



SANYO Semiconductors DATA SHEET

LV23002M — Bi-CMOS IC For Radio Cassette and Mini Component System 1-chip Tuner IC Incorporating PLL

Overview

The LV23002M is a one-chip tuner IC incorporating PLL for radio cassette and mini component system.

Features

- AM
- FM-FE
- FM-IF
- MPX
- PLL

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\ max}$	V_{CC}	7.0	V
	$V_{DD\ max}$	V_{DD}	5.0	V
Maximum input voltage	$V_{IN1\ max}$	CE, DI, CL	5.0	V
	$V_{IN2\ max}$	XIN	$V_{DD}+0.3$	V
Maximum output voltage	$V_{O1\ max}$	DO	6.0	V
	$V_{O2\ max}$	XOUT, PD	$V_{DD}+0.3$	V
	$V_{O3\ max}$	BO1, BO2, AOUT	12.0	V
Allowable power dissipation	$P_d\ max$	$T_a \leq 70^\circ\text{C}$ Mounted on a glass epoxy board. Board size : 114.3 mm×76.1mm = 1.6mm	400	mW
Operating temperature	T_{opr}		-20 to +70	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +125	$^\circ\text{C}$

Note : This product should be handled with care because the resistance of one pin against electrostatic discharge damage is low.

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Operating Condition at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V _{CC}		5.0	V
	V _{DD}		3.0	V
Operating supply voltage range	V _{CC op}		4.0 to 6.0	V
	V _{DD op}		2.5 to 3.6	V

Note : Use the product with the supply voltage applied to V_{CC} and V_{DD}.

PLL block Allowable Operating Range at Ta = -20 to +70°C, V_{SS} = 0V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply voltage	V _{DD}		2.5		3.6	V
Input high level voltage	V _{IH}	CE, CL, DI	0.7V _{DD}		5.0	V
Input low level voltage	V _{IL}	CE, CL, DI	0		0.3V _{DD}	V
Output voltage	V _{O1}	DO	0		6.0	V
	V _{O2}	BO1, BO2, AOUT	0		10	V
Operating frequency	f _{IN1}	XIN ; V _{IN1}		75		kHz
	f _{IN2}	FMIN ; V _{IN2}	10		160	MHz
	f _{IN3}	AMIN (SNS = 1) ; V _{IN3}	2		40	MHz
	f _{IN4}	AMIN (SNS = 0) ; V _{IN4}	0.5		10	MHz

Note : Due attention must be paid on leak because the XIN pin has an extremely high input impedance.

Operating Characteristics at Ta = 25°C, V_{CC} = 5.0V, V_{DD} = 3.0V, See the specified circuit.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[FM-FE characteristics] : fc = 98MHz, fm = 1kHz, 22.5kHzdev.						
3dB sensitivity	3dB LS	60dB μ V EMF, 30%mod output reference, -3dB input		3		dB μ V EMF
Actual sensitivity	QS	S/N = Input at S/N = 30dB		10		dB μ V EMF
[FM-IF monaural characteristics] : fc = 10.7MHz, fm = 1kHz, 75kHzdev.						
Demodulation output	V _O	100dB μ V, 12pin output	210	330	420	mVrms
Channel balance	CB	100dB μ V, 13pin output /12pin output	-1.5	0	+1.5	dB
Signal-to-noise ratio	S/N	100dB μ V, 12pin output	68	75		dB
Total harmonic distortion (Monaural)	THD	100dB μ V, 12pin output		0.3	1.5	%
3dB sensitivity	3dB LS	V _O reference, Input level at which V _O reference is -3dB.		38	44	dB μ V
IF count sensitivity	IF-C3	SDC0 = 1, SDC1 = 0, 18pin(DO) output	45	51	61	dB μ V
Mute attenuation	Mute-Att	100dB μ V, 12pin output		68		dB
[FM-IF stereo characteristics] : fc = 10.7MHz, fm = 1kHz, L+R = 90%, Pilot = 10%, V _{IN} = 100dB μ V						
Separation	SEP	L-mod, 12pin output /13pin output	28	40		dB
Total harmonic distortion (Main)	THD	Main-mod, 12pin output		0.5	1.5	%
Stereo ON sensitivity	ST-ON	Stereo operation ON at Pilot = 5.5% Stereo not ON at Pilot = 0.6%				
Cap challenge	CR	Stereo ON at fm = 18.6 kHz and 10% modulation fm = 19.4kHz, Stereo ON at fm = 19.4 kHz and 10% modulation				

