



SANYO Semiconductors DATA SHEET

LV3401M — Bi-CMOS IC FM Multiplex Filter

Overview

The LV3401M is a filter IC for FM multiplex broadcasting reception which is used in combination with demodulation and error correction IC (LC72700 series). The use of switched capacitor filter (SCF) technique obviates the need for frequency adjustment and ensures stable operation.

Functions

- 76kHz BPF (Gaussian filter)
- 54kHz HPF
- 125kHz LPF
- Anti-aliasing filter
- Limiter circuit

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\ max}$		6	V
Input voltage	V_3, V_{12}		-0.3 to $V_{CC}+0.3$	V
Allowable power dissipation	$P_d\ max$	$T_a \leq 85^\circ\text{C}^*$	180	mW
Operating temperature	T_{opr}		-40 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +125	$^\circ\text{C}$

* Mounted on a board: $114.3 \times 76.1 \times 1.6\text{mm}^3$ Glass epoxy

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

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		5.0	V
Allowable operating range	$V_{CC\ op}$		3 to 5.5	V
Input signal voltage range	V_{IN}	Baseband signal for FM : 100% modulation	200 to 300	mVrms
		$f_{in} = 76\text{kHz, CW}$	8 to 30	mVrms
Clock frequency	f_{ck}	Rectangular wave	3.60	MHz
Clock input voltage	V_{ck}	Rectangular wave	1.0 to V_{CC}	Vp-p

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LV3401M

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$, $f_{ck} = 3.6\text{MHz}$, $V_{ck} = 1\text{Vp-p}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply current	I_{CCO}	Pin 14 current when $V_{IN} = \text{no signal}$	3.8	6	8	mA
SCF block common voltage	V_2	Pin 2 voltage when $V_{IN} = \text{no signal}$	2.2	2.4	2.6	V
Signal input resistance	R_{IN3}	Pin 3 input resistance		36		k Ω
Clock input resistance	R_{IN12}	Pin 12 input resistance		5		k Ω
[MSK output]						
MSK input sensitivity	V_{3S}	Input level at which an MSK output having a frequency of 76kHz is obtained when $V_{IN} = 76\text{kHz}$, CW is applied.			4	mVrms
MSK output H level	V_{10H}	$V_{IN} = 76\text{kHz}$, 4mVrms, CW	4			V
MSK output L level	V_{10L}				0.4	V

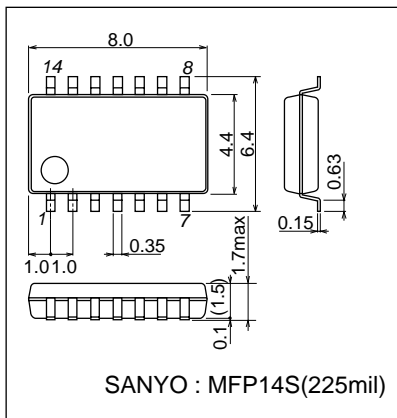
Reference Characteristics

Parameter	Symbol	Conditions	Ratings	Unit
AAF cutoff frequency	f_{AAF}		300	kHz
HPF corner frequency	f_{HPF}		54	kHz
LPF cutoff frequency	f_{LPF}		125	kHz
BPF center frequency	f_{BPF}		76	kHz
BPF-3dB frequency	$f_{BPF-3dB}$		19	kHz
In-band maximum group delay time difference	B_{DL}		± 5	μs

