

SANYO	No.3890A	LA8604M
	Narrowband FM IF Stage	

OVERVIEW

The LA8604M is a narrowband FM IF stage IC that incorporates all the functional blocks for a complete IF stage, including noise filtering, making it ideal for use in cordless telephones.

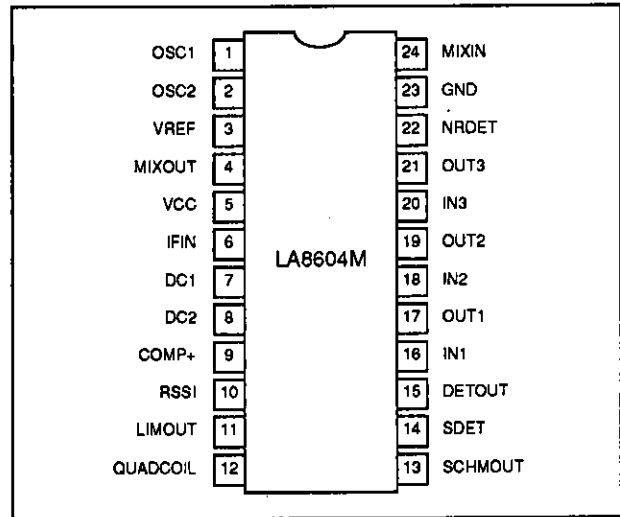
The LA8604M comprises a second-stage oscillator, a mixer, an IF amplifier, an FM detector, and noise detector, amplifier and rectifier circuits. A signal level meter output which is linear over a wide dynamic range of up to 70 dB is also incorporated.

The LA8604M operates from a 2.4 to 6 V supply and is available in 24-pin MFPs.

FEATURES

- On-chip mixer, IF amplifier and limiter
- On-chip noise filter buffer
- 70 dB (typ) signal level meter linearity
- Signal level meter output buffer
- 2.4 to 6 V supply
- 24-pin MFP

