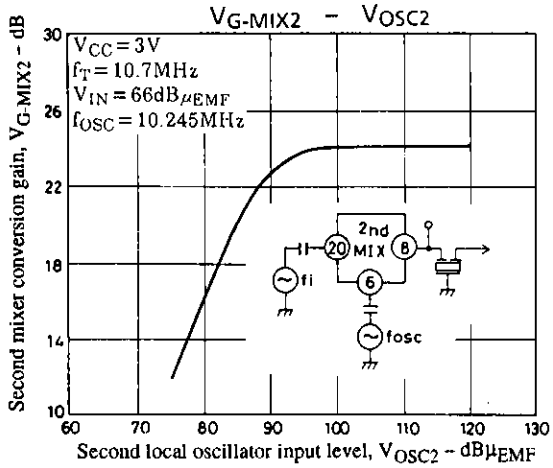
$V_{G\text{-}MIX1}$ – V_{CC}



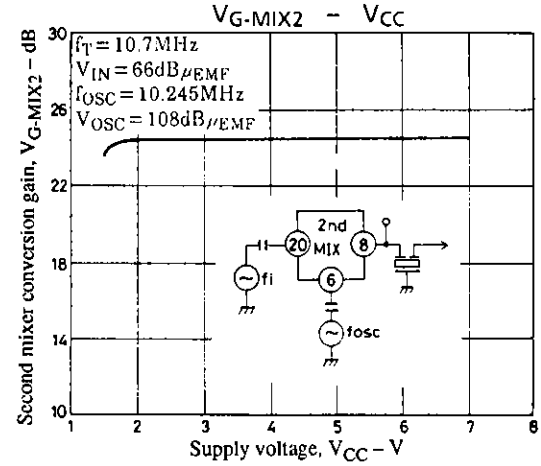
$V_{G\text{-}MIX2}$ – V_{IN}



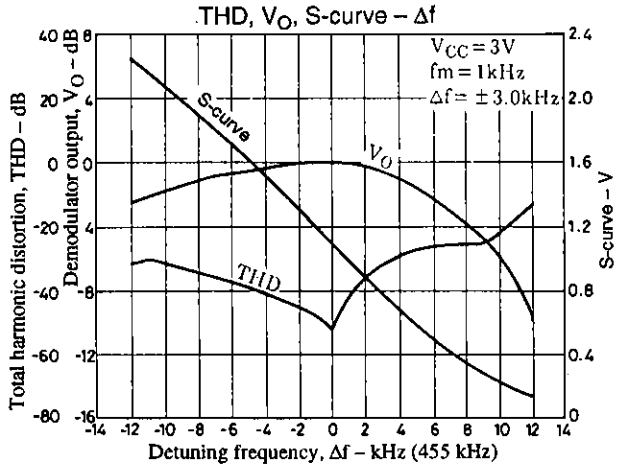
$V_{G\text{-}MIX2}$ – V_{OSC2}



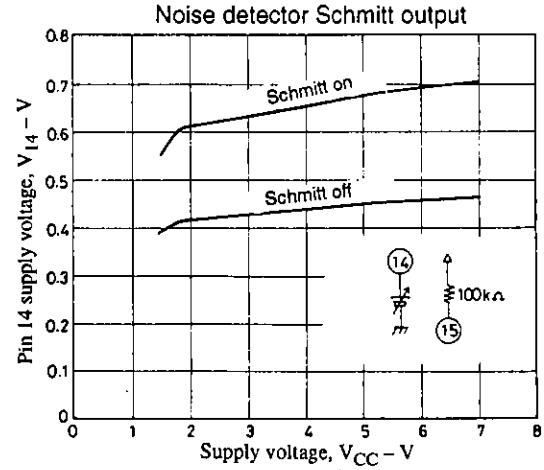
$V_{G\text{-}MIX2}$ – V_{CC}



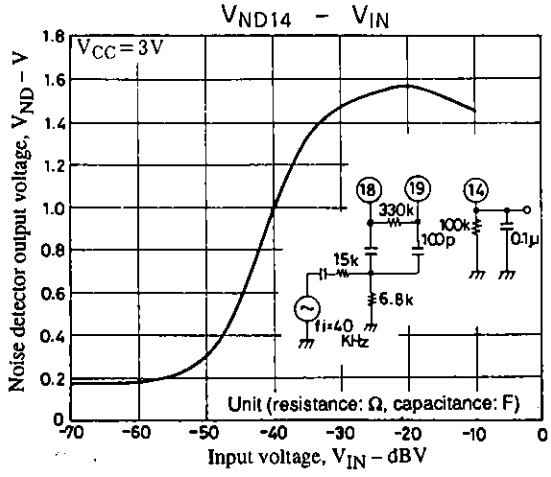