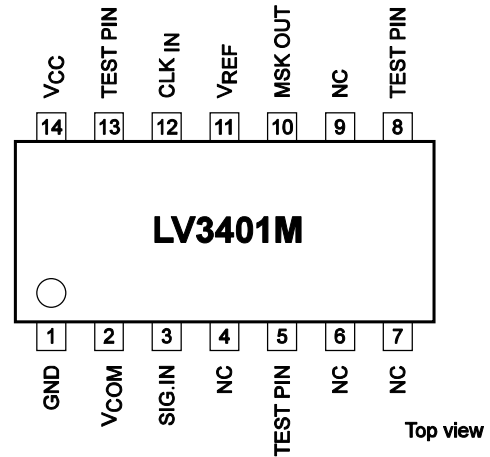
Package Dimensions

unit :mm

3111A

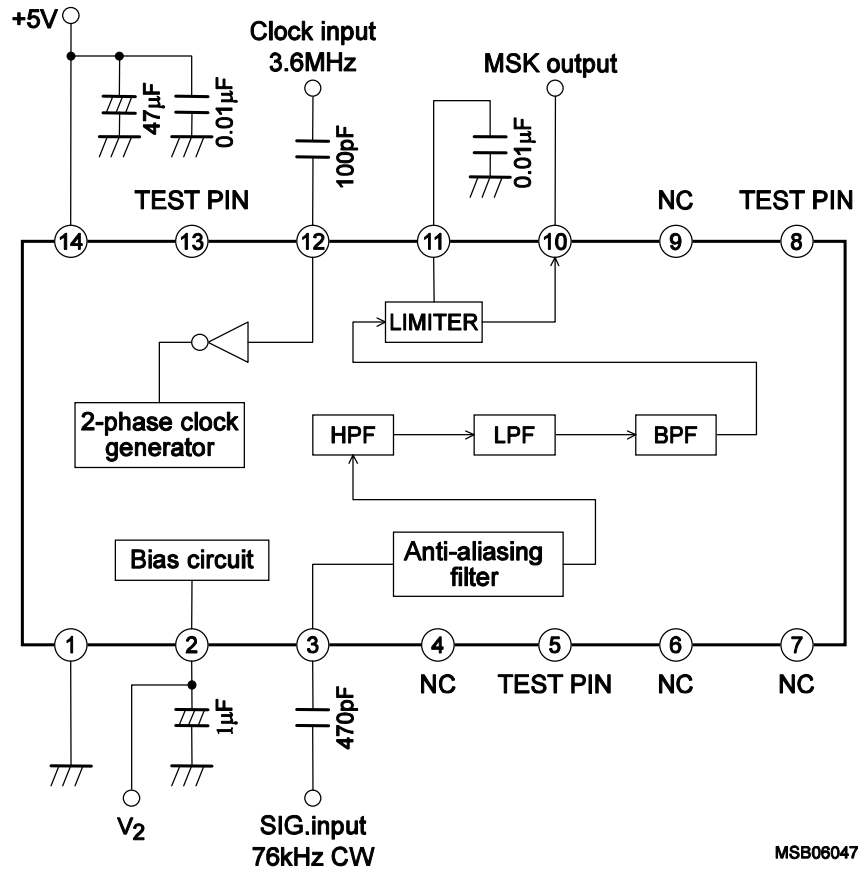


Pin Assignment



LV3401M

Block Diagram and Test Circuit

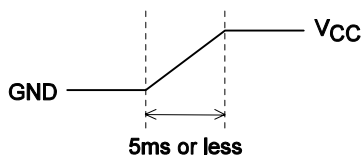


Pin Description

Pin No.	Pin name	Description
1	GND	Ground pin
2	VCOM	SCF block common pin. Decoupling capacitor connection.
3	SIG.IN	Signal input pin. FM demodulation signal (composite signal) input. Demodulation signal 200 to 300mVrms input. When 76kHz only is input, input sensitivity is 4mVrms or less.
10	MSK OUT	MSK output (CMOS output)
11	VREF	Limiter reference pin. Internal resistor and external capacitor are used to form LPF.
12	CLK _{IN}	3.6MHz clock input. Since limiter amplifier provides DC bias, clock is input through capacitive coupling.
14	V _{CC}	Power supply pin.
5, 8, 13	TEST PIN	Test pin. Left open.
4, 6, 7, 9	NC	Idle pin.

Usage Notes

- (1) Leave pins 4 to 9 and pin 13 open.
- (2) Input the clock to pin 12, as such, through a capacitor (100pF) from the decoder(LC72700 series) clock output pin or input the clock to pin 12 through a capacitor after making the rising/trailing edge less steep by inserting a CR-formed LPF en route if it is desirable to reduce spurious radiation from the clock line.
- (3) 5ms or less are recommended at the rising time of the power supply.



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