# 2.16 LDO功能（LDO）(3.01)

测试人员：郑焕龙 测试时间：2020-08-20

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）；万用表（FLUKE 17B DIGITAL MULTIMETER）；
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LDO2（1.8V/2.4V）输出程序，测试LDO2的带载能力，电压系数，最大驱动能力，温漂数据。（LDO2输出脚：VCAP2）
2. 要求：2.16 LDO寄存器读写及对应功能正常，LDO2能够正常输出1.8V和2.4V电压
   1. 内部LDO输出稳定，无波动。
3. 测试数据：

LDO2电压系数（空载）

|  |  |  |  |  |  |  |  |
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| LDO2输出2.4V | |  |  | LDO2输出1.8V | |  |  |
| 电源电压 | 1# | 2# | 3# | 电源电压 | 1# | 2# | 3# |
| 5.0 | 2.4055 | 2.3933 | 2.3947 | 5.0 | 1.8072 | 1.7972 | 1.8027 |
| 4.5 | 2.4042 | 2.3921 | 2.3931 | 4.5 | 1.8062 | 1.7965 | 1.8017 |
| 4.0 | 2.4032 | 2.3917 | 2.3924 | 4.0 | 1.8054 | 1.7972 | 1.8022 |
| 3.5 | 2.4035 | 2.3924 | 2.3934 | 3.5 | 1.8056 | 1.7964 | 1.8015 |
| 3.0 | 2.403 | 2.3922 | 2.3928 | 3.0 | 1.806 | 1.7969 | 1.8017 |
| 2.9 | 2.4033 | 2.3928 | 2.3933 | 2.9 | 1.8056 | 1.7962 | 1.8012 |
| 2.8 | 2.4034 | 2.3919 | 2.3921 | 2.8 | 1.8046 | 1.7964 | 1.801 |
| 2.7 | 2.4039 | 2.3921 | 2.3925 | 2.7 | 1.8054 | 1.7965 | 1.8018 |
| 2.6 | 2.4036 | 2.3914 | 2.3929 | 2.6 | 1.8045 | 1.7963 | 1.8011 |
| 2.5 | 2.4035 | 2.3928 | 2.3924 | 2.5 | 1.8038 | 1.796 | 1.8005 |
| 2.4 | 2.3925 | 2.3881 | 2.3887 | 2.4 | 1.8039 | 1.7961 | 1.8017 |
| 2.3 | 2.2928 | 2.2888 | 2.2893 | 2.3 | 1.8041 | 1.7953 | 1.8011 |
| 2.2 | 2.1929 | 2.1892 | 2.1896 | 2.2 | 1.8032 | 1.7954 | 1.8012 |
| 2.1 | 2.0931 | 2.0895 | 2.0899 | 2.1 | 1.8036 | 1.7956 | 1.8004 |
| 2.0 | 1.9931 | 1.9898 | 1.9903 | 2.0 | 1.8037 | 1.7958 | 1.8008 |
| 1.9 | 1.8878 | 1.8869 | 1.8867 | 1.9 | 1.8878 | 1.8874 | 1.8868 |
| 1.8 | 1.7872 | 1.7863 | 1.7861 | 1.8 | 1.7871 | 1.7868 | 1.7861 |

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| LDO2电压系数（负载200Ω） | | |  |  |  |  |  |
| LDO2输出2.4V | |  |  | LDO2输出1.8V | |  |  |
| 电源电压 | 1# | 2# | 3# | 电源电压 | 1# | 2# | 3# |
| 5.0 | 2.3895 | 2.378 | 2.3747 | 5.0 | 1.793 | 1.785 | 1.7856 |
| 4.5 | 2.3895 | 2.379 | 2.3776 | 4.5 | 1.794 | 1.785 | 1.7863 |
| 4.0 | 2.3901 | 2.381 | 2.3782 | 4.0 | 1.794 | 1.786 | 1.7879 |
| 3.5 | 2.3918 | 2.381 | 2.3798 | 3.5 | 1.795 | 1.787 | 1.7882 |
| 3.0 | 2.3925 | 2.382 | 2.3792 | 3.0 | 1.795 | 1.786 | 1.788 |
| 2.9 | 2.3895 | 2.378 | 2.3688 | 2.9 | 1.794 | 1.786 | 1.7891 |
| 2.8 | 2.3253 | 2.320 | 2.2902 | 2.8 | 1.795 | 1.786 | 1.7888 |
| 2.7 | 2.2326 | 2.228 | 2.1969 | 2.7 | 1.795 | 1.786 | 1.789 |
| 2.6 | 2.1336 | 2.130 | 2.0968 | 2.6 | 1.795 | 1.787 | 1.7882 |
| 2.5 | 2.0314 | 2.028 | 1.9941 | 2.5 | 1.794 | 1.786 | 1.7849 |
| 2.4 | 1.9271 | 1.924 | 1.8906 | 2.4 | 1.794 | 1.786 | 1.7394 |
| 2.3 | 1.821 | 1.818 | 1.785 | 2.3 | 1.770 | 1.767 | 1.6582 |
| 2.2 | 1.711 | 1.708 | 1.676 | 2.2 | 1.691 | 1.690 | 1.56 |
| 2.1 | 1.598 | 1.596 | 1.564 | 2.1 | 1.587 | 1.587 | 1.4534 |
| 2.0 | 1.480 | 1.478 | 1.445 | 2.0 | 1.471 | 1.472 | 0.0245 |

