

# Hardware Unit Test Report

## DCDC Power measurement

| Hardware version | FW version | Sample No.           | eMMC Flash P/N |
|------------------|------------|----------------------|----------------|
| V015             | None       | S/N: 2152001215-01S1 | None           |

### 1. PCBA Setup

PCBA only SMT on some parts of power IC, so the test is achieved by vendor. Some detail will be ignored.

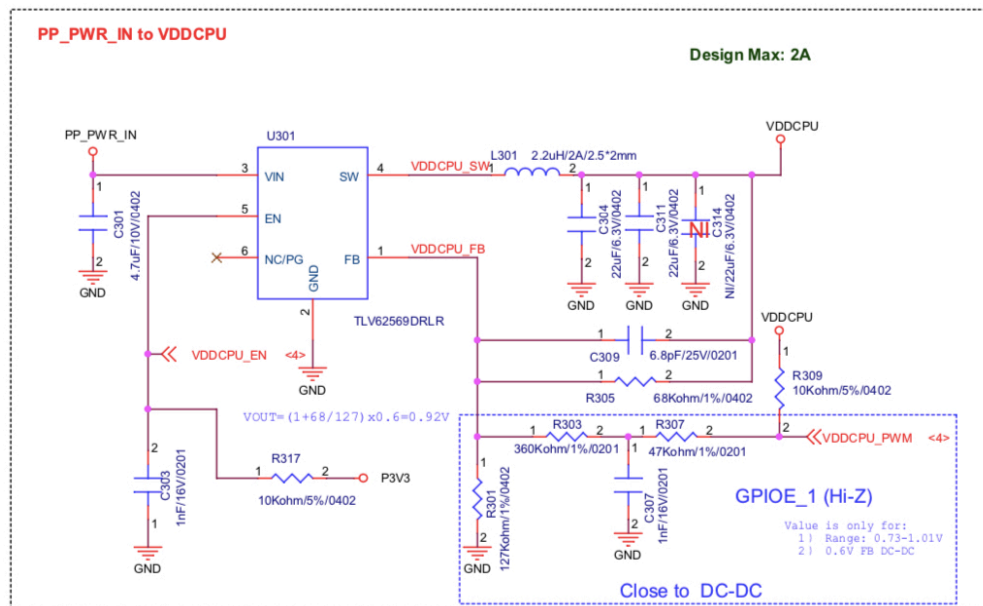
Measure circuits:

There are 4 power circuits need to measure and check the power efficiency can reach 80% and 85%.

The power circuits and DCDC consumption with full load notes are as below:

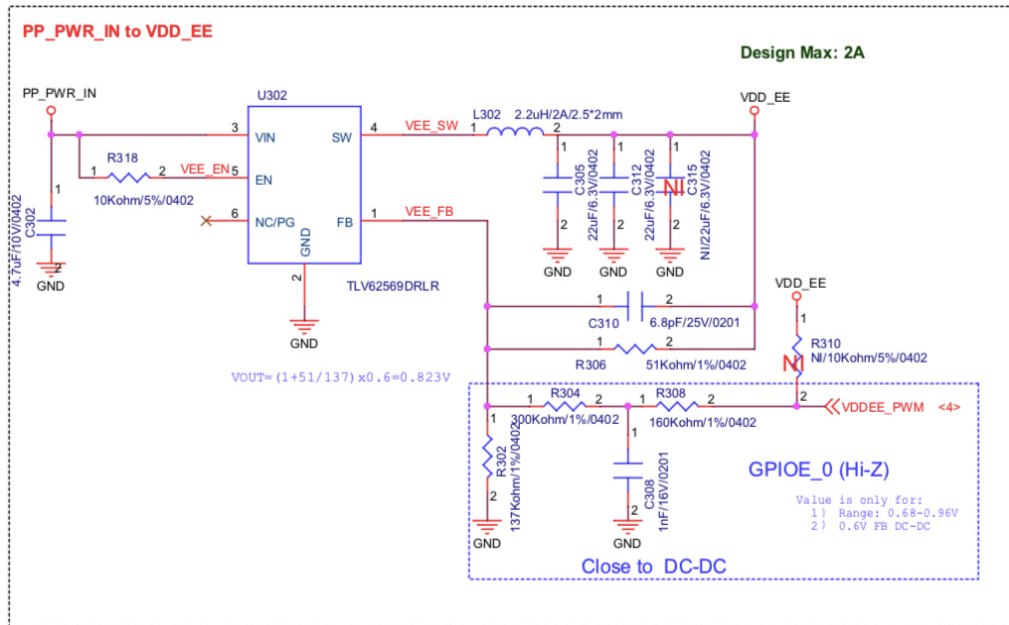
#### 1. VDDCPU

VDDCPU is about **0.92V/368.5mA** usage in full load condition with playing 4Kp60 video from YouTube.



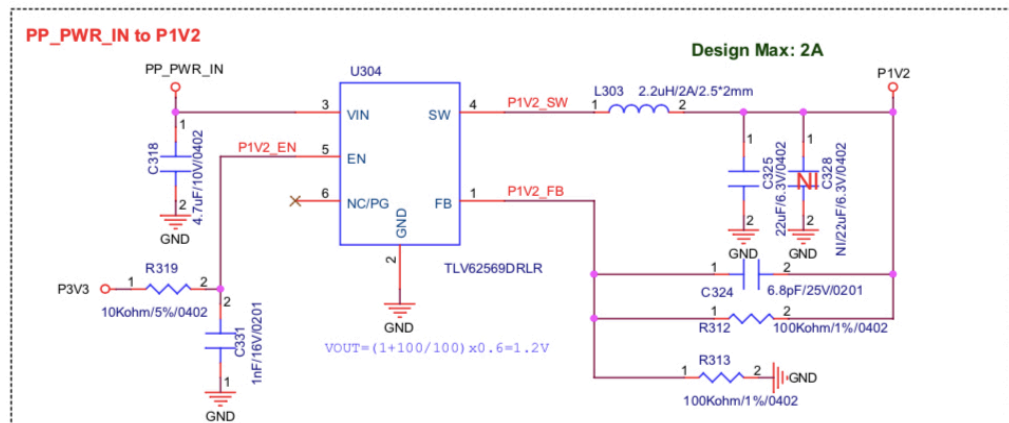
## 2. VDD\_EE

VDD\_EE is about **0.82V/688.8mA** usage in full load condition with playing 4Kp60 video from YouTube.