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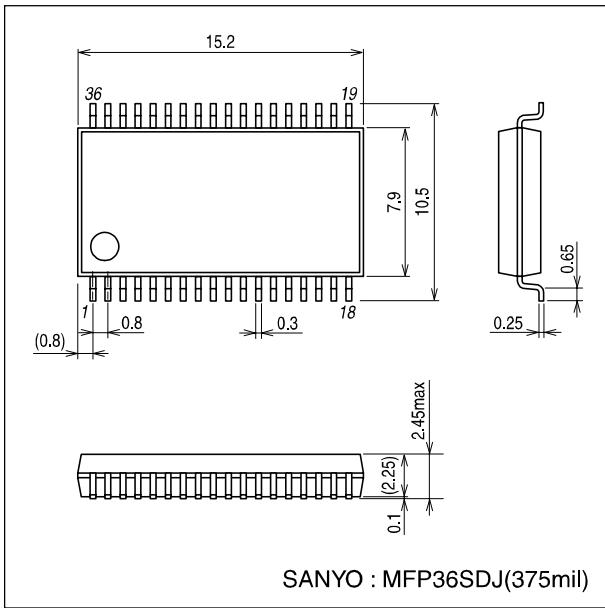
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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[AM characteristics] : $f_c = 1000\text{kHz}$, $f_m = 1\text{kHz}$, 30%mod						
Detection output 1	V_{O1}	23dB μV , 12pin output	20	40	80	mVrms
Detection output 2	V_{O2}	80dB μV , 12pin output	60	110	160	mVrms
Signal-to-noise ratio 1	S/N1	23dB μV , 12pin output	15	20		dB
Signal-to-noise ratio 2	S/N2	80dB μV , 12pin output	47	54		dB
Total harmonic distortion	THD	80dB μV , 12pin output		1.2	3.0	%
IF count sensitivity	IF-C	18pin(DO) output	16	26	36	dB μV
Low-range attenuation	LOW-CUT	V_{O2} reference, Pin 12 output at $f_m = 100\text{Hz}$	5	8	11	dB
[Current dissipation]						
Current dissipation	ICCFM	No input in FM mode	20	30	40	mA
	ICCAM	No input in AM mode	10	20	30	
	I_{DD}	$f_r = 83\text{MHz}$, $X'_{tal} = 75\text{kHz}$, No input to tuner	1	2	5	
[PLL characteristics]						
Internal return resistance	R_f	XIN		8		$M\Omega$
Built-in output resistance	R_d	XOUT		250		$k\Omega$
Hysteresis width	VHIS	CE, CL, DI		$0.1V_{DD}$		V
Output high level voltage	V_{OH}	PD ; $I_O = -1\text{mA}$	$V_{DD}-1.0$			V
Output low level voltage	V_{OL1}	PD ; $I_O = 1\text{mA}$			1.0	V
	V_{OL2}	BO1, BO2 ; $I_O = 1\text{mA}$			0.25	V
		BO1, BO2 ; $I_O = 5\text{mA}$			1.25	V
	V_{OL3}	DO ; $I_O = 1\text{mA}$			0.25	V
V_{OL4}	AOUT ; $I_O = 1\text{mA}$, AIN = 2.0V			0.5	V	
Input high level current	I_{IH1}	CE, CL, DI ; $V_I = 6.0\text{V}$			5.0	μA
	I_{IH2}	XIN ; $V_I = V_{DD}$	0.16		0.9	μA
	I_{IH3}	AIN ; $V_I = 6.0\text{V}$			200	nA
Input low level current	I_{IL1}	CE, CL, DI ; $V_I = 0\text{V}$			5.0	μA
	I_{IL2}	XIN ; $V_I = 0\text{V}$	0.16		0.9	μA
	I_{IL3}	AIN ; $V_I = 0\text{V}$			200	nA
Output off-leak current	IOFF1	BO1, AOUT, BO2 ; $V_O = 10\text{V}$			5.0	μA
	IOFF2	DO ; $V_O = 6.0\text{V}$			5.0	μA
"H" level 3-state off-leak current	IOFFH	PD ; $V_O = 6.0\text{V}$		0.01	200	nA
"L" level 3-state off-leak current	IOFFL	PD ; $V_O = 0\text{V}$		0.01	200	nA

Package Dimensions

unit : mm
3263



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