PRODUCT NAME

TR3002

TITLE

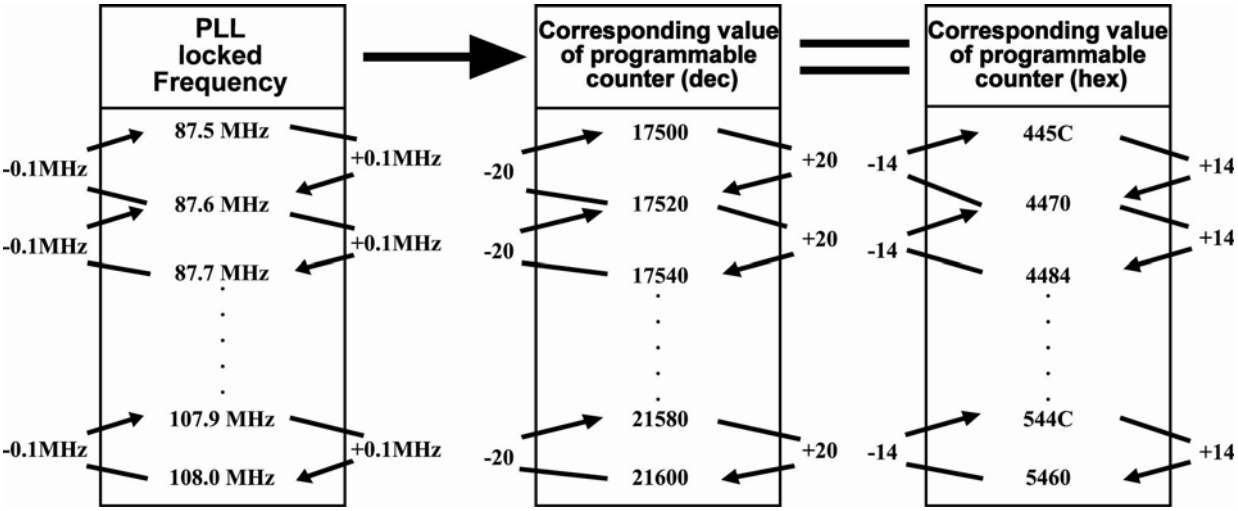
1. **Relationship between the setting value of programmable counter and the PLL lockable frequency.**
2. **How to lower the power consumption of MCU after cut the power supply of TR3002.**

APPLICATION NOTE

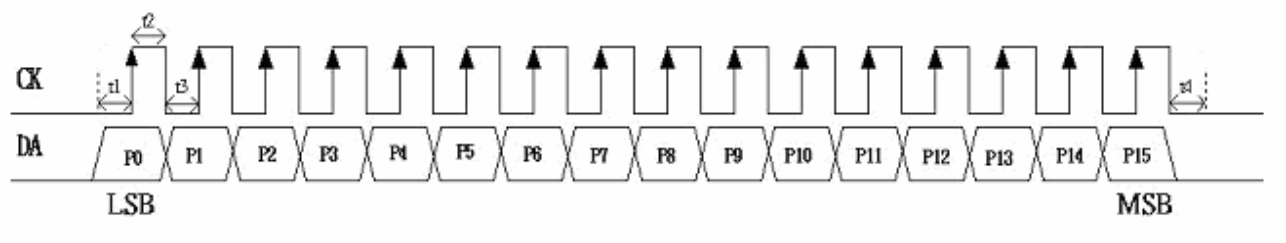
1. **Relationship between the setting value of programmable counter and the PLL lockable frequency:**

   (1). Voltage range VDD=2.2V ~ 3.6V, 1MHz ~ 20MHz crystal can be used.

   (2). If the 4MHz crystal is used, the PLL lockable frequency range would be 87.5 MHz ~ 108.0 MHz, and the setting range of programmable counter, which is corresponding to these frequency values, would be 17500 ~ 21600. When the interval of each lockable frequency is ± 0.1MHZ, the value of the programmable counter changes ± 20.
   For example:



(3). Serial data transfer format:
To transmit the value of programmable counter via the serial I/O port of TR3002