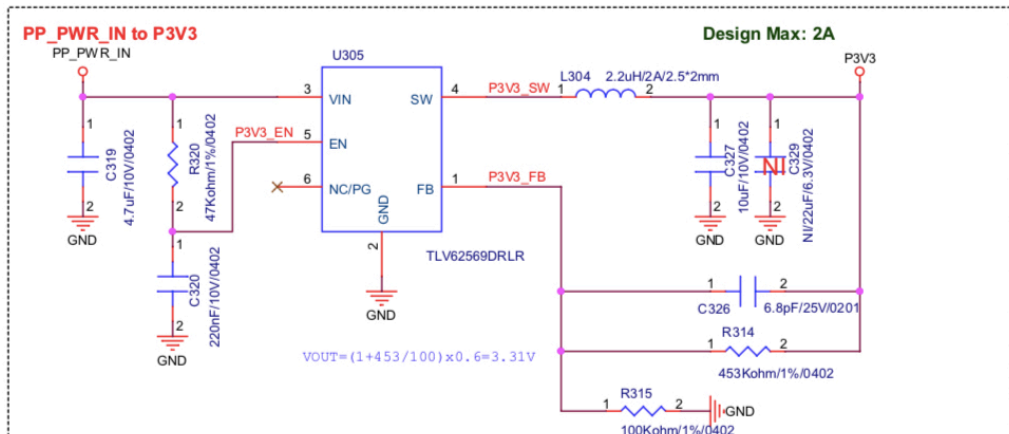
## 3. P1V2

P1V2 is about **1.2V/553.4mA** usage in full load condition with playing 4Kp60 video from YouTube.



## 4. P3V3

P3V3 is about **3.3V/280.5mA** usage in full load condition with playing 4Kp60 video from YouTube.



**Criteria:**

## 1. VDDCPU

| Spec                                                                                                                                                                         | Test result |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Rail VDDCPU:<br>Vout=0.92V, +/-100mV<br>Ripple = +/-10%<br>load transient = +/-10%<br>Power efficiency=80%<br>Power loss=20%<br>Phase Margin>=45 degree<br>Gain Margin>=12dB | Pass        |

## 2. VDD\_EE

| Spec                                                                                                                                                                         | Test result |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Rail VDD_EE:<br>Vout=0.82V, +/-100mV<br>Ripple = +/-10%<br>load transient = +/-10%<br>Power efficiency=80%<br>Power loss=20%<br>Phase Margin>=45 degree<br>Gain Margin>=12dB | Pass        |

## 3. P1V2

| Spec                                                                                                                                                                                         | Test result |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Rail P1V2:<br>Vout=1.2V, +/-100mV<br>Ripple = +/-10%<br>load transient = +/-10%<br>Iout=2A maximum<br>Power efficiency=85%<br>Power loss=15%<br>Phase Margin>=45 degree<br>Gain Margin>=12dB | Pass        |

## 4. P3V3

| Spec                                                                                                                                                                                         | Test result |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Rail P3V3:<br>Vout=3.3V, +/-100mV<br>Ripple = +/-10%<br>load transient = +/-10%<br>Iout=2A maximum<br>Power efficiency=90%<br>Power loss=10%<br>Phase Margin>=45 degree<br>Gain Margin>=12dB | Pass        |

