



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

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\text{ max}}$		7.0	V
Allowable power dissipation	$P_{d\text{ max}}$	$T_a \leq 75^\circ\text{C}$	150	mW
Operating temperature	T_{opr}		-20 to +75	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +125	$^\circ\text{C}$

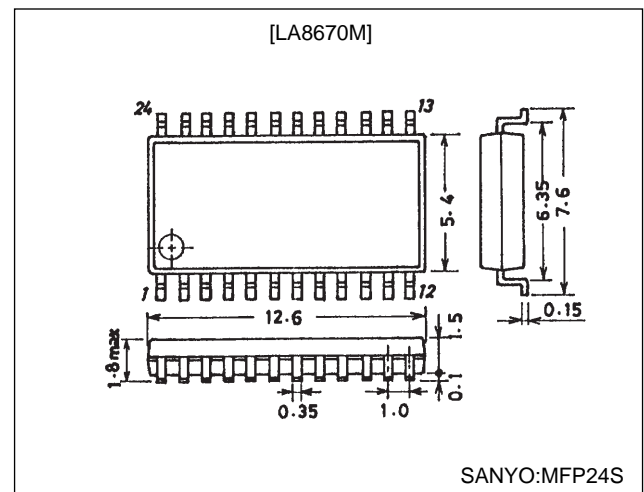
Operating Conditions at $T_a = 25^\circ\text{C}$

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

Package Dimensions

unit: mm

3112-MFP24S



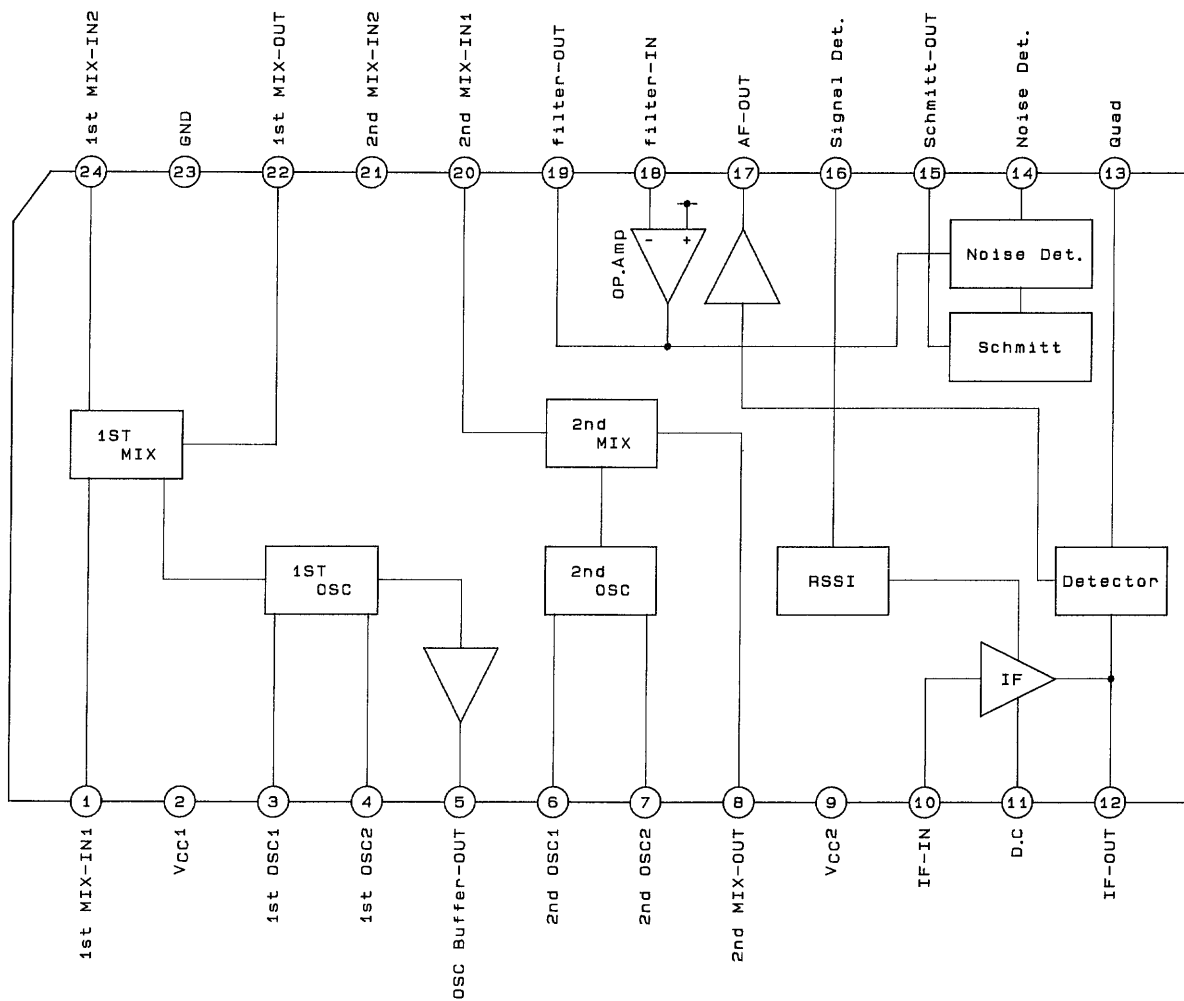
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Operating Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 3\text{ V}$, $f_C (\text{MIX}) = 49.830\text{ MHz}$, $f_{\text{mod}} = 1\text{ kHz}$, $\Delta f = \pm 3\text{ kHz}$