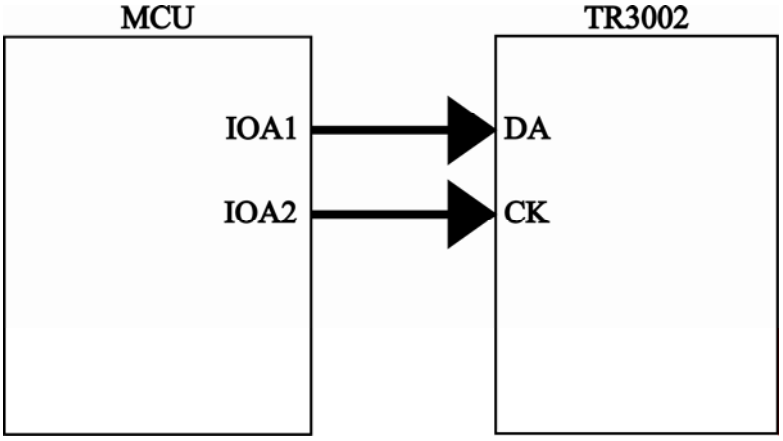


(A). CK signal: The DA signal will latch into the TR3002 at the CK rise edge.
(B). DA signal: The value of programmable counter needs to be transmitted from LSB.
(C). t1, t2, t3, t4 TIME: > 4us.
(D). The CK signal and DA signal need to keep "LOW" after the transmission of 16 bits data is completed.

(4). How to calculate the setting value of programmable counter:
[P15…...P0] = N (setting value of programmable counter:
1600(dec) < N < 65280 (dec))

For example:
If N = 17500;
Crystal frequency = 4MHz;
Reference frequency = 4MHz/800(fixed) = 5kHz.
Synthesis frequency f= 5kHz * N=5kHz * 17500 = 87.5MHz

(5). Hardware:
To control the TR3002 by MCU. (see the diagram below)



(6). The program example below is the code for the 4 bit MCU (tenx technology inc.) to control TR3002 and lock the 87.5MHz [445C(hex)] signal (transmit the CK and DA signal via IOA port, and define IOA2=CK, IOA1=DA)

```
.data
                data0   equ  00h          ; define data0~data3 as values for
                                             programmable counter
                data1   equ  01h          ; data3 is MSB; data0 is LSB
                data2   equ  02h
                data3   equ  03h

                serial_signal   equ   04h  ; define to transmit the CK, DA signal
                data_times      equ   05h
                data_buff 0     equ   06h
                data_buff 1     equ   07h
                .endd
.code
Start:
                lds  data0 , 0CH           ; initialize data0~data3(445C)
                lds  data1 , 05H
                lds  data2 , 04H
                lds  data3 , 04H

                lds  serial_signal, 00h    ; initialize CK=0 and DA=0
                opa  serial_signal,        ; transmit via IOA port
                spa  1fh

                lds  70H, 00h              ; move the content marked with data0
                                             to the field marked with data_buff0
                mvl  70H
                mvh  71H
                mvu  70H
                lda#  @hl
                sta   data_buff0
                lds   data_times,04H       ; code data total 16 bit
                lds   data_buff1,04H       ; set data_times  *data_buff1=16
                call   send_clk
.endc
;*****************************************************************************************
send_clk:                                  ; send_clk subroutine function is to
                                             transmit the content of data0~data3
                                             register via IOA port, in serial mode.
send_clk0:
                lda    data_buff0
                jb0    send_clk1
                lds    serial_signal,00h
                opa    serial_signal
                lds    serial_signal,02h
```

```
                jmp   send_clk2
send_clk1:
                lds   serial_signal,01h
                opa   serial_signal
                lds   serial_signal,03h
                nop
send_clk2:
                dec* data_buff1
                jz    send_clk3
                nop
                nop
                nop
                opa   serial_signal
                sr0   data_buff0
                nop
                nop
                jmp   send_clk0
send_clk3:
                lds   data_buff1,04h
                dec*  data_times
                jz    send_clk4
                opa   serial_signal
                lda#  @hl
                sta   data_buff0
                nop
                jmp   send_clk0
send_clk4:
                opa   serial_signal
                nop
                nop
                nop
                nop
                nop
                nop
                nop
                nop
                nop
                nop
                nop
                nop
                nop
                nop
                lds   70h,00h
                opa   70h
                rts
```

2. How to lower the power consumption of MCU after cut the power supply of TR3002:

(1). There are two signal lines between the MCU and TR3002: CK and DA.

(2). After cut the power supply of TR3002, set the two signal lines as “LOW” to lower the unnecessary power consumption at the MCU IO lead.