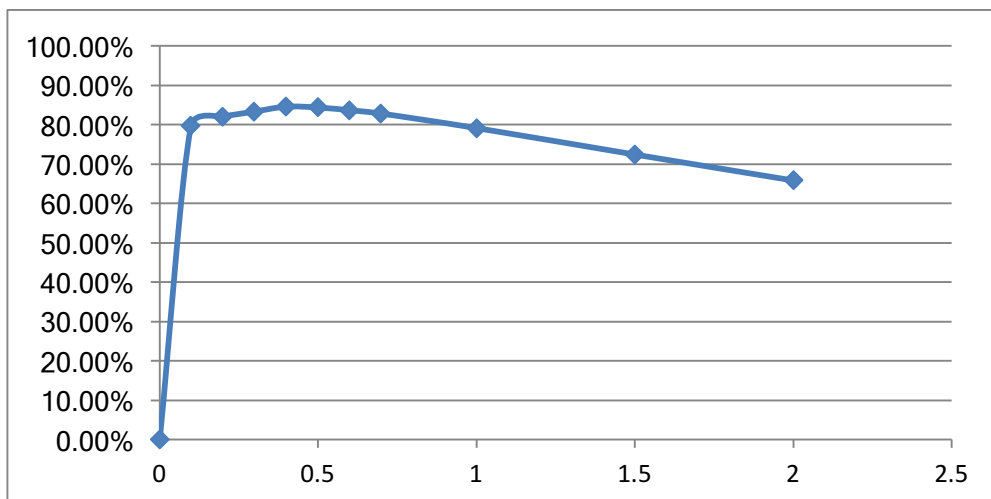
## 2. Test Results

## 1. VDDCPU

## 1. Efficiency

| Vin   | Iin    | Vout   | Iout   | Eff    | Loss   | Pass/Fail |
|-------|--------|--------|--------|--------|--------|-----------|
| 5.127 | 0.0011 | 0.882  | 0      | 0.00%  | 0.00%  | --        |
| 5.122 | 0.0212 | 0.8765 | 0.0987 | 79.67% | 20.33% | Fail      |
| 5.117 | 0.0414 | 0.874  | 0.1987 | 81.98% | 18.02% | Pass      |
| 5.112 | 0.061  | 0.8697 | 0.2987 | 83.31% | 16.69% | Pass      |
| 5.107 | 0.0802 | 0.8674 | 0.3993 | 84.56% | 15.44% | Pass      |
| 5.102 | 0.1004 | 0.8653 | 0.4993 | 84.34% | 15.66% | Pass      |
| 5.118 | 0.121  | 0.8654 | 0.5987 | 83.66% | 16.34% | Pass      |
| 5.11  | 0.1426 | 0.8636 | 0.6987 | 82.81% | 17.19% | Pass      |
| 5.075 | 0.2129 | 0.8549 | 1      | 79.12% | 20.88% | Fail      |
| 5.043 | 0.3477 | 0.8459 | 1.5006 | 72.39% | 27.61% | Fail      |
| 5.004 | 0.5079 | 0.8357 | 2.0012 | 65.80% | 34.20% | Fail      |

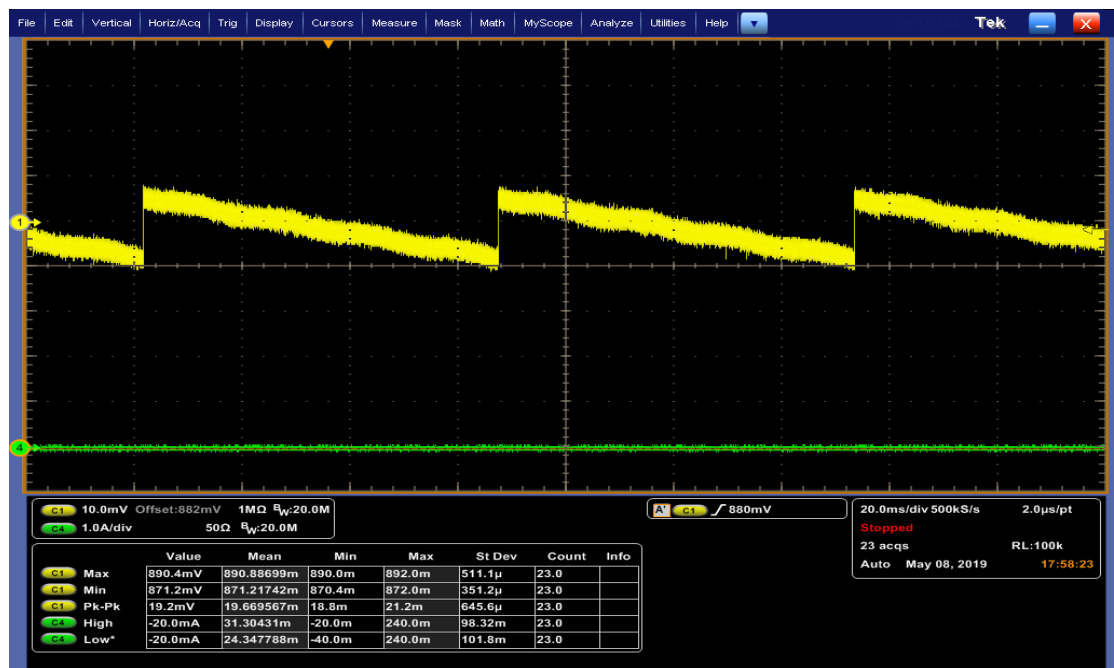
Efficiency Chart:



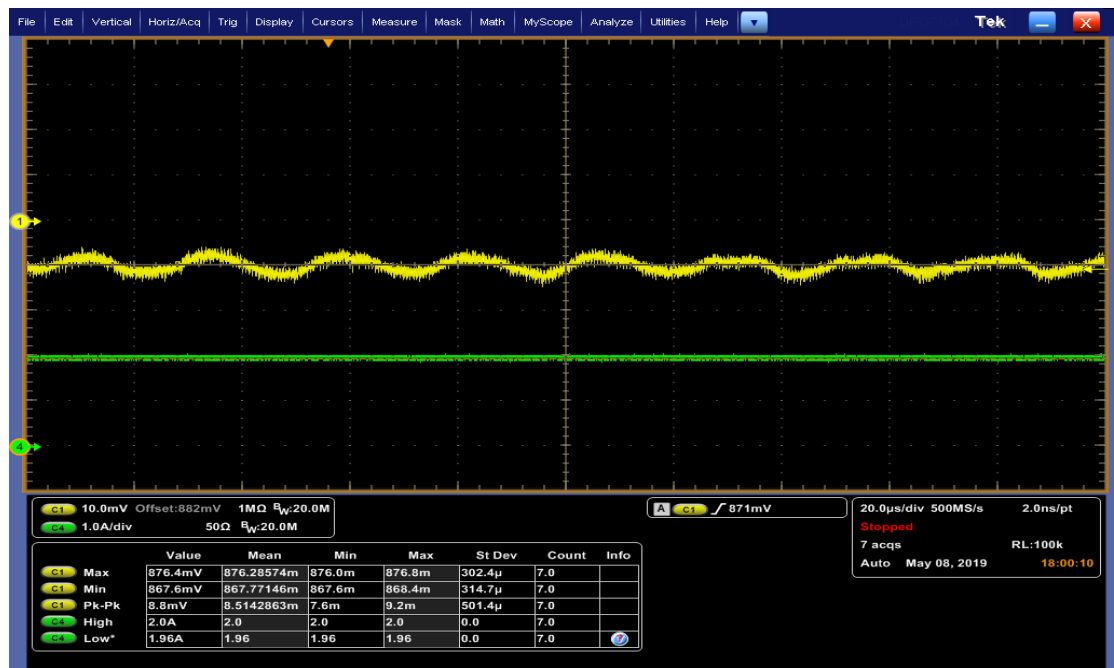
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## 2. Ripple

