

DA 产生正弦波

明德扬科技教育有限公司

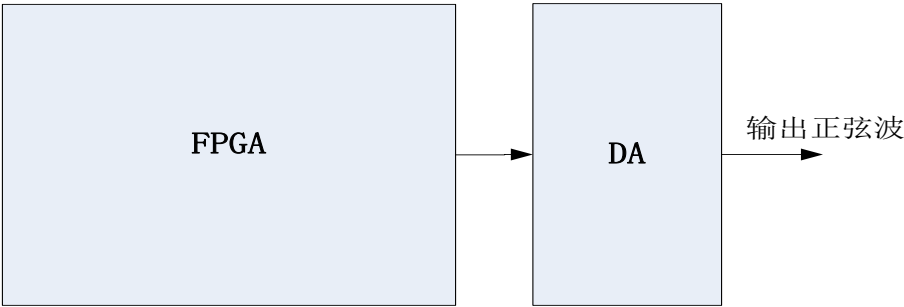
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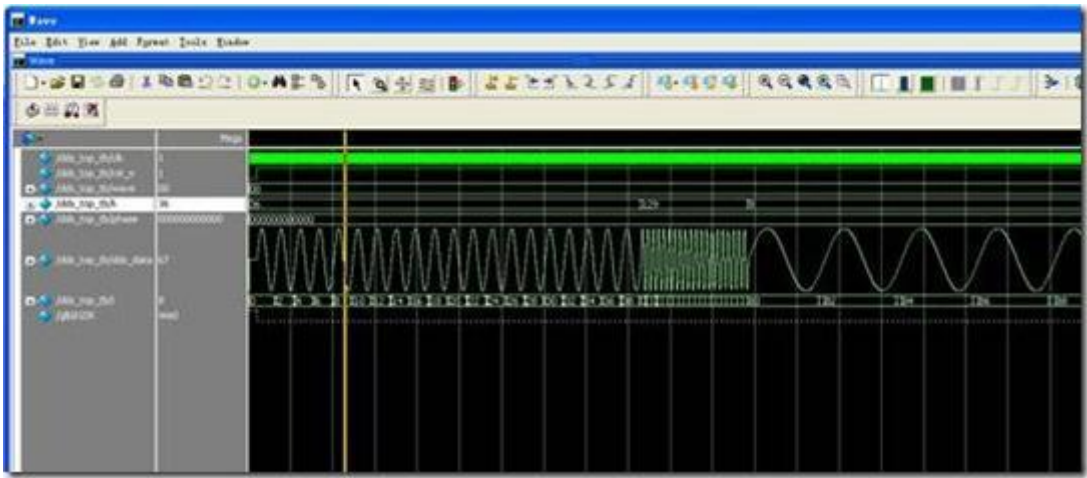
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一、 练习要求说明



DA 模块：就是数模转换模块，可以输出不同幅度的电压。

本练习要实现的功能是连续输出正弦波：先输出 20 个频率为 0.5k 的正弦波；然后是 20 个频率为 2K 的正弦波；然后是 20 个频率为 0.1K 的正弦波。重复以上过程。



我们提供的资料：AD DA 模块的原理图；DA 芯片的数据手册：DAC0832.pdf

提示：可能会用到 IP 核：ROM

二、 接口信号

信号名	I/O	位宽	说明
clk	I	1	系统工作时钟 50M
rst_n	I	1	系统复位信号，低电平有效

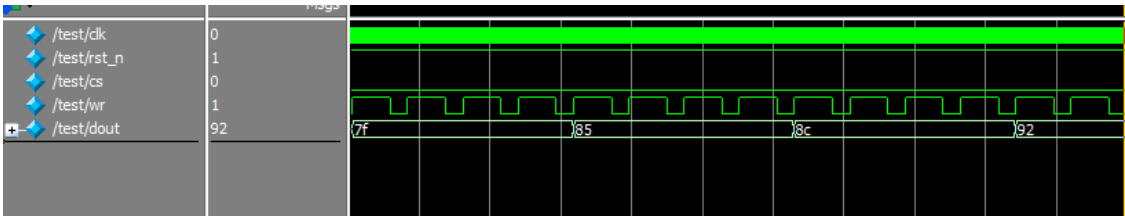
cs	O	1	与 DAC 相连的片选 CS 信号
wr	O	1	与 DAC 相连的写使能 WR 信号
dout	O	8	与 ADC 相连的数据 DATA 信号