Parameter	Symbol	Conditions	min	typ	max	Unit
Quiescent current	I_{CCO}	No input		7.3	9.5	mA
Mixer intercept point	I_{p3}	First mixer		-4.8		dBm
12 dB sensitivity	12dB S/N	No input matching		3.2	5.0	dB μ
Demodulator output	V_O	$V_{in} = 80\text{ dB}\mu$	143	180	227	mVrms
Signal-to-noise ratio	S/N	No modulation, $V_{in} = 80\text{ dB}\mu$	60	67		dB
AM rejection ratio	AMR	AM 30% modulation	35	43		dB
Total harmonic distortion	THD	$V_{in} = 80\text{ dB}\mu$		2.2	3.0	%
Signal meter output	$V_{SM(1)}$	$V_{in} = 0\text{ dB}\mu$	0.05	0.30	0.65	V
	$V_{SM(2)}$	$V_{in} = 40\text{ dB}\mu$	0.60	0.90	1.40	V
	$V_{SM(3)}$	$V_{in} = 80\text{ dB}\mu$	1.05	1.40	1.85	V
Noise detector output	$V_{ND(1)}$	$f_i = 40\text{ kHz}$, $V_i = -50\text{ dBV}$		0.10	0.25	V
	$V_{ND(2)}$	$f_i = 40\text{ kHz}$, $V_i = -30\text{ dBV}$	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	$V_{SH(1)}$	$V_{14} = 0.8\text{ V}$			0.3	V
	$V_{SH(2)}$	$V_{14} = 0.2\text{ V}$	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		k Ω
		Second mixer		330		Ω
Mixer output resistance		First mixer		330		Ω
		Second mixer		2.0		k Ω
FM detector output impedance				520		Ω