0A:



2A:

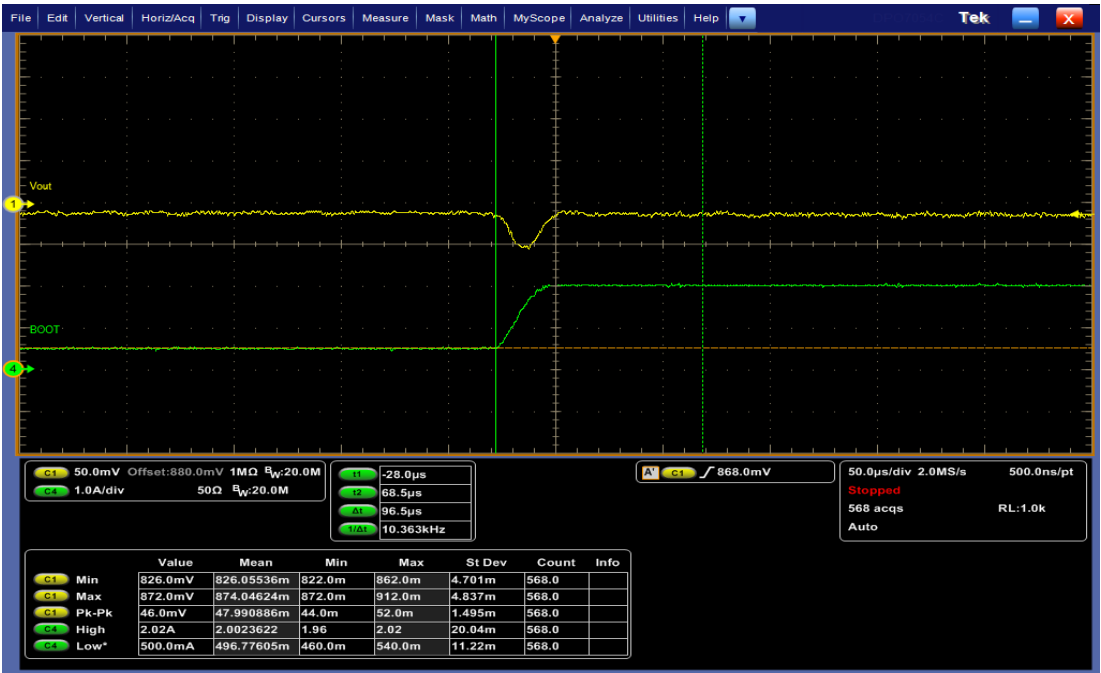


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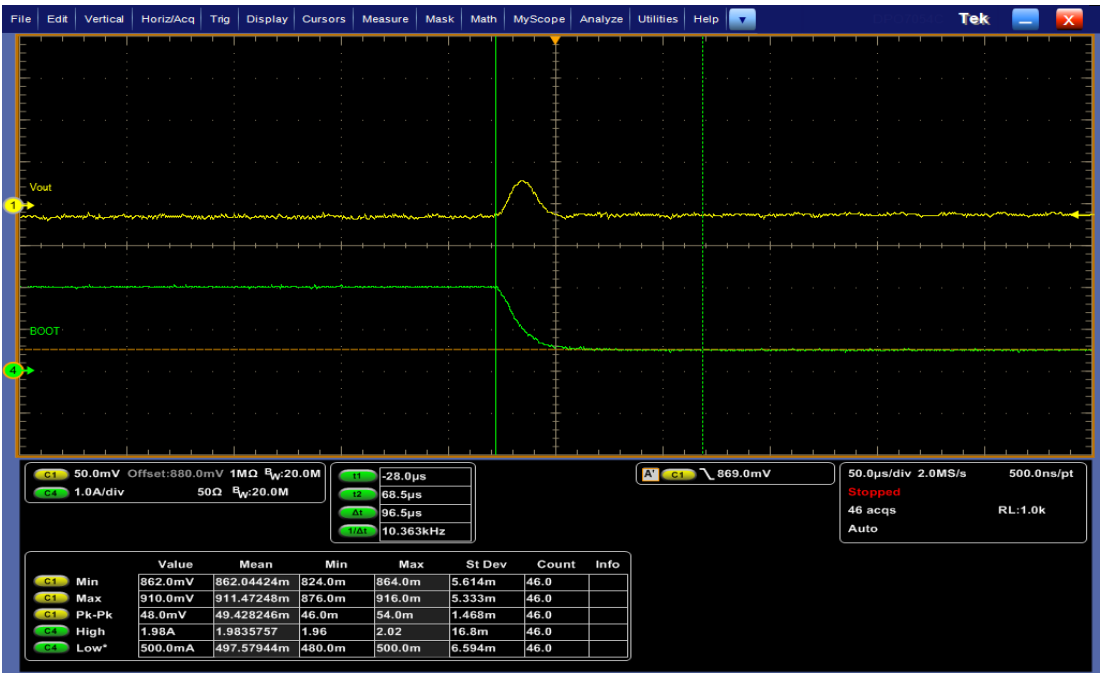
|    | Measure(V) | Spec(V) |           | Pass/Fail |
|----|------------|---------|-----------|-----------|
| 0A | 0.8904     | 1.012   | Max       | Pass      |
|    | --         | 0.92    | Typical   | --        |
|    | 0.8712     | 0.828   | Min       | Pass      |
|    | 0.0192     | 0.184   | Vmax-Vmin | Pass      |
| 2A | 0.8764     | 1.012   | Max       | Pass      |
|    | --         | 0.92    | Typical   | --        |
|    | 0.8676     | 0.828   | Min       | Pass      |
|    | 0.0088     | 0.184   | Vmax-Vmin | Pass      |

