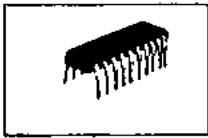




No. 1190 A

LC7132



C MOS LSI  
PLL FREQUENCY SYNTHESIZER LSI  
FOR 27MHZ CB TRANSCEIVERS

Use

PLL frequency synthesizer LSI for 27MHz CB transceivers (U.S. standard).

Functions, features

1. Built-in high speed programmable divider for direct PLL system.
2. Doubled-frequency of VCO applicable as transmitting frequency carrier.
3. PLL out-of-lock output available to inhibit transmission.
4. Instantaneous call capability of channel 9.
5. Built-in detecting circuit of mis-program.
6. Built-in amplifier for crystal oscillator.
7. Built-in amplifier for active low-pass filter.
8. 7-segment code channel selection. (allowable voltage 15V)

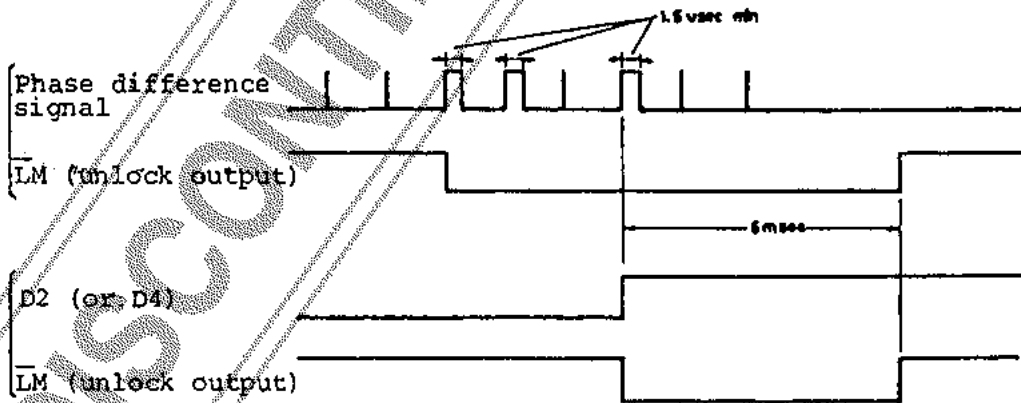
Description of functions

Digital Out-of-Lock Output

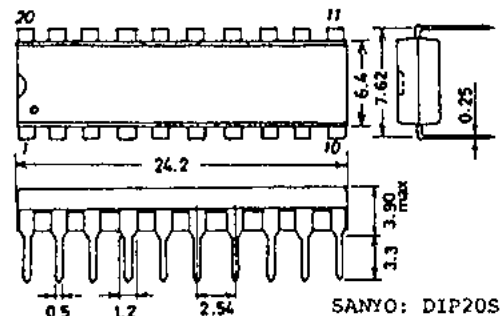
In direct PLL system, phase difference signal's pulse width at channel change is too narrow, so it is difficult to get out-of-lock signal from phase detector in the way of using C,R components externally.

LC7132 makes it possible to output the out-of-lock signal to have digital discriminate-expander of the pulse from phase detector internally (Detects the phase difference signal over 1.6 $\mu$ s pulse width, and makes it expand to 6ms output pulse).

And also LC7132 outputs the out-of-lock signal when the phase difference signal is within 1.6 $\mu$ s to have the detector of channel change input.



Case Outline  
3021B-D20S1C  
(unit:mm)



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Instantaneous call of channel 9 and recourse against miscode.

.Setting CH9 at "H" level causes channel 9 to be selected.

.Inputting miscode to D1 to D8 causes channel 19 to occur.

.The following table shows the transmitting/receiving channel corresponding to the combination of D1 to D8 and CH9.

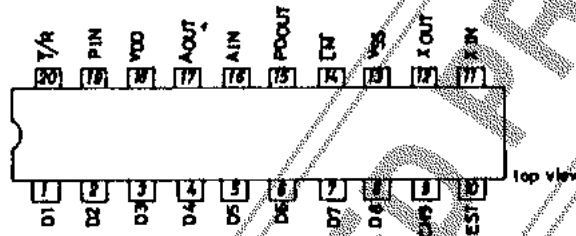
Input		Output
Data of D1 to D8	CH9	Channel
Normal code	0	Channel depending on D1 to D8
	1	Channel 9
Error program	0	Channel 19
	1	Chanel 9

1 : "H" level  
0 : "L" level

Built-in amplifier for active low-pass filter

In direct PLL system, active low-pass filter is more available, as lock-up-time of PLL using active low-pass filter is shorter than the one using passive low-pass filter. The LC7132 contains an N channel open drain amplifier for active filter in order to make lockup time shorter.