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

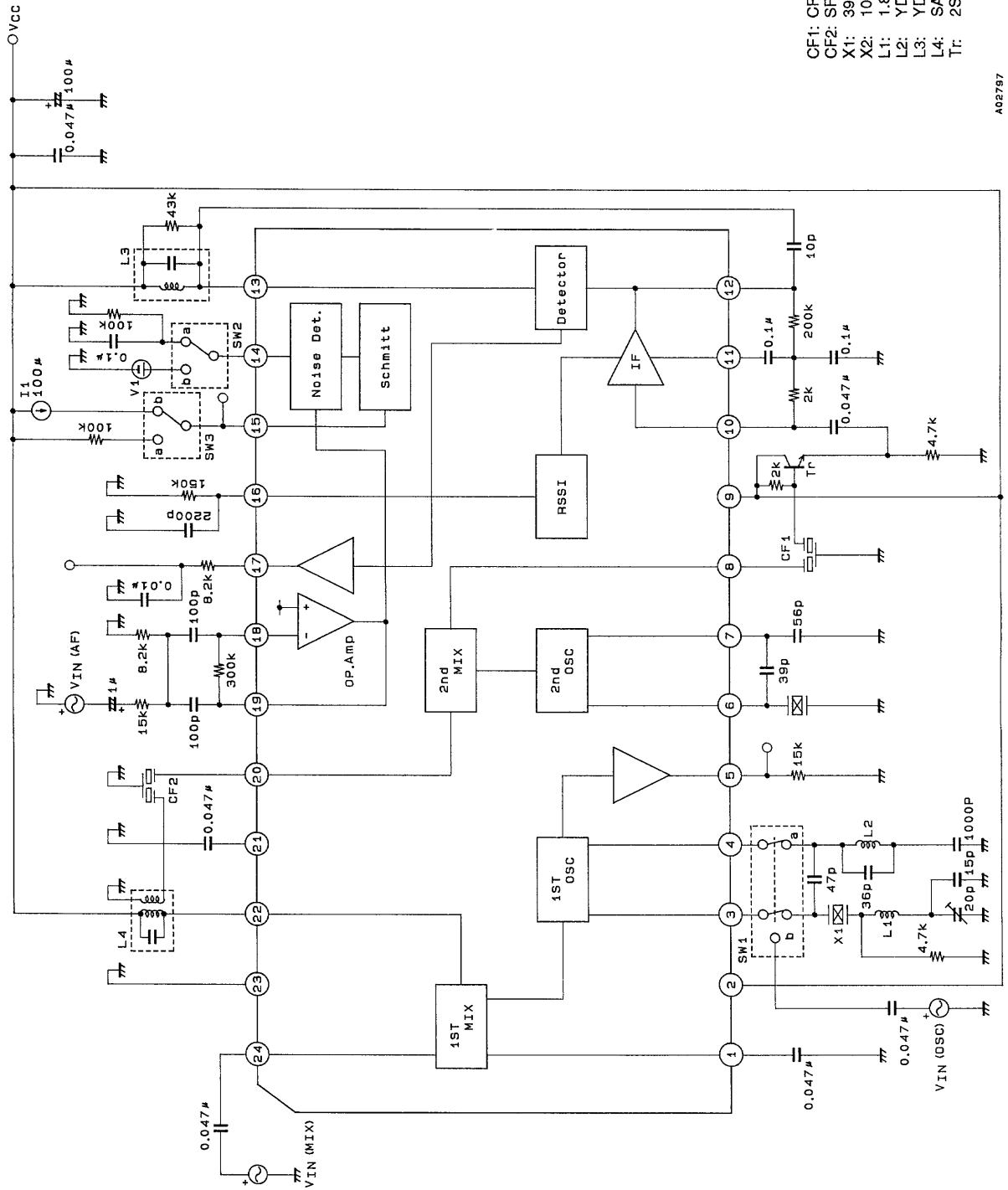
Equivalent Circuit Block Diagram