3. Load transient

0.5A→2A



2A→0.5A



0.5A↔2A



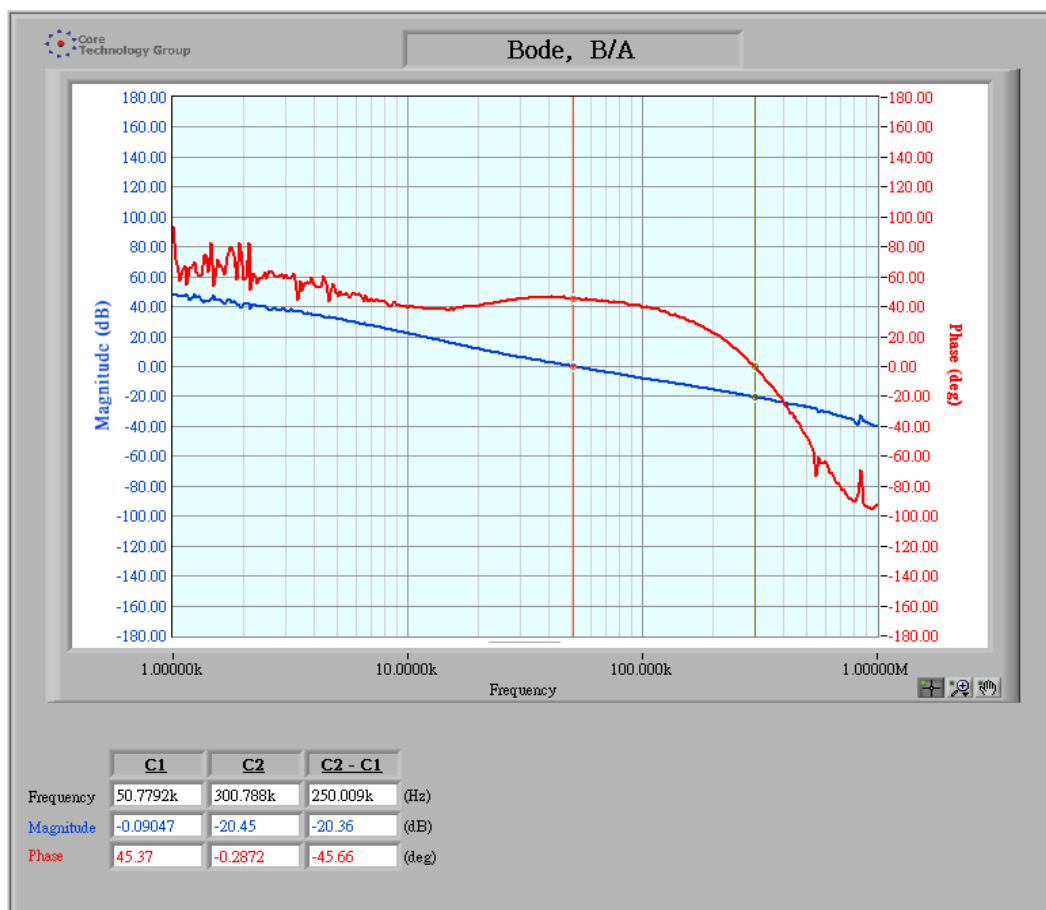
|           | Measure(V) | Spec(V) | Pass/Fail |
|-----------|------------|---------|-----------|
| 0.5-->2A  | 0.872      | 1.012   | Pass      |
|           | 0.826      | 0.828   | Pass      |
|           | 0.046      | 0.184   | Pass      |
| 2A-->0.5A | 0.91       | 1.012   | Pass      |
|           | 0.862      | 0.828   | Pass      |
|           | 0.048      | 0.184   | Pass      |
| 0.5<-->2A | 0.912      | 1.012   | Pass      |
|           | 0.824      | 0.828   | Pass      |
|           | 0.088      | 0.184   | Pass      |

#### 4. bode plot

0.3A:



2A:



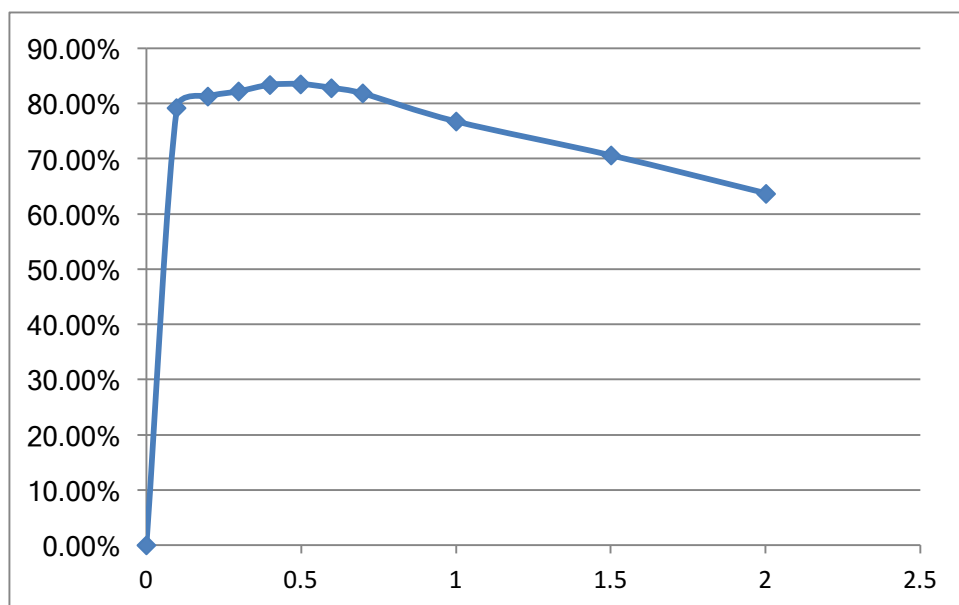
|      | Measure(V)   | Spec(V)                 | Pass/Fail |
|------|--------------|-------------------------|-----------|
| 0.5A | 17.93dB      | $\geq 12\text{dB}$      | Pass      |
|      | 54.74 degree | $\geq 45\text{ degree}$ | Pass      |
| 2A   | 20.36dB      | $\geq 12\text{dB}$      | Pass      |
|      | 45.66 degree | $\geq 45\text{ degree}$ | Pass      |

