# 2.03 时钟测试（RTC）(2.12 3.02)

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1. 测试仪器：直流稳压电源（IT6932A）；数字示波器（TDS2022C）；高低温交变湿热试验箱（501565）
2. 测试工具：CS2110 下载器，CS2110 MPA DEMO VER1.2
3. 上位机下载软件及烧写程序：CS2110 3.0.0



1. 测试方法：烧录不同主频程序输出PWM波，测试各时钟模块的电压系数及温漂；
2. 要求：2.03 各时钟源切换与选择功能正常
   1. 脉冲宽度调制器寄存器读写及对应功能正常。
3. 测试数据：

各时钟模块的电压系数: 单位：KHz

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 14K | 1# | 2# | 3# | 32K | 1# | 2# | 3# |
| 5 | 0.997 | 1.008 | 1.015 | 5 | 0.999 | 1.015 | 0.995 |
| 4.5 | 0.996 | 1.008 | 1.015 | 4.5 | 0.998 | 1.014 | 0.994 |
| 4 | 0.996 | 1.007 | 1.015 | 4 | 0.997 | 1.014 | 0.993 |
| 3.5 | 0.996 | 1.007 | 1.014 | 3.5 | 0.997 | 1.013 | 0.993 |
| 3 | 0.996 | 1.007 | 1.014 | 3 | 0.996 | 1.013 | 0.992 |
| 2.9 | 0.996 | 1.007 | 1.014 | 2.9 | 0.996 | 1.013 | 0.992 |
| 2.8 | 0.996 | 1.007 | 1.014 | 2.8 | 0.996 | 1.013 | 0.992 |
| 2.7 | 0.996 | 1.007 | 1.014 | 2.7 | 0.996 | 1.013 | 0.992 |
| 2.6 | 0.996 | 1.007 | 1.014 | 2.6 | 0.996 | 1.013 | 0.992 |
| 2.5 | 0.996 | 1.007 | 1.014 | 2.5 | 0.996 | 1.013 | 0.992 |
| 2.4 | 0.996 | 1.007 | 1.014 | 2.4 | 0.996 | 1.012 | 0.992 |
| 2.3 | 0.996 | 1.007 | 1.014 | 2.3 | 0.996 | 1.012 | 0.992 |
| 2.2 | 0.995 | 1.007 | 1.014 | 2.2 | 0.996 | 1.012 | 0.992 |
| 2 | 0.993 | 启不来 | 1.008 | 2 | 0.994 |  | 0.984 |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| 910K | 1# | 2# | 3# | 4M | 1# | 2# | 3# |
| 5 | 1.001 | 1.011 | 1.01 | 5 | 101.24 | 101.27 | 101.07 |
| 4.5 | 0.999 | 1.008 | 1.005 | 4.5 | 100.78 | 100.77 | 100.58 |
| 4 | 0.999 | 1.004 | 1.004 | 4 | 100.44 | 100.48 | 100.28 |
| 3.5 | 0.999 | 1.002 | 1.002 | 3.5 | 100.28 | 100.3 | 100.06 |
| 3 | 1 | 1.001 | 1.001 | 3 | 100.1 | 100.17 | 99.91 |
| 2.9 | 1 | 1 | 1 | 2.9 | 100.06 | 100.09 | 99.85 |
| 2.8 | 1 | 1 | 1 | 2.8 | 100.03 | 1100.04 | 99.8 |
| 2.7 | 1 | 1 | 1 | 2.7 | 100 | 100.01 | 99.74 |
| 2.6 | 1.001 | 1 | 1 | 2.6 | 99.98 | 99.99 | 99.75 |
| 2.5 | 1.001 | 1 | 1 | 2.5 | 99.95 | 99.99 | 99.73 |
| 2.4 | 1.001 | 1 | 1 | 2.4 | 99.91 | 100.21 | 99.77 |
| 2.3 | 1.002 | 1 | 1 | 2.3 | 100.03 | 100.23 | 100.3 |
| 2.2 | 1 | 0.994 | 0.994 | 2.2 | 100 | 99.72 | 99.98 |
| 2 | 0.983 | 0.984 | 0.983 | 2 | 98.93 |  | 97.77 |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| 8M | 1# | 2# | 3# | 16M | 1# | 2# | 3# |
| 5 | 100.97 | 100.92 | 101.08 | 5 | 101.16 | 100.6 | 101.03 |
| 4.5 | 100.44 | 100.53 | 100.62 | 4.5 | 100.93 | 100.4 | 100.78 |
| 4 | 100.28 | 100.23 | 100.28 | 4 | 100.7 | 100.33 | 100.68 |
| 3.5 | 100.01 | 100.06 | 99.98 | 3.5 | 100.58 | 100.26 | 100.62 |
| 3 | 99.7 | 99.77 | 99.81 | 3 | 100.1 | 99.94 | 100.53 |
| 2.9 | 99.61 | 99.75 | 99.67 | 2.9 | 99.96 | 99.66 | 100.08 |
| 2.8 | 99.6 | 99.75 | 99.63 | 2.8 | 99.8 | 99.57 | 99.93 |
| 2.7 | 99.6 | 99.73 | 99.59 | 2.7 | 99.71 | 99.46 | 99.79 |
| 2.6 | 99.6 | 99.68 | 99.57 | 2.6 | 99.64 | 99.43 | 99.7 |
| 2.5 | 99.6 | 99.71 | 99.55 | 2.5 | 99.63 | 99.5 | 99.67 |
| 2.4 | 99.68 | 100.18 | 99.73 | 2.4 | 99.66 | 100.09 | 99.9 |
| 2.3 | 99.04 | 1001.1 | 100.62 | 2.3 | 99.88 | 101.2 | 101.03 |
| 2.2 | 101.4 | 100.08 | 100.26 | 2.2 | 101.22 | 99.8 | 100.61 |
| 2 | 100.45 |  | 99.3 | 2 | 100.5 |  | 97.26 |