Pin Assignment



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

Parameter	Symbol	Conditions	Value	Unit
Maximum Supply Voltage	$V_{DDmax}$		-0.3 to +9.0	V
Maximum Input Voltage	$V_{INmax}(1)$	D1 to D8, CH9	-0.3 to +17	V
	$V_{INmax}(2)$	Input pins other than above.	-0.3 to $V_{DD}+0.3$	V
Maximum Output Voltage	$V_{OUT}(1)$	LM, AOUT, output off	-0.3 to +10.0	
	$V_{OUT}(2)$	PDOUT, AOUT, output off	-0.3 to $V_{DD}+0.3$	V
Maximum Output Current	$I_{OUT}(1)$	LM	0 to 15	mA
	$I_{OUT}(2)$	AOUT	0 to 2.5	mA
Allowable Power Dissipation	$P_{dmax}$	$T_a=70^\circ\text{C}$	300	mW
Operating Temperature	$T_{opg}$		-30 to +70	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$

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

Parameter	Symbol	Conditions	min	typ	max	unit
Supply Voltage	$V_{DD}$	$T_a=-30$ to $+70^\circ\text{C}$	5.0		8.0	V
Output Voltage	$V_{OUT}$	LM, AOUT, output off	0		9.0	V
Input Amplitude	$V_{IN}(1)$	$X_{IN}, *, f_{IN}(1)=10.25\text{MHz}$	1.0	$0.9V_{DD}$		Vp-p
	$V_{IN}(2)$	$PIN, *, f_{IN}(2)=20\text{MHz}$	1.0	$0.9V_{DD}$		Vp-p
Input Frequency	$f_{IN}(1)$	$X_{IN}, *, V_{IN}(1)=1.0\text{Vp-p}$	1.0		10.25	MHz
	$f_{IN}(2)$	$PIN, *, V_{IN}(2)=1.0\text{Vp-p}$	1.0		20	MHz
Input "H" Level Voltage	$V_{IH}(1)$	D1 to D8, CH9	$0.8V_{DD}$		15	V
	$V_{IH}(2)$	T/R	$0.7V_{DD}$		$V_{DD}$	V
Input "L" Level Voltage	$V_{IL}(1)$	D1 to D8, CH9	0		$0.4V_{DD}$	V
	$V_{IL}(2)$	T/R	0		$0.3V_{DD}$	V

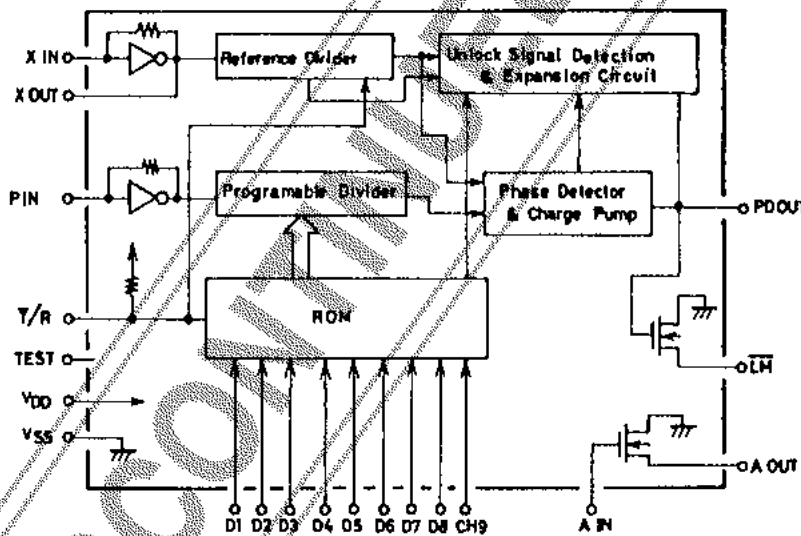
Note \* : Sinusoidal wave, capacitive coupling,  $T_a=-30$  to  $+70^\circ\text{C}$