## 2. VDD\_EE

### 1. Efficiency:

| Vin    | Iin    | Vout   | Iout   | Eff    | Loss   | Pass/Fail |
|--------|--------|--------|--------|--------|--------|-----------|
| 5.1447 | 0.0011 | 0.825  | 0      | 0.00%  | 0.00%  | --        |
| 5.1402 | 0.0199 | 0.821  | 0.0987 | 79.22% | 20.78% | Fail      |
| 5.1357 | 0.039  | 0.8193 | 0.1987 | 81.28% | 18.72% | Pass      |
| 5.1313 | 0.0577 | 0.8147 | 0.2987 | 82.19% | 17.81% | Pass      |
| 5.1271 | 0.0758 | 0.8113 | 0.3993 | 83.36% | 16.64% | Pass      |
| 5.116  | 0.0945 | 0.8094 | 0.4987 | 83.49% | 16.51% | Pass      |
| 5.117  | 0.1141 | 0.8075 | 0.5987 | 82.80% | 17.20% | Pass      |
| 5.113  | 0.1346 | 0.8057 | 0.6987 | 81.80% | 18.20% | Pass      |
| 5.0985 | 0.2018 | 0.7894 | 1      | 76.72% | 23.28% | Fail      |
| 5.0696 | 0.3306 | 0.7883 | 1.5006 | 70.58% | 29.42% | Fail      |
| 5.0354 | 0.4858 | 0.7788 | 2.0012 | 63.71% | 36.29% | Fail      |

Efficiency Chart:



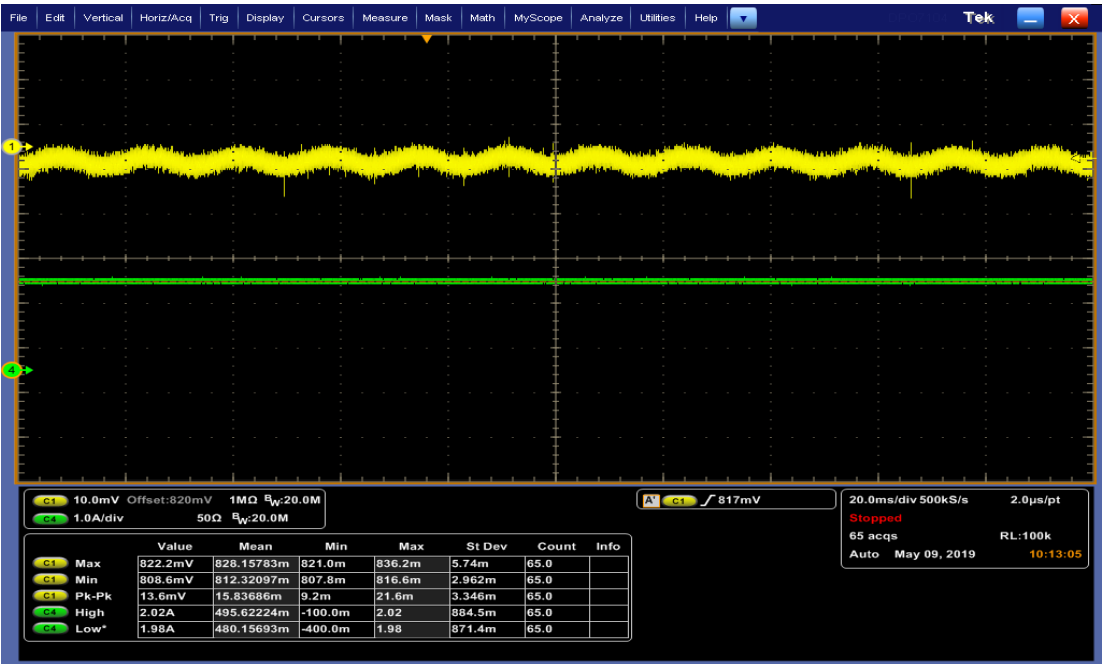
## 2. Ripple

0A:

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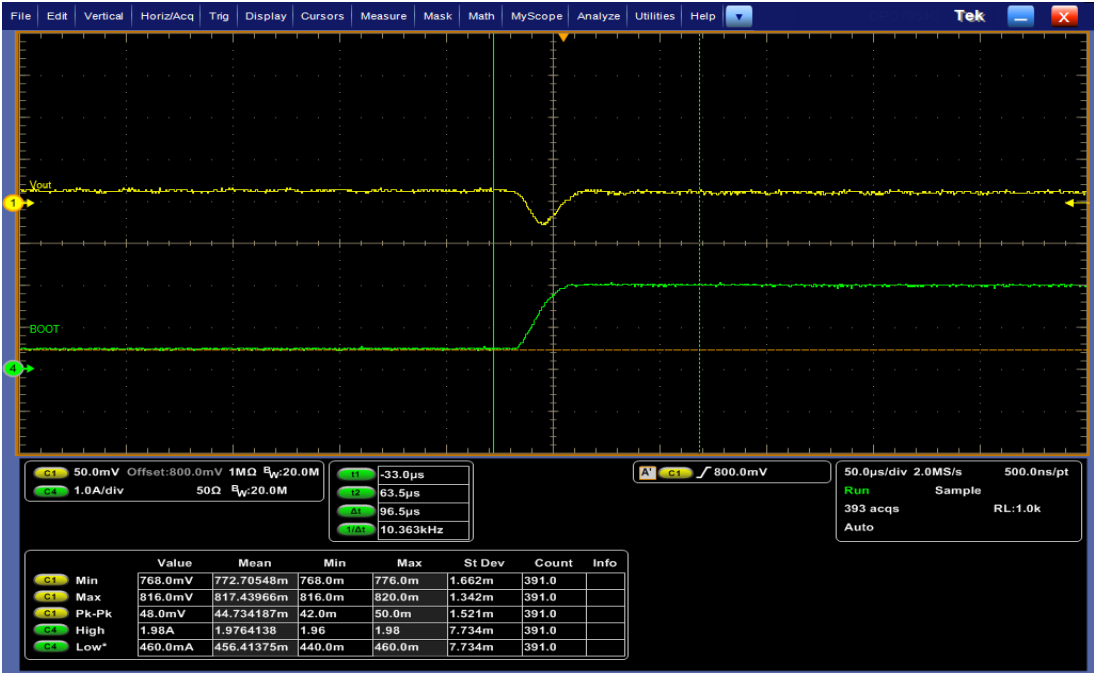
2A:



|    | Measure(V) | Spec(V) |           | Pass/Fail |
|----|------------|---------|-----------|-----------|
| 0A | 0.8354     | 0.902   | Max       | Pass      |
|    | --         | 0.82    | Typical   | --        |
|    | 0.8158     | 0.738   | Min       | Pass      |
|    | 0.0196     | 0.164   | Vmax-Vmin | Pass      |
| 2A | 0.8222     | 0.902   | Max       | Pass      |
|    | --         | 0.82    | Typical   | --        |
|    | 0.8086     | 0.738   | Min       | Pass      |
|    | 0.0136     | 0.164   | Vmax-Vmin | Pass      |

3. Load transient

0.5A→2A:



2A→0.5A:



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0.5A↔2A:

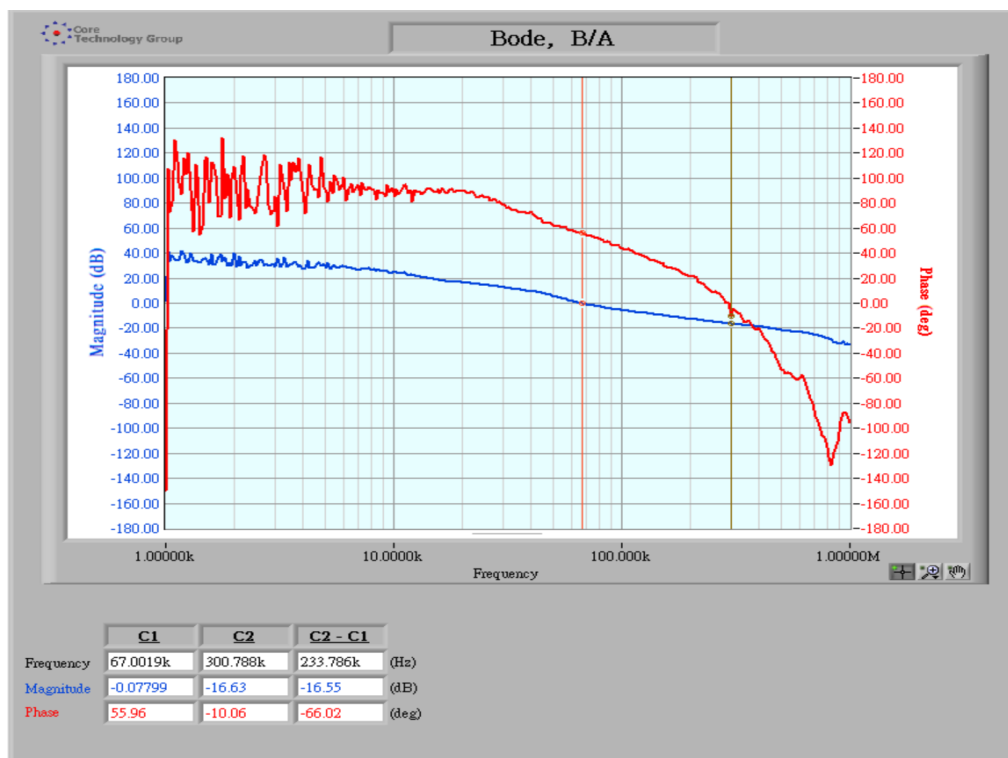


|           | Measure(V) | Spec(V) | Pass/Fail |
|-----------|------------|---------|-----------|
| 0.5-->2A  | 0.816      | 0.902   | Pass      |
|           | 0.768      | 0.738   | Pass      |
|           | 0.048      | 0.164   | Pass      |
| 2A-->0.5A | 0.854      | 0.902   | Pass      |
|           | 0.81       | 0.738   | Pass      |
|           | 0.044      | 0.164   | Pass      |
| 0.5<-->2A | 0.85       | 0.902   | Pass      |
|           | 0.774      | 0.738   | Pass      |
|           | 0.076      | 0.164   | Pass      |