各时钟模块的温漂系数 单位：hz

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 14K | 1# | 2# | 3# | 32K | 1# | 2# | 3# |
| -40 | 935.29 | 957.42 | 943.61 | -40 | 988.39 | 958.42 | 976.79 |
| -30 | 953.4 | 973.6 | 965.53 | -30 | 998.53 | 977.12 | 988.27 |
| -20 | 967.71 | 984.09 | 982.31 | -20 | 1004.8 | 989.11 | 995.67 |
| -10 | 978.36 | 992.02 | 994.64 | -10 | 1008.5 | 997.46 | 999.17 |
| 0 | 985.51 | 995.91 | 1003.9 | 0 | 1009.4 | 1003.2 | 1001.8 |
| 10 | 990.43 | 998.96 | 1011.6 | 10 | 1006.35 | 1007.19 | 1000.3 |
| 20 | 993.23 | 998.7 | 1015.6 | 20 | 1004.2 | 1009.5 | 996.86 |
| 30 | 994.92 | 997.35 | 1017.9 | 30 | 999.34 | 1008.2 | 992.59 |
| 40 | 994.14 | 994.64 | 1019.3 | 40 | 992.76 | 1006.5 | 987.29 |
| 50 | 992.56 | 991.6 | 1019.5 | 50 | 984.1 | 1003.2 | 980.5 |
| 60 | 990.56 | 985.92 | 1018.6 | 60 | 975.73 | 998.46 | 973.09 |
| 70 | 987.36 | 980.38 | 1016.4 | 70 | 967.17 | 992.29 | 964.36 |
| 80 | 982.43 | 973.29 | 1013.8 | 80 | 957.41 | 987.29 | 954.67 |

单位：khz

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 910K | 1# | 2# | 3# | 4M | 1# | 2# | 3# |
| -40 | 1007.9 | 1002.5 | 1024.4 | -40 | 22.9 | 22.07 | 22.69 |
| -30 | 1006.8 | 1001.9 | 1020.6 | -30 | 22.91 | 22.95 | 22.72 |
| -20 | 1005.4 | 1001.5 | 1016.7 | -20 | 22.9 | 22.92 | 22.76 |
| -10 | 1004.1 | 1001.4 | 1013.1 | -10 | 22.89 | 22.89 | 22.78 |
| 0 | 1002.9 | 1000.7 | 1009.2 | 0 | 22.88 | 22.85 | 22.79 |
| 10 | 1001.3 | 1001.4 | 1005.4 | 10 | 22.86 | 22.81 | 22.8 |
| 20 | 1001 | 999.64 | 1001.9 | 20 | 22.84 | 22.78 | 22.82 |
| 30 | 999.73 | 999.46 | 997.86 | 30 | 22.81 | 22.73 | 22.83 |
| 40 | 999.78 | 998.83 | 994.64 | 40 | 22.78 | 22.69 | 22.84 |
| 50 | 999.57 | 998.25 | 991.42 | 50 | 22.76 | 22.64 | 22.87 |
| 60 | 999.59 | 997.74 | 988.42 | 60 | 22.74 | 22.6 | 22.89 |
| 70 | 999.27 | 997.56 | 986.04 | 70 | 22.72 | 22.57 | 22.91 |
| 80 | 998.82 | 996.77 | 983.97 | 80 | 22.71 | 22.54 | 22.93 |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| 8M | 1# | 2# | 3# | 16M | 1# | 2# | 3# |
| -40 | 100.45 | 101.58 | 101.46 | -40 | 100.76 | 100.46 | 100.54 |
| -30 | 101.32 | 101.28 | 101.18 | -30 | 102.31 | 101.47 | 100.09 |
| -20 | 100.25 | 101.01 | 100.98 | -20 | 101.84 | 100.68 | 101.28 |
| -10 | 100.15 | 100.73 | 100.67 | -10 | 100.15 | 100.15 | 99.95 |
| 0 | 99.99 | 100.41 | 100.36 | 0 | 100.15 | 100.03 | 99.97 |
| 10 | 99.91 | 100.13 | 100.1 | 10 | 100.14 | 99.87 | 99.89 |
| 20 | 99.97 | 99.79 | 99.83 | 20 | 100.08 | 99.68 | 99.78 |
| 30 | 99.79 | 99.48 | 99.5 | 30 | 100.03 | 99.61 | 99.73 |
| 40 | 99.79 | 99.2 | 99.21 | 40 | 99.95 | 99.51 | 99.67 |
| 50 | 99.58 | 98.86 | 98.86 | 50 | 99.89 | 99.13 | 99.55 |
| 60 | 99.32 | 98.47 | 98.52 | 60 | 99.79 | 98.74 | 99.47 |
| 70 | 99.16 | 98.12 | 98.3 | 70 | 99.69 | 98.74 | 99.34 |
| 80 | 98.87 | 97.72 | 97.98 | 80 | 99.61 | 98.42 | 99.18 |

1. 测试结果：根据测试结果表明，各时钟源选择与切换功能正常，脉冲宽度调制器寄存器读写及对应功能正常；时钟频率为14K时，低温波动较大，时钟频率为32K时，高温波动较大。
2. CS2110 MPA DEMO VER1.2原理图：