A02796

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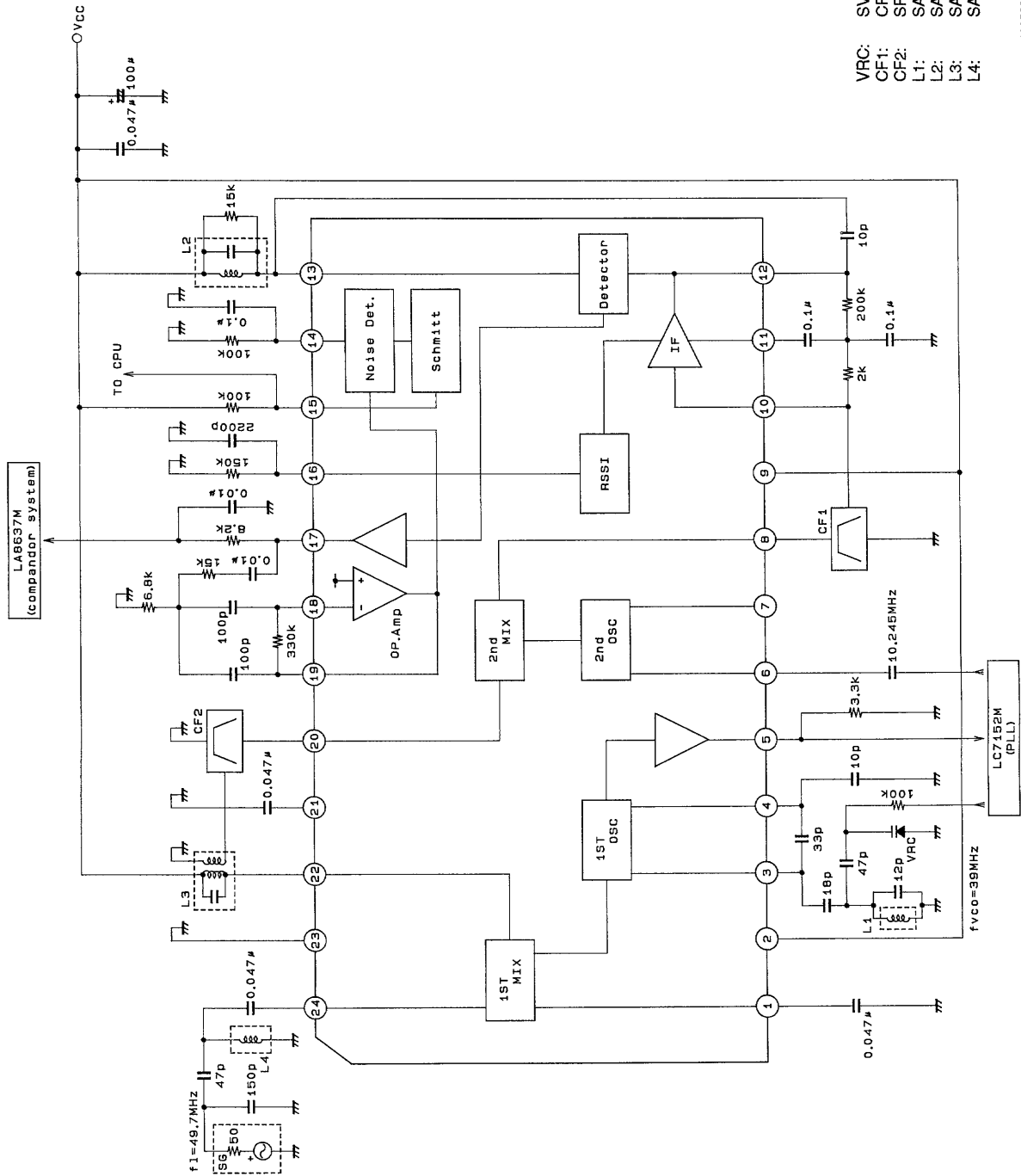
Test Circuit