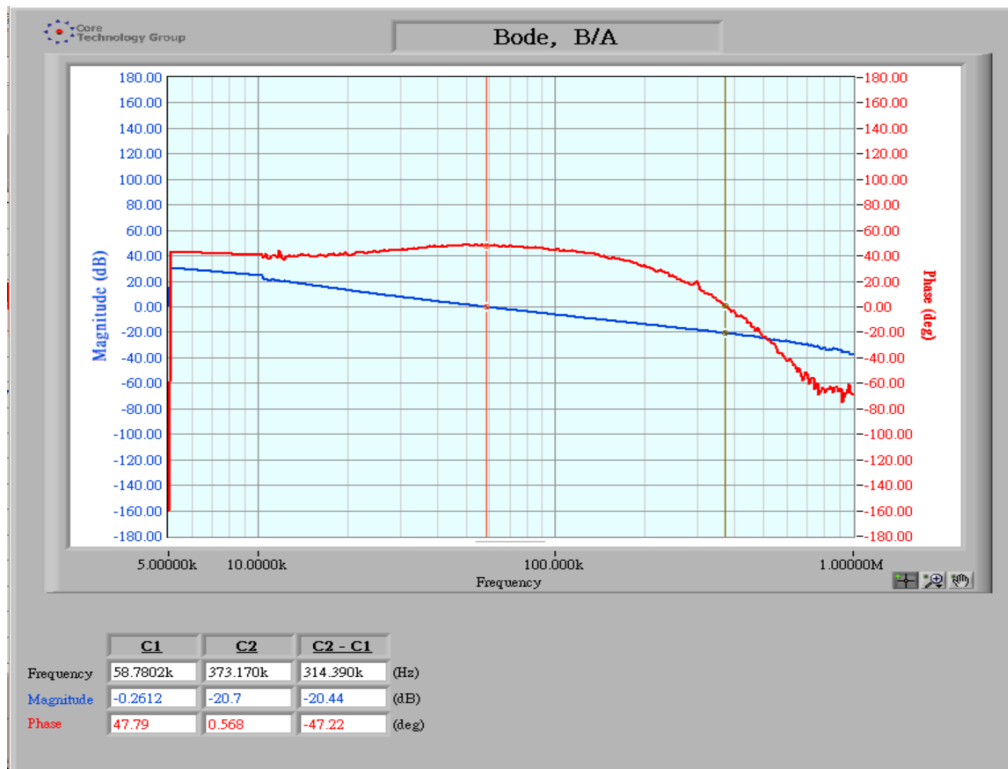
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## 4. bode plot

0.3A:



2A:



## BFX-AT100 V015 Hardware unit test report

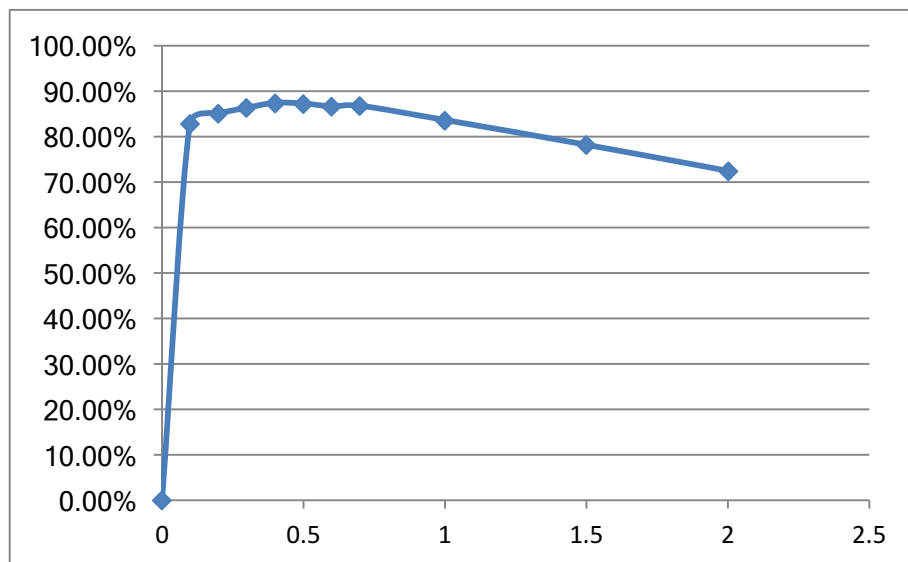
|      | Measure(V)   | Spec(V)                 | Pass/Fail |
|------|--------------|-------------------------|-----------|
| 0.5A | 16.55dB      | $\geq 12\text{dB}$      | Pass      |
|      | 66.02 degree | $\geq 45\text{ degree}$ | Pass      |
| 2A   | 20.44dB      | $\geq 12\text{dB}$      | Pass      |
|      | 47.22 degree | $\geq 45\text{ degree}$ | Pass      |

## 3. P1V2

## 1. Efficiency

| Vin    | Iin    | Vout   | Iout   | Eff    | Loss   | Pass/Fail |
|--------|--------|--------|--------|--------|--------|-----------|
| 5.1637 | 0.0012 | 1.2001 | 0      | 0.00%  | 0.00%  | --        |
| 5.1584 | 0.0277 | 1.1986 | 0.0987 | 82.79% | 17.21% | Fail      |
| 5.1524 | 0.0543 | 1.1961 | 0.1987 | 84.95% | 15.05% | Pass      |
| 5.1471 | 0.0803 | 1.193  | 0.2987 | 86.22% | 13.78% | Pass      |
| 5.1418 | 0.1059 | 1.1908 | 0.3993 | 87.32% | 12.68% | Pass      |
| 5.1364 | 0.1324 | 1.1887 | 0.4987 | 87.17% | 12.83% | Pass      |
| 5.1068 | 0.1596 | 1.1783 | 0.5987 | 86.55% | 13.45% | Pass      |
| 5.103  | 0.1876 | 1.1878 | 0.6987 | 86.69% | 13.31% | Pass      |
| 5.1068 | 0.2762 | 1.1783 | 1      | 83.54% | 16.46% | Fail      |
| 5.0727 | 0.4426 | 1.1683 | 1.5006 | 78.09% | 21.91% | Fail      |
| 5.0328 | 0.637  | 1.1589 | 2.0012 | 72.34% | 27.66% | Fail      |