THD, V_O, S-curve – Δf



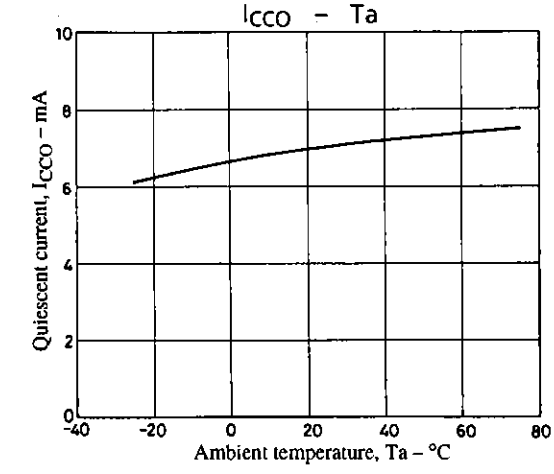
Noise detector Schmitt output

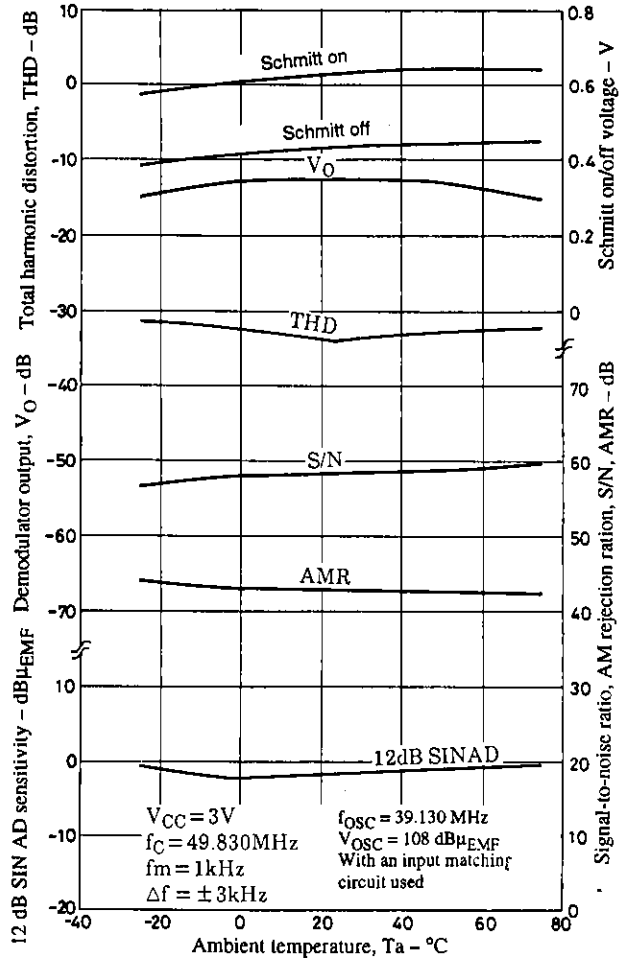


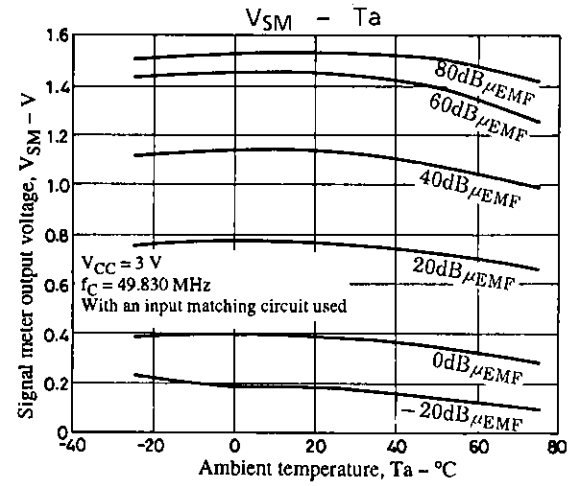
V_{ND14} – V_{IN}

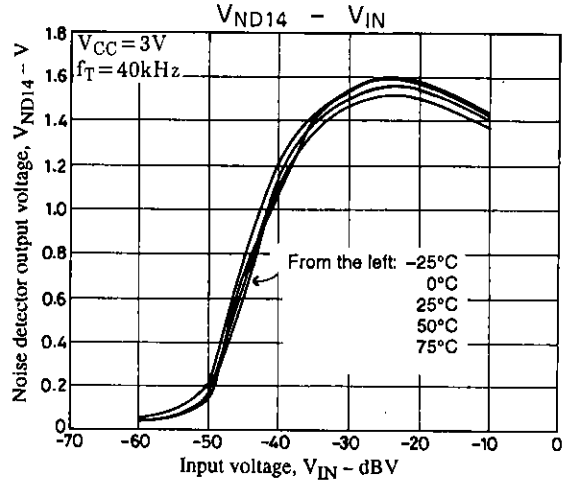


I_{CCO} – Ta









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