- CF1: CFW455F (Murata Mfg. Co., Ltd.)
- CF2: SFE10.7MS2 (Murata Mfg. Co., Ltd.)
- X1: 39.130 MHz
- X2: 10.245 MHz
- L1: 1.8 μH
- L2: YD1002 (Mitsumi Electric Co., Ltd.)
- L3: YD0051 (Mitsumi Electric Co., Ltd.)
- L4: SA-246 (Sumida)
- T: 2SC2999

Unit (resistance: Ω, capacitance: F)

Sample Application Circuit



- VFC: SVC201SPA (Sanyo Electric Co., Ltd.)
- CF1: CFW455F (Murata Mfg. Co., Ltd.)
- CF2: SFE10.7MS2 (Murata Mfg. Co., Ltd.)
- L1: SA-254 (Sumida)
- L2: SA-257 (Sumida)
- L3: SA-246 (Sumida)
- L4: SA-289 (Sumida)

A02789 Unit (resistance: Ω, capacitance: F)

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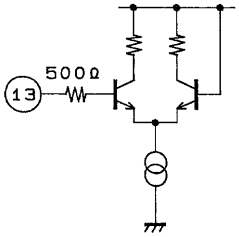
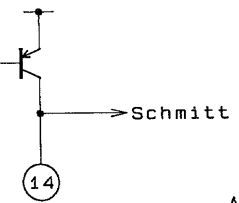
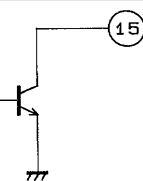
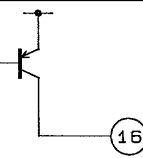
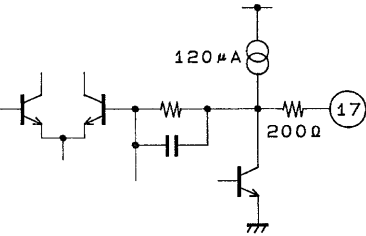
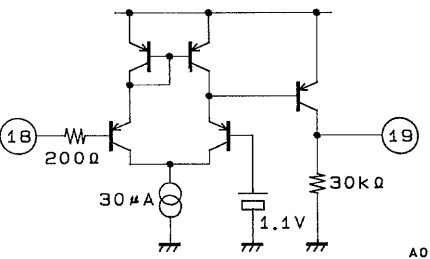
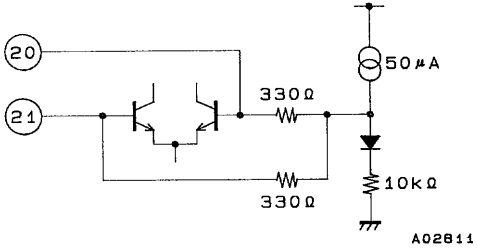
Pin Functions