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| LDO2电压系数（负载100Ω） | | |  |  |  |  |  |
| LDO2输出2.4V | |  |  | LDO2输出1.8V | |  |  |
| 电源电压 | 1# | 2# | 3# | 电源电压 | 1# | 2# | 3# |
| 5.0 | 2.377 | 2.365 | 2.364 | 5.0 | 1.784 | 1.776 | 1.7765 |
| 4.5 | 2.379 | 2.367 | 2.365 | 4.5 | 1.785 | 1.777 | 1.7772 |
| 4.0 | 2.380 | 2.368 | 2.365 | 4.0 | 1.786 | 1.777 | 1.7788 |
| 3.5 | 2.381 | 2.368 | 2.366 | 3.5 | 1.786 | 1.778 | 1.7801 |
| 3.0 | 2.112 | 2.104 | 2.048 | 3.0 | 1.786 | 1.778 | 1.7795 |
| 2.9 | 2.012 | 2.005 | 1.950 | 2.9 | 1.786 | 1.776 | 1.7794 |
| 2.8 | 1.912 | 1.904 | 1.849 | 2.8 | 1.784 | 1.774 | 1.7703 |
| 2.7 | 1.806 | 1.800 | 1.746 | 2.7 | 1.756 | 1.774 | 1.7198 |
| 2.6 | 1.699 | 1.693 | 1.641 | 2.6 | 1.684 | 1.665 | 1.6364 |
| 2.5 | 1.589 | 1.583 | 1.532 | 2.5 | 1.585 | 1.566 | 1.5343 |
| 2.4 | 1.474 | 1.469 | 1.419 | 2.4 | 1.474 | 1.456 | 1.4228 |
| 2.3 | 1.355 | 1.350 | 1.301 | 2.3 | 1.355 | 1.338 | 1.3051 |
| 2.2 | 1.230 | 1.226 | 1.178 | 2.2 | 1.230 | 1.214 | 1.1815 |
| 2.1 | 1.098 | 1.096 | 1.051 | 2.1 | 1.099 | 1.085 | 1.0535 |
| 2.0 | 0.963 | 0.961 | 0.920 | 2.0 | 0.964 | 0.945 | 0.9231 |

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| LDO2负载能力 | |  |  |  |  |  |  |
| 5V供电LDO2输出2.4V | | |  | 3V供电LDO2输出2.4V | | |  |
| 负载电阻 | 1# | 2# | 3# | 负载电阻 | 1# | 2# | 3# |
| 100K | 2.405 | 2.392 | 2.390 | 100K | 2.405 | 2.391 | 2.392 |
| 10K | 2.404 | 2.391 | 2.388 | 10K | 2.404 | 2.390 | 2.391 |
| 1K | 2.399 | 2.385 | 2.388 | 1K | 2.402 | 2.388 | 2.390 |
| 500 | 2.399 | 2.382 | 2.384 | 500 | 2.400 | 2.385 | 2.385 |
| 400 | 2.396 | 2.382 | 2.382 | 400 | 2.398 | 2.385 | 2.385 |
| 300 | 2.395 | 2.380 | 2.380 | 300 | 2.367 | 2.383 | 2.383 |
| 200 | 2.391 | 2.376 | 2.375 | 200 | 2.392 | 2.380 | 2.379 |
| 150 | 2.387 | 2.372 | 2.372 | 150 | 2.362 | 2.350 | 2.302 |
| 100 | 2.380 | 2.364 | 2.365 | 100 | 2.112 | 2.092 | 1.948 |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| 5V供电LDO2输出1.8V | | |  | 3V供电LDO2输出1.8V | | |  |
| 负载电阻 | 1# | 2# | 3# | 负载电阻 | 1# | 2# | 3# |
| 100K | 1.806 | 1.796 | 1.799 | 100K | 1.805 | 1.796 | 1.799 |
| 10K | 1.806 | 1.794 | 1.798 | 10K | 1.804 | 1.796 | 1.797 |
| 1K | 1.801 | 1.792 | 1.792 | 1K | 1.802 | 1.795 | 1.796 |
| 500 | 1.799 | 1.789 | 1.731 | 500 | 1.800 | 1.792 | 1.795 |
| 400 | 1.798 | 1.789 | 1.790 | 400 | 1.799 | 1.790 | 1.794 |
| 300 | 1.796 | 1.787 | 1.789 | 300 | 1.798 | 1.790 | 1.793 |
| 200 | 1.793 | 1.784 | 1.786 | 200 | 1.795 | 1.787 | 1.789 |
| 150 | 1.790 | 1.782 | 1.783 | 150 | 1.792 | 1.784 | 1.787 |
| 100 | 1.783 | 1.776 | 1.776 | 100 | 1.787 | 1.778 | 1.780 |

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| LDO2最大输出能力 | |  |  |
|  | 1# | 2# | 3# |
| 5V-2.4V | 80.650 | 80.630 | 80.07 |
| 5V-1.8V | 80.680 | 80.350 | 79.89 |
| 3V-2.4V | 30.229 | 30.224 | 30.075 |
| 3V-1.8V | 30.369 | 30.165 | 29.915 |

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| LDO2温漂（括号内为基准TRIM值） | | | |
|  | 1#（0D） | 2#（06） | 3#（05） |
| -40 | 1.786 | 1.782 | 1.827 |
| -20 | 1.796 | 1.787 | 1.818 |
| 0 | 1.800 | 1.791 | 1.805 |
| 20 | 1.806 | 1.793 | 1.792 |
| 40 | 1.811 | 1.793 | 1.781 |
| 60 | 1.816 | 1.792 | 1.769 |
| 80 | 1.822 | 1.788 | 1.757 |

1. 测试结果：根据测试结果表明，（1）、空载时，LDO2能够正常输出1.8V，当VDD<2.3V时，LDO2输出电压<2.4V；

（2）、负载200Ω：VDD<2.8V，LDO2输出电压<2.4V；VDD<2.2V，LDO2输出电压<1.8V；

（3）、LDO在±2%范围内波动。

8. CS2110 MPA DEMO VER1.2原理图：



