

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.

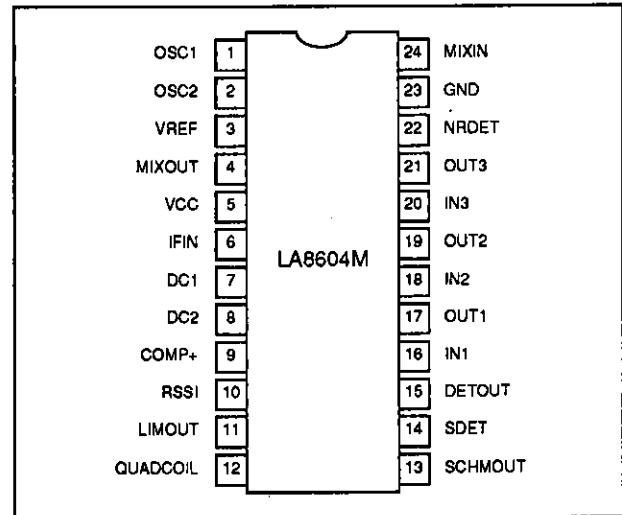
The LA8604M comprises a second-stage oscillator, a mixer, an IF amplifier, an FM detector, and noise detector, amplifier and rectifier circuits. A signal level meter output which is linear over a wide dynamic range of up to 70 dB is also incorporated.

