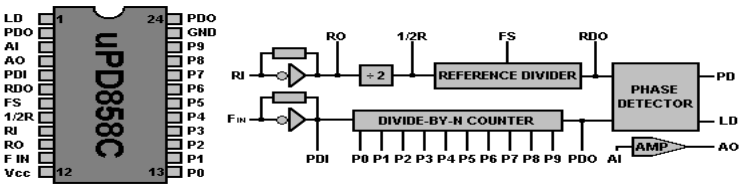
Last modified 2020-04-17

uPD858C

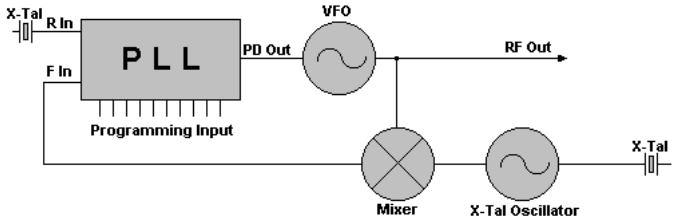
PLL frequency synthesizer



Overview

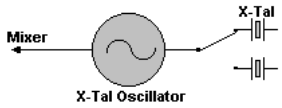
This PLL-circuit use a 10 bit BCD programmable divide-by-N counter for 399 channels.

Down-converting of the frequency to the divider



This PLL circuit use a mixer and a XTAL oscillator to convert the output frequency f_{OUT} to the f_{IN} to the PLL Circuit.
The XTAL frequency is $f_{XTAL} = f_{OUT} - f_{IN}$

The output frequency can be changed by changing the mixing-XTAL or add a new mixing-XTAL to the oscillator.



Pin	Name	Description
1	LD	Loop detector output - High = Unlocked, Low = Locked
2	PD out	Phase Detector output
3	AI	Loop filter Amplifier Input
4	AO	Loop filter Amplifier Output
5	PDI	Programmable Divider Input
6	RDO	Reference Divider Output
7	FS	Frequency Select input - High=10 KHz, Low=5 KHz
8	1/2R	Reference frequency divided by 2
9	RI	Reference oscillator Input (XTAL)
10	RO	Reference oscillator Output (XTAL)
11	Fin	VCO oscillator input
12	VCC	Power supply (+5 VDC)
13	P0	Programmable input 0
14	P1	Programmable input 1
15	P2	Programmable input 2
16	P3	Programmable input 3
17	P4	Programmable input 4
18	P5	Programmable input 5
19	P6	Programmable input 6
20	P7	Programmable input 7
21	P8	Programmable input 8
22	P9	Programmable input 9
23	GND	Ground
24	PO	Programmable divider Output

Modification methods

BCD Programming of uPD858

Ch. No.	Divided by	P0	P1	P2	P3	P4	P5	P6	P7	P8	P9
1	91	1	0	0	0	1	0	0	1	0	0
2	92	0	1	0	0	1	0	0	1	0	0
3	93	1	1	0	0	1	0	0	1	0	0
4	95	1	0	1	0	1	0	0	1	0	0
..	..	..	..	..	..	..	..	..	0		
40	135	1	0	1	0	1	1	0	0	1	0

P0 to P3 is ONES
P4 to P7 is TENS
P8 to P9 is HUNDREDS

Above each program pin number is now something called "BCD POWERs" rather than the previous "POWERS-OF-2". In this system the pins are assigned such that eac successive group of pins has a significance 10 times greater than the preceeding group. Within each decimal group the weights still double in the usual binary progressio but here the highest possible number in a group can't exceed "9" or its decimal multiple such as "90", "900", etc. (Assuming there were that many IC pins.)

Each decimal group can only have a maximum of 4 bits. In this IC there are only 10 rather than 12 program pins so the Hundreds Group can never be worth more than (1
2) x 100 or 300. Just figure the total binary value of each group in the usual way, multiply it by 1, 10, or 100 as appropriate, then add all the groups together: 0nes Group
Tens Group + Hundreds Group, etc.

Since each group has a value, the sum of the groups is the N-Code. For Ch.1, the group sum is 1 + (10 + 80) = 91. Try the math yourself for the other channels. Also notic
that Pin 22 is permanently grounded (logic "0") since its BCD weight is "200", but we never need a code bigger than "135." (100 + 30 + 5.) By using all ten pins (pins 13
22) you see there's a potential frequency capacity of (9 + 90 + 300) = 399 channels if you could .program them all. This fact has been put to great use in modifications!
Once again, the uPD858 chip had the excess capacity for possible use elsewhere.

See also the explanation of PLL pin functions