Pin No.	Symbol	Internal equivalent circuit	Note
24	1st MIX-IN 2		First mixer inputs
1	1st MIX-IN 1		
2	V _{CC1}		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 _{CC2}		Power supply
10	IF-IN		IF amplifier input
11	D.C		
12	IF-OUT		Limiter amplifier output

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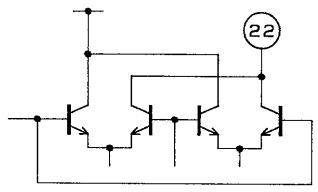
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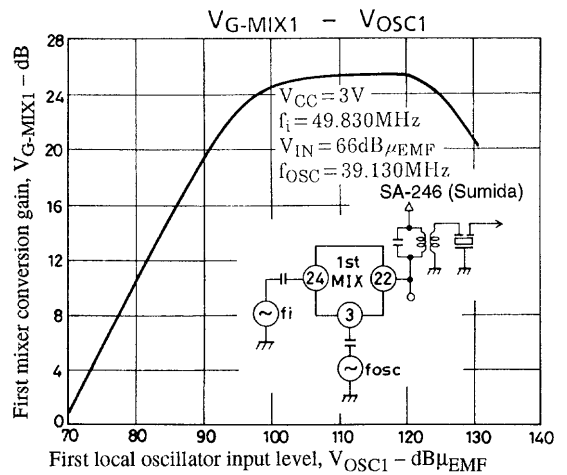
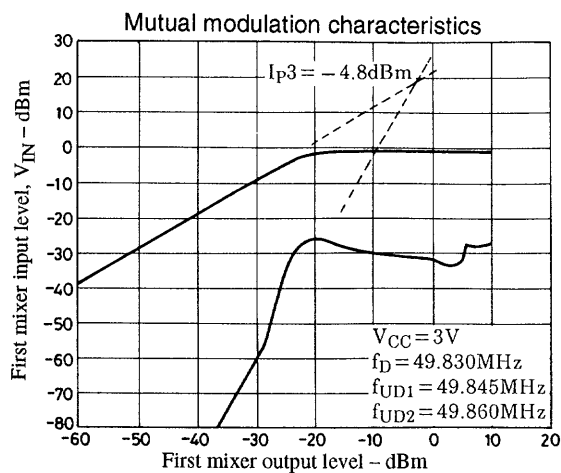
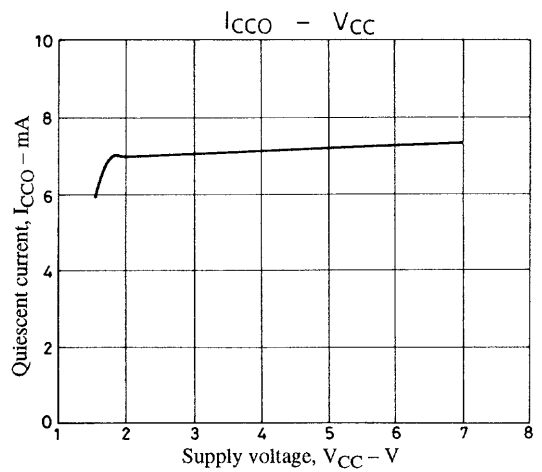
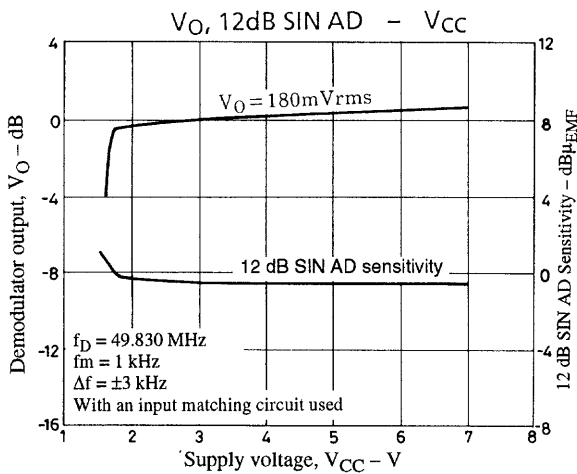
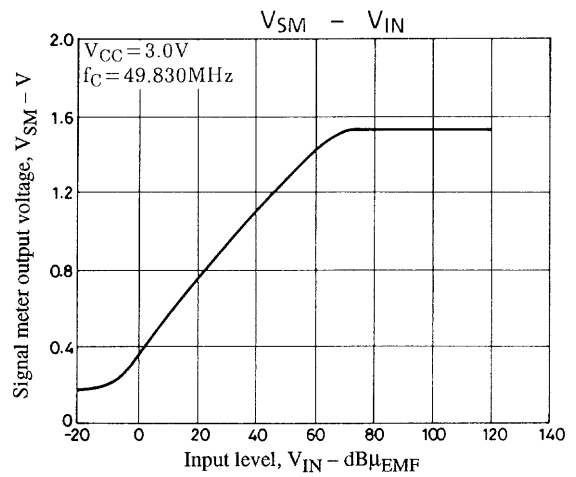
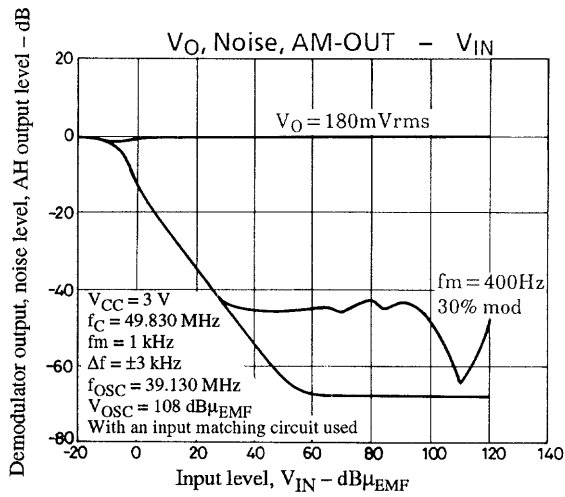
Pin No.	Symbol	Internal equivalent circuit	Note
13	Quad.	 <p style="text-align: right;">A02805</p>	Discriminator connection
14	Noise det.	 <p style="text-align: right;">A02806</p>	Noise detector
15	Schmitt-OUT	 <p style="text-align: right;">A02807</p>	Noise Schmitt output
16	Signal DET.	 <p style="text-align: right;">A02808</p>	Field strength signal output
17	AF-OUT	 <p style="text-align: right;">A02809</p>	FM detector output
18	Filter-IN	 <p style="text-align: right;">A02810</p>	Noise filter input
19	Filter-OUT		Noise filter output
20	2nd MIX-IN 1	 <p style="text-align: right;">A02811</p>	Second mixer input
21	2nd MIX-IN 2		