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

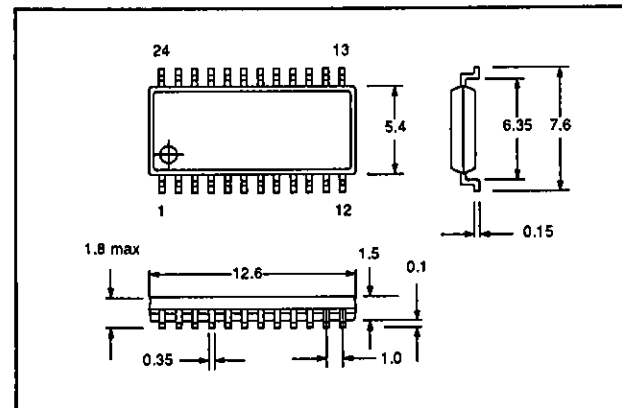
PINOUT



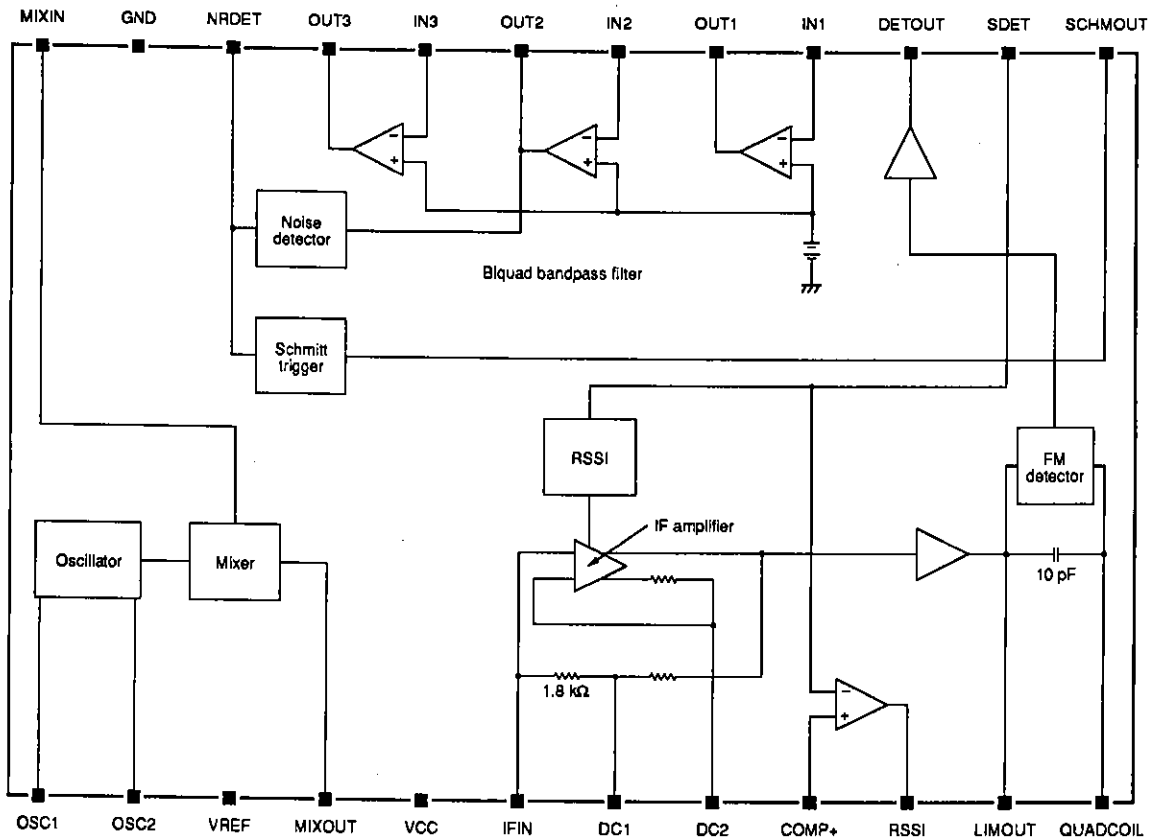
PACKAGE DIMENSIONS

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.

LA8604M

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.