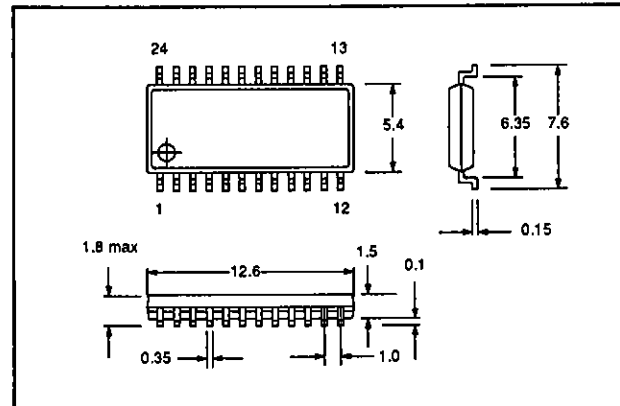
PINOUT



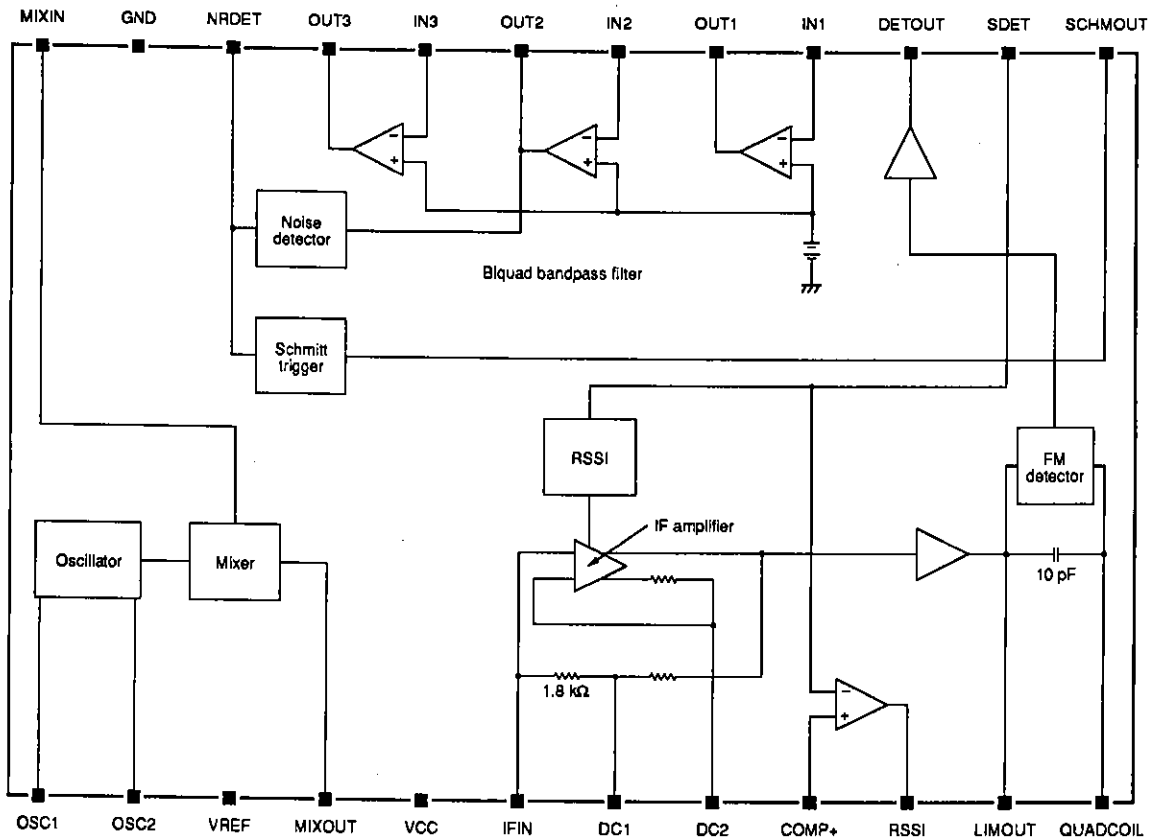
PACKAGE DIMENSIONS

Unit: mm

3112-MFP24S



BLOCK DIAGRAM



PIN DESCRIPTION

Number	Name	Equivalent circuit	Description
1	OSC1		Colpitts oscillator crystal connection. Nominal voltage is V_{cc} .
2	OSC2		Colpitts oscillator capacitor connection. Nominal voltage is $V_{cc} - 0.7$ V.
3	VREF		1.2 V reference voltage output
4	MIXOUT		Mixer buffer output. Nominal voltage is $V_{cc} - 0.3$ V.

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Number	Name	Equivalent circuit	Description
5	VCC		Supply voltage
6	IFIN		IF amplifier input. Nominal voltage is $V_{CC} - 0.9$ V.
7	DC1		IF amplifier feedback network connections. Nominal voltage is $V_{CC} - 0.9$ V.
8	DC2		
9	COMP+		RSSI comparator threshold input
10	RSSI		Open-collector, RSSI comparator output
11	LIMOUT		Limiter amplifier output. Nominal voltage is 0.2 V.
12	QUADCOIL		Detector tuning network connection. Nominal voltage is V_{CC} .
13	SCHMOUT		Open-collector, noise comparator Schmitt-trigger output
14	SDET		Signal strength detector output. Nominal voltage is in the range 0.1 to 1.5 V.
15	DETOUT		FM detector output. Nominal voltage is 1.2 V.
16	IN1		Operational amplifier 1 inverting input. Nominal voltage is 1.0 V.
17	OUT1		Operational amplifier 1 output. Nominal voltage is 1.0 V.

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Number	Name	Equivalent circuit	Description
18	IN2		Operational amplifier 2 inverting input. Nominal voltage is 1.0 V.
19	OUT2		Operational amplifier 2 output. Nominal voltage is 1.0 V.
20	IN3		Operational amplifier 3 inverting input. Nominal voltage is 1.0 V.
21	OUT3		Operational amplifier 3 output. Nominal voltage is 1.0 V.
22	NRDET		Noise detector output. Nominal voltage is in the range 0 to 1.4 V.
23	GND		Ground
24	MIXIN		Mixer input. Nominal voltage is 1.2 V.

SPECIFICATIONS

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	8	V
Power dissipation	P_D	300	mW
Operating temperature range	T_{OPR}	-20 to 75	°C
Storage temperature range	T_{STG}	-40 to 125	°C

Recommended Operating Conditions

$T_A = 25\text{ °C}$

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	3	V
Supply voltage range	V_{CC}	2.4 to 6.0	V

Electrical Characteristics

 $V_{CC} = 3 \text{ V}$, $T_a = 25 \text{ }^\circ\text{C}$, $f_c = 21.7 \text{ MHz}$, $f_{mod} = 1 \text{ kHz}$, $\Delta f = \pm 3 \text{ kHz}$

Parameter	Symbol	Condition	Rating			Unit
			min	typ	max	
Quiescent supply current	I_{CCO}		—	2.8	3.8	mA
Noise detector output voltage	V_{ND}	$V_i = 10 \text{ dB}\mu$	1.1	1.4	—	V
		$V_i = 30 \text{ dB}\mu$	—	0	0.1	
Schmitt-trigger output voltage	V_{SH}	$V_i = 10 \text{ dB}\mu$	—	—	0.5	V
		$V_i = 25 \text{ dB}\mu$	2.8	—	—	
Signal meter output voltage	V_{SM}	$V_i = 5 \text{ dB}\mu$	—	0.1	0.3	V
		$V_i = 50 \text{ dB}\mu$	0.8	1.1	1.4	
		$V_i = 80 \text{ dB}\mu$	1.3	1.6	2.0	
RSSI output voltage	V_{RSSI}	$V_i = 5 \text{ dB}\mu$	2.8	—	—	V
		$V_i = 35 \text{ dB}\mu$	—	—	0.5	
Demodulated rms output voltage	V_o	$V_i = 80 \text{ dB}\mu$	115	170	230	mV
-3 dB limiting sensitivity	-3dBLS	$V_i = 80 \text{ dB}\mu$	—	5	11	dB μ
Signal-to-noise ratio	S/N	$V_i = 80 \text{ dB}\mu$, zero modulation	54	60	—	dB
		$V_i = 20 \text{ dB}\mu$, zero modulation	20	25	—	
Amplitude modulation rejection ratio	AMR	30% AM modulation, $V_i = 80 \text{ dB}\mu$	30	40	—	dB
Schmitt-trigger level	SH		10	18	25	dB μ
Schmitt-trigger hysteresis	SH _{HY}		—	1	—	dB
Mixer conversion gain	G_M		—	20	—	dB
Mixer input frequency	f_M		—	—	90	MHz
Mixer input impedance	R_{MI}		—	3.6	—	k Ω
Mixer output impedance	R_{MO}		—	1.8	—	k Ω
IF amplifier input impedance	R_{II}		—	1.8	—	k Ω
FM detector output impedance	R_{FMO}		—	2.4	—	k Ω
Total harmonic distortion	THD	$V_i = 80 \text{ dB}\mu$	—	0.7	2.0	%

TYPICAL APPLICATIONS

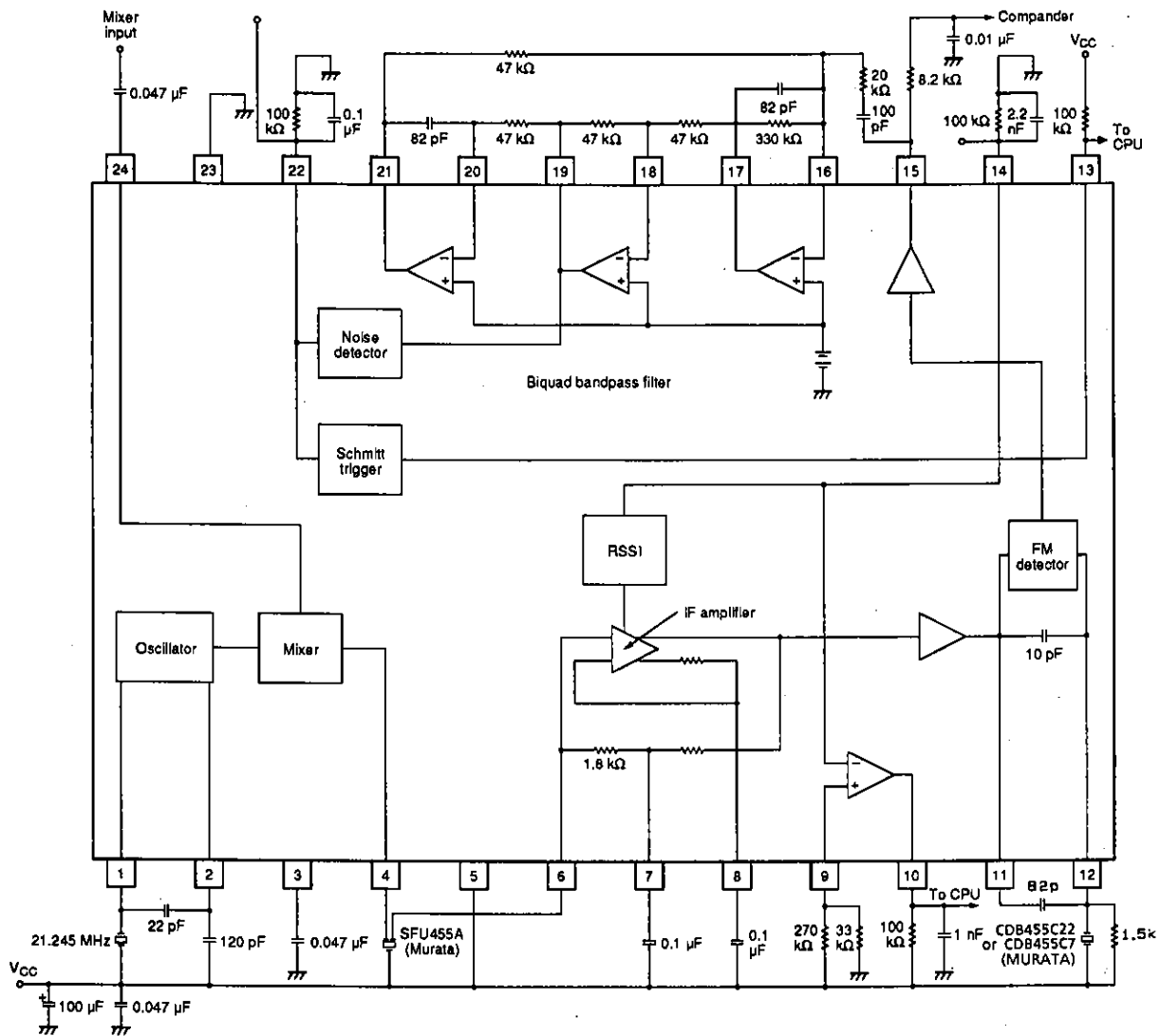


Figure 1. Crystal detector