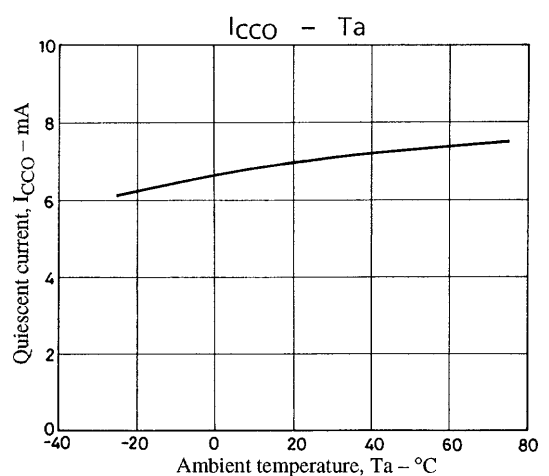
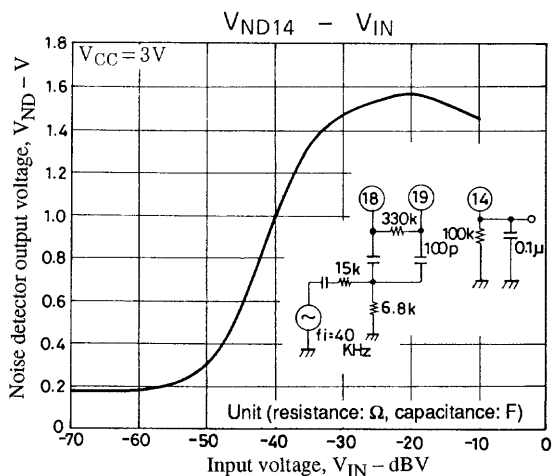
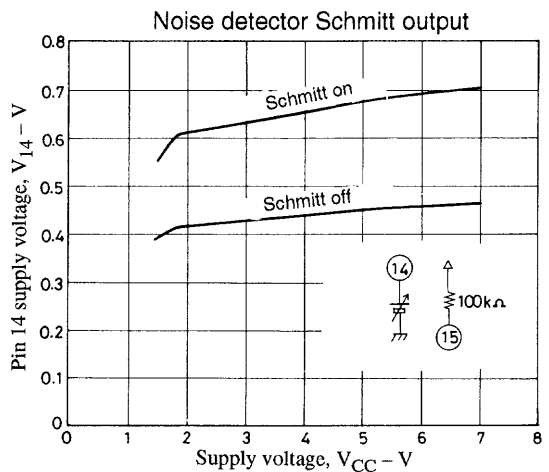
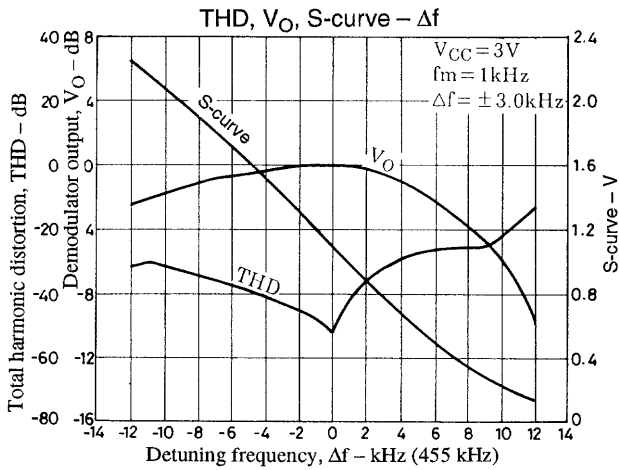
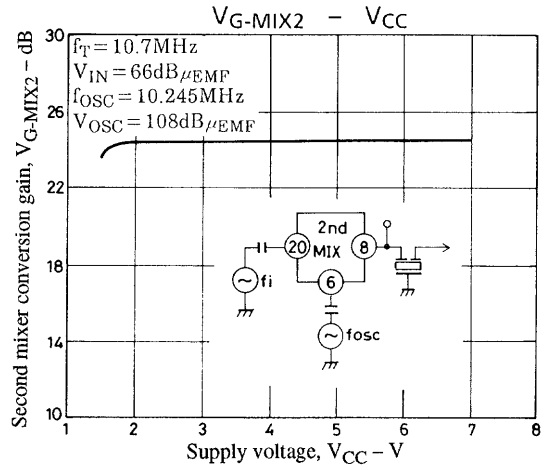
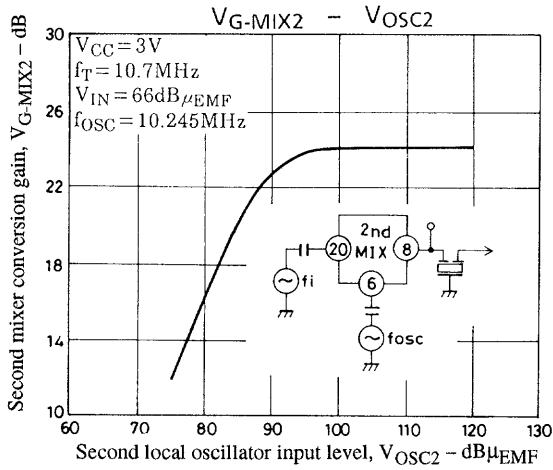
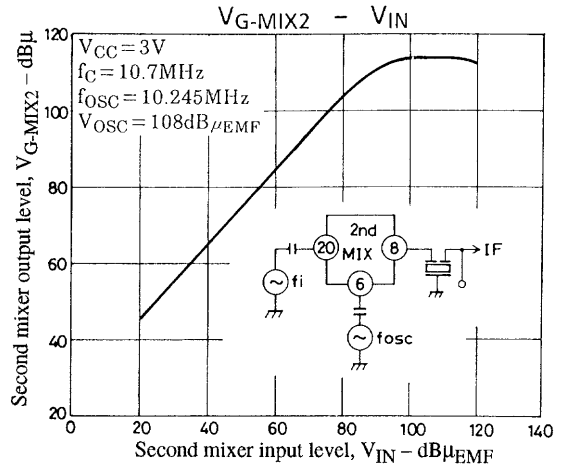
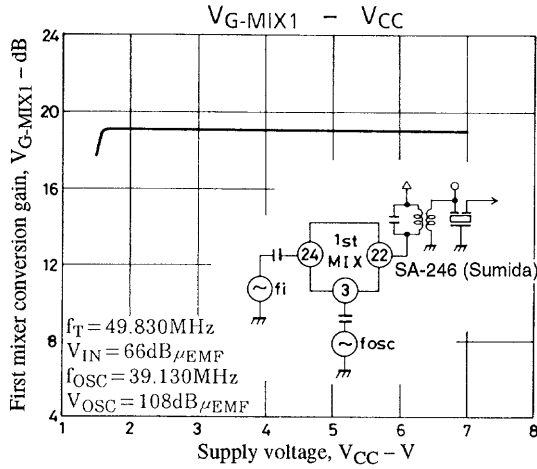
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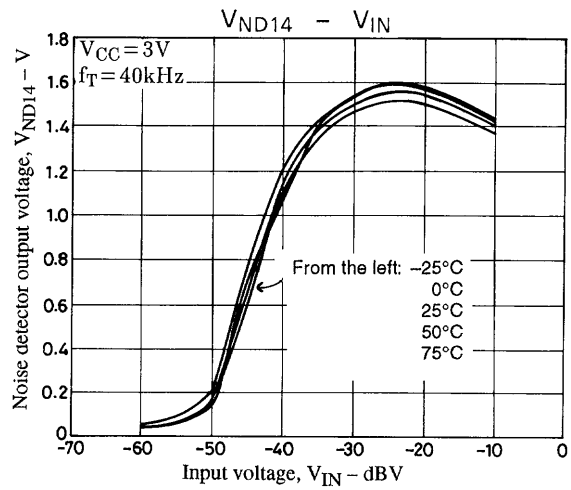