Electrical Characteristics at  $T_a=25^\circ\text{C}, V_{DD}=5$  to  $8\text{V}$

Parameter	Symbol	Conditions	min	typ	max	unit
Input "H" Level Current	$I_{IH}(1)$	$X_{IN}, PIN, V_{IN}=V_{DD}$			40	$\mu\text{A}$
Input "H" Level Current	$I_{IH}(2)$	D1 to D8, CH9 $V_{IN}=15\text{V}$			5.0	$\mu\text{A}$
Input "H" Level Current	$I_{IH}(3)$	AIN $V_{IN}=V_{DD}$		0.01		nA
Input "L" Level Current	$I_{IL}(1)$	$X_{IN}, PIN, V_{IN}=V_{SS}$			40	$\mu\text{A}$
	$I_{IL}(2)$	D1 to D8, CH9 $V_{IN}=V_{SS}$			5.0	$\mu\text{A}$

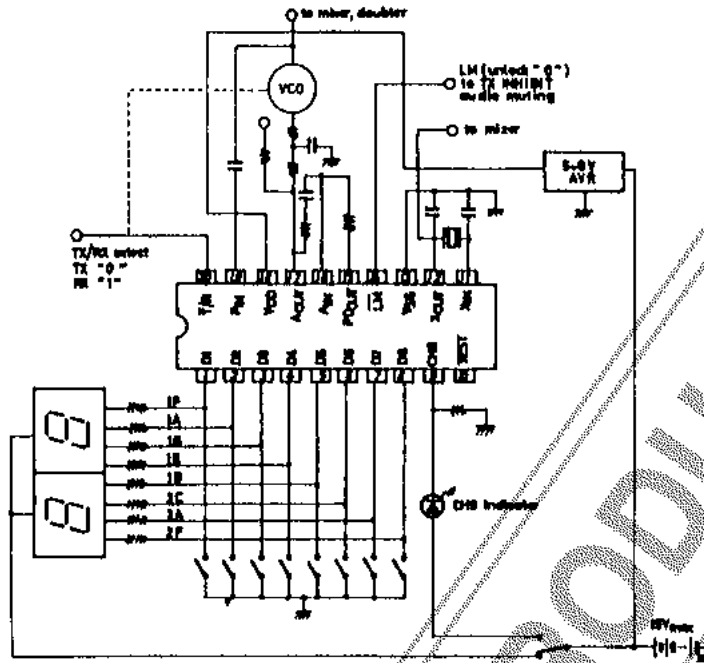
			min	typ	max	unit
Input "L" Level Current	$I_{IL}(3)$ $\bar{T}/R$	$V_{IN}=V_{SS}$	40	200	500	$\mu A$
	$I_{IL}(4)$ $A_{IN}$	$V_{IN}=V_{SS}$		0.01		nA
Output "H" Level Voltage	$V_{OH}$ $PD_{OUT}$	$I_{OUT}=0.3mA$ $V_{DD}-1.0$				V
Output "L" Level Voltage	$V_{OL}(1)$ $PD_{OUT}$	$I_{OUT}=0.3mA$			1.0	V
	$V_{OL}(2)$ $A_{OUT}$	$I_{OUT}=0.5mA$			0.3	V
	$V_{OL}(3)$ $\bar{LM}$	$I_{OUT}=15mA$			1.1	V
Feedback Resistance	$R_F(1)$ $X_{IN}$			1.0		Mohm
	$R_F(2)$ $P_{IN}$			0.5		Mohm
Input Threshold Voltage	$V_{th}$			$1/2V_{DD}$		V
"H" Level 3-State Leak Current	$I_{OFFH}$ $PD_{OUT}$	$V_{OUT}=V_{DD}$		0.01		nA
"L" Level 3-State Leak Current	$I_{OFFL}$ $PD_{OUT}$	$V_{OUT}=V_{SS}$		0.01		nA
Input Floating Voltage	$V_{IF}(1)$ $\bar{T}/R$	Input pins open		$V_{DD}-0.2$		V
Output Off Leak Current	$I_{OFF}(1)$ $A_{OUT}$	$V_{OUT}=9V$			3.0	$\mu A$
	$I_{OFF}(2)$ $\bar{LM}$	$V_{OUT}=9V$			5.0	$\mu A$
Current Dissipation	$I_{DD}$	$f_{IN}(1)=10.25MHz,$ $f_{IN}(2)=20MHz, V_{IN}(1)=V_{IN}(2)=1.0Vp-p$ $CH9=A_{IN}=V_{SS}, D1 \text{ to } D4, D6 \text{ to } D8=V_{DD}, D5=V_{SS},$ Other pins open, Number of frequency divisions=3254		10	20	mA