三、 功能说明

本练习使用到 ROM，可参考 ROM IP 核的使用，本练习提供 ROM 初始化文件 sin.mif。
sin.mif 的结构如下图。

```
1 WIDTH=8;
2 DEPTH=128;
3 ADDRESS_RADIX=UNS;
4 DATA_RADIX=HEX;
5 CONTENT BEGIN
6 0:7F;
7 1:85;
8 2:8C;
9 3:92;
10 4:98;
11 5:9E;
12 6:A4;
13 7:AA;
14 8:B0;
15 9:B6;
16 10:BC;
17 11:C2;
18 12:C8;
19 13:CE;
20 14:D4;
21 15:DA;
22 16:E0;
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943 937:4C;
944 938:50;
945 939:54;
946 940:58;
947 941:5C;
948 942:60;
949 943:64;
950 944:68;
951 945:6C;
952 946:70;
953 947:74;
954 948:78;
955 949:7C;
956 950:80;
957 951:84;
958 952:88;
959 953:8C;
960 954:90;
961 955:94;
962 956:98;
963 957:9C;
964 958:A0;
965 959:A4;
966 960:A8;
967 961:AC;
968 962:B0;
969 963:B4;
970 964:B8;
971 965:BC;
972 966:C0;
973 967:C4;
974 968:C8;
975 969:CC;
976 970:D0;
977 971:D4;
978 972:D8;
979 973:DC;
980 974:E0;
981 975:E4;
982 976:E8;
983 977:EC;
984 978:F0;
985 979:F4;
986 980:F8;
987 981:FC;
988 982:00;
989 983:04;
990 984:08;
991 985:0C;
992 986:10;
993 987:14;
994 988:18;
995 989:1C;
996 990:20;
997 991:24;
998 992:28;
999 993:2C;
```

第 6 行代码的 0 为第 0 个数据，数据值为 8'h7F。
第 7 行代码的 1 为第 1 个数据，数据值为 8'h85。
依此类推，最后第 127 个数据，数据值为 8'h7F。



cs 信号：如波形图所示，该信号一直输出为 0。表示片选一直有效。
wr 信号：该信号每隔 3900ns 的时间，就输出一个低电平脉冲。低电平脉冲的宽度为：120ns。
dout 信号：该信号可分成三个阶段。

第 1 阶段，每隔 (3900×4) ns 变化一次，按初始化文件的顺序输出值，如先输出 8'h7F，等 (3900×4) ns 后输出 8'h85，将 mif 文件的数据输出完，然后重复 20 次。

第 2 阶段：每隔 (3900×1) ns 变化一次，按初始化文件的顺序输出值，如先输出 8'h7F，等 (3900×1) ns 后输出 8'h85，将 mif 文件的数据输出完，然后重复 20 次。

第 3 阶段：每隔 (3900×20) ns 变化一次，按初始化文件的顺序输出值，如先输出 8'h7F，等 (3900×20) ns 后输出 8'h85，将 mif 文件的数据输出完，然后重复 20 次。

第 3 阶段完成后，又从阶段 1 开始重复。

上面第 1 阶段即产生了 20 个 0.5k 的正弦波；阶段 2 产生了 20 个 2k 的正弦波；阶段 3 产生了 20 个 0.1k 的正弦波。

在波形窗口，在 dout 信号名右键，选择 format, analog(automatic)；然后在 dout 信号名右键，radix, unsigned，就可以将 dout 以模拟波形的方式来显示，如下图。