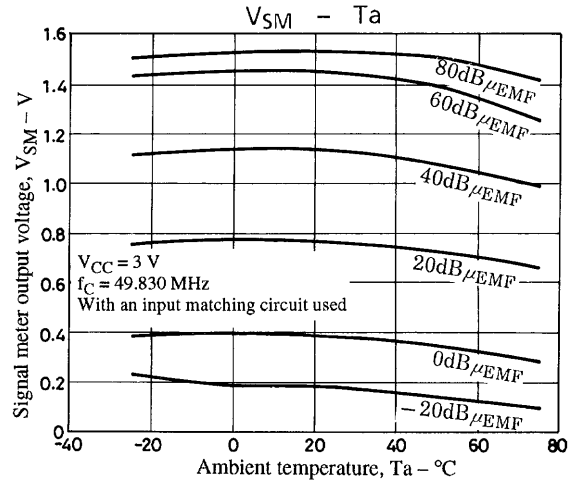
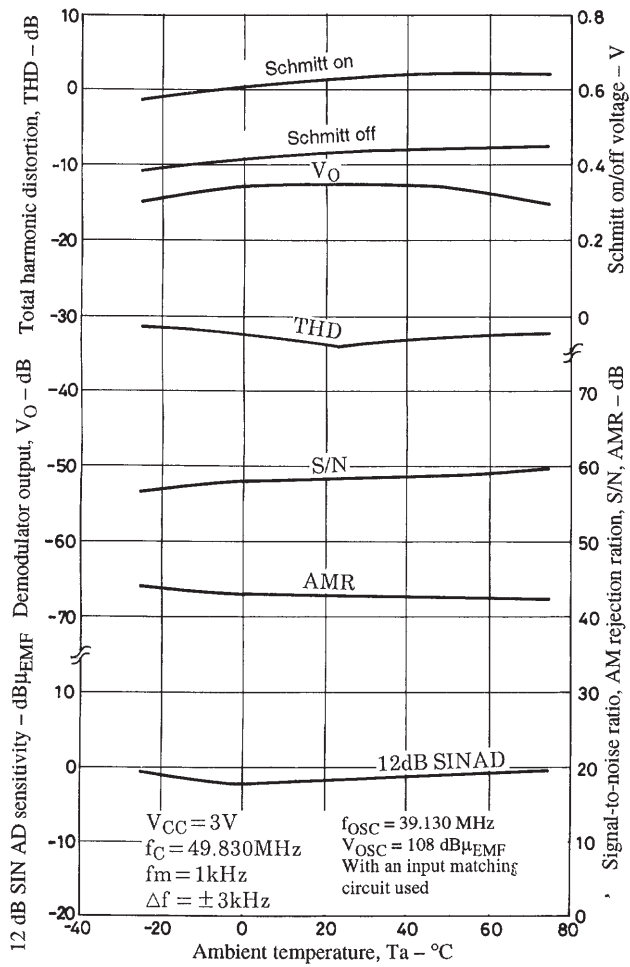
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Pin No.	Symbol	Internal equivalent circuit	Note
22	1st MIX-OUT	 <p style="text-align: right;">A02B12</p>	First mixer output
23	GND		Ground







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