Equivalent Circuit and Block Diagram



- D1 to D8 : Program input (7-segment code)
- X IN, X OUT : Amplifier for crystal oscillator
- VDD, VSS : Power Supply
- $\bar{LM}$  : Lock monitor output Lock--open "1", unlock--"0"
- PDOUT : Charge pump output
- A IN, A OUT : Amplifier for low-pass filter
- P IN : Programmable divider input
- $\bar{T}/R$  : Transmission/reception changeover input  
 $\bar{T}/R="0"$ ---Transmission  $\bar{T}/R="1"$   
 $\bar{T}/R="1"$ (or open)---reception
- CH9 : Channel 9 select input
- TEST : LSI test pin (TEST pin:Connected to VSS or open)

Application Circuit



Program Data and Frequency Division

Channel No.	PROGRAM CODE								RX (T/R="1")		TX (T/R="0")	
	D1 (1F)	D2 (1A)	D3 (1G)	D4 (1E)	D5 (1B)	D6 (2C)	D7 (2A)	D8 (2F)	N	F <sub>VCO</sub> (MHz)	N	F <sub>VCO</sub> (MHz)
1	1	1	1	1	0	1	1	1	3254	16.27	5393	13.4825
2	1	0	0	0	0	1	1	1	3256	16.28	5395	13.4875
3	1	0	0	1	0	1	1	1	3258	16.29	5397	13.4925
4	0	1	0	1	0	1	1	1	3262	16.31	5401	13.5025
5	0	0	0	1	1	1	1	1	3264	16.32	5403	13.5075
6	0	0	0	0	1	1	1	1	3266	16.33	5405	13.5125
7	-	0	1	1	0	1	1	1	3268	16.34	5407	13.5175
8	0	0	0	0	0	1	1	1	3272	16.36	5411	13.5275
9	0	0	0	1	0	1	1	1	3274	16.37	5413	13.5325
10	0	0	1	0	0	0	1	1	3276	16.38	5415	13.5375
11	1	1	1	1	0	0	1	1	3278	16.39	5417	13.5425
12	1	0	0	0	0	0	1	1	3282	16.41	5421	13.5525
13	1	0	0	1	0	0	1	1	3284	16.42	5423	13.5575
14	0	1	0	1	0	0	1	1	3286	16.43	5425	13.5625
15	0	0	0	1	1	0	1	1	3288	16.44	5427	13.5675
16	0	0	0	0	1	0	1	1	3292	16.46	5431	13.5775
17	-	0	1	1	0	0	1	1	3294	16.47	5433	13.5825
18	0	0	0	0	0	0	1	1	3296	16.48	5435	13.5875
19	0	0	0	1	0	0	1	1	3298	16.49	5437	13.5925
20	0	0	1	0	0	1	0	1	3302	16.51	5441	13.6025
21	1	1	1	1	0	1	0	1	3304	16.52	5443	13.6075
22	1	0	0	0	0	1	0	1	3306	16.53	5445	13.6125
23	1	0	0	1	0	1	0	1	3312	16.56	5451	13.6275
24	0	1	0	1	0	1	0	1	3308	16.54	5447	13.6175
25	0	0	0	1	1	1	0	1	3310	16.55	5449	13.6225
26	0	0	0	0	1	1	0	1	3314	16.57	5453	13.6325
27	-	0	1	1	0	1	0	1	3316	16.58	5455	13.6375
28	0	0	0	0	0	1	0	1	3318	16.59	5457	13.6425
29	0	0	0	1	0	1	0	1	3320	16.60	5459	13.6475
30	0	0	1	0	0	0	0	1	3322	16.61	5461	13.6525
31	1	1	1	1	0	0	0	1	3324	16.62	5463	13.6575
32	1	0	0	0	0	0	0	1	3326	16.63	5465	13.6625
33	1	0	0	1	0	0	0	1	3328	16.64	5467	13.6675
34	0	1	0	1	0	0	0	1	3330	16.65	5469	13.6725
35	0	0	0	1	1	0	0	1	3332	16.66	5471	13.6775
36	0	0	0	0	1	0	0	1	3334	16.67	5473	13.6825
37	-	0	1	1	0	0	0	1	3336	16.68	5475	13.6875
38	0	0	0	0	0	0	0	1	3338	16.69	5477	13.6925
39	0	0	0	1	0	0	0	1	3340	16.70	5479	13.6975
40	0	0	1	0	0	0	1	0	3342	16.71	5481	13.7025

"1" : logical high level  
 "0" : logical low level  
 "-" : don't care