LA8604M

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

LA8604M

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

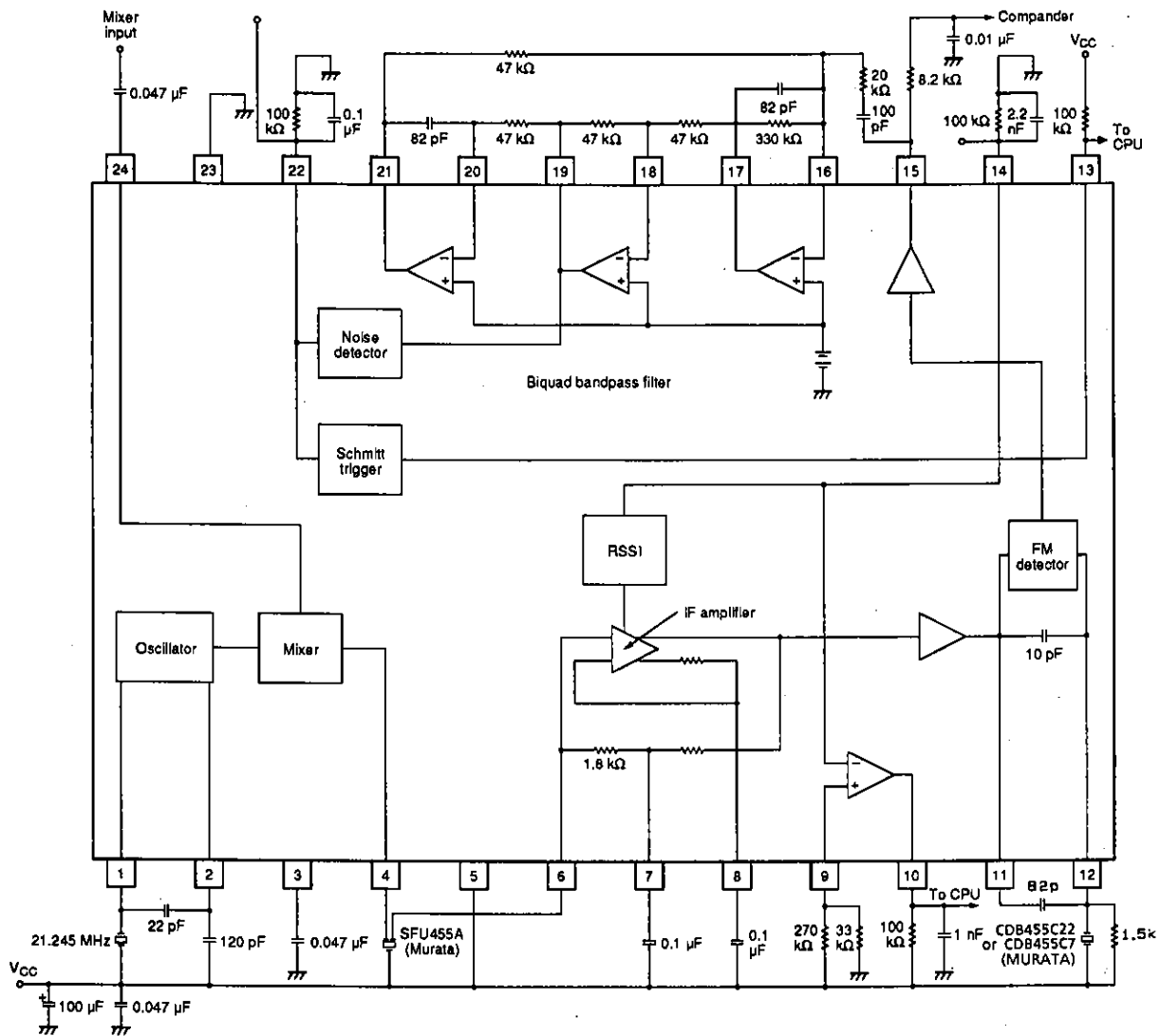


Figure 1. Crystal detector

LA8604M

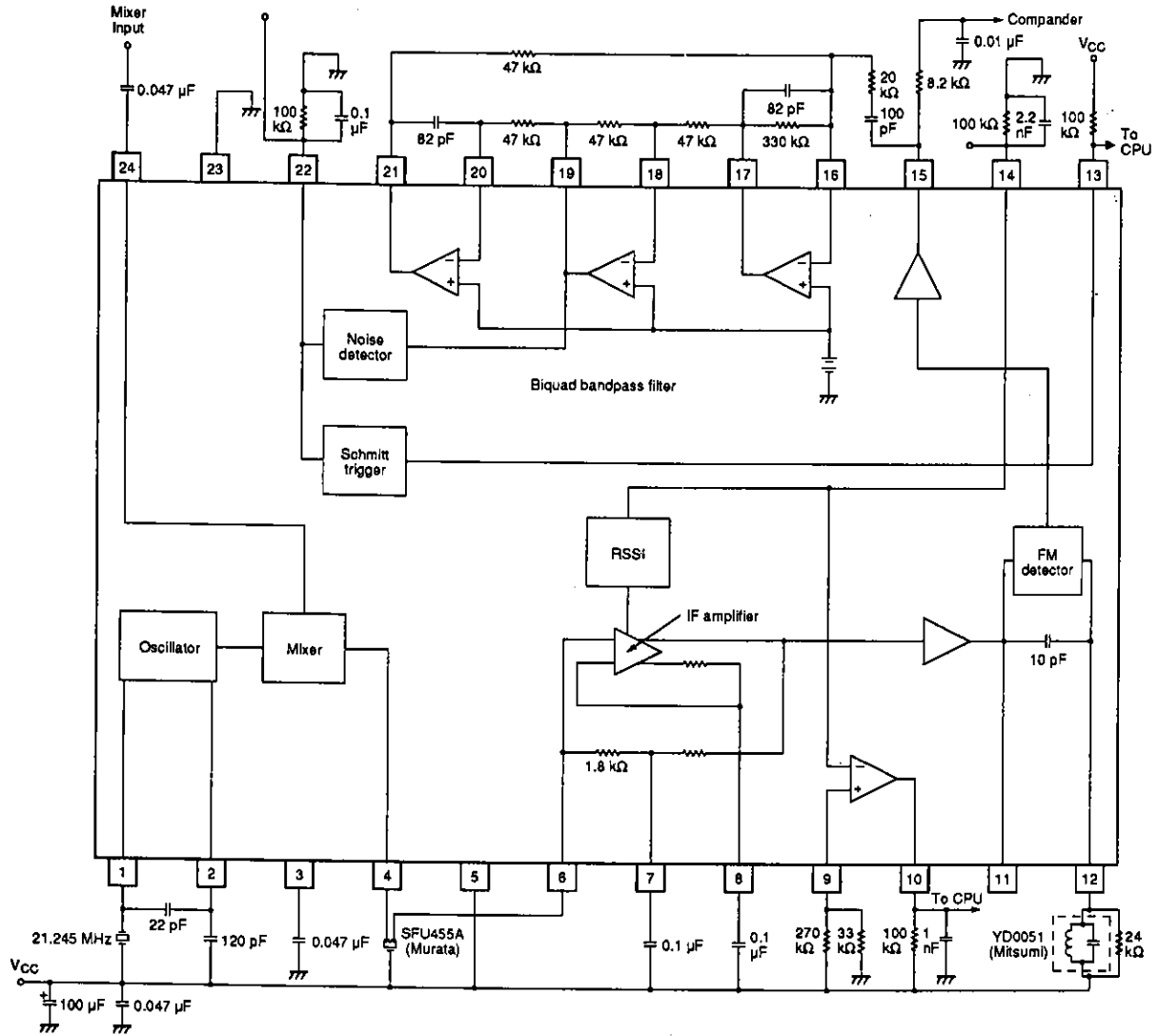


Figure 2. LC network detector

- No products described or contained herein are intended for use in surgical implants, life-support systems, aerospace equipment, nuclear power control systems, vehicles, disaster/crime-prevention equipment and the like, the failure of which may directly or indirectly cause injury, death or property loss.
- Anyone purchasing any products described or contained herein for an above-mentioned use shall:

 - ① Accept full responsibility and indemnify and defend SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors and all their officers and employees, jointly and severally, against any and all claims and litigation and all damages, cost and expenses associated with such use;
 - ② Not impose any responsibility for any fault or negligence which may be cited in any such claim or litigation on SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors or any of their officers and employees jointly or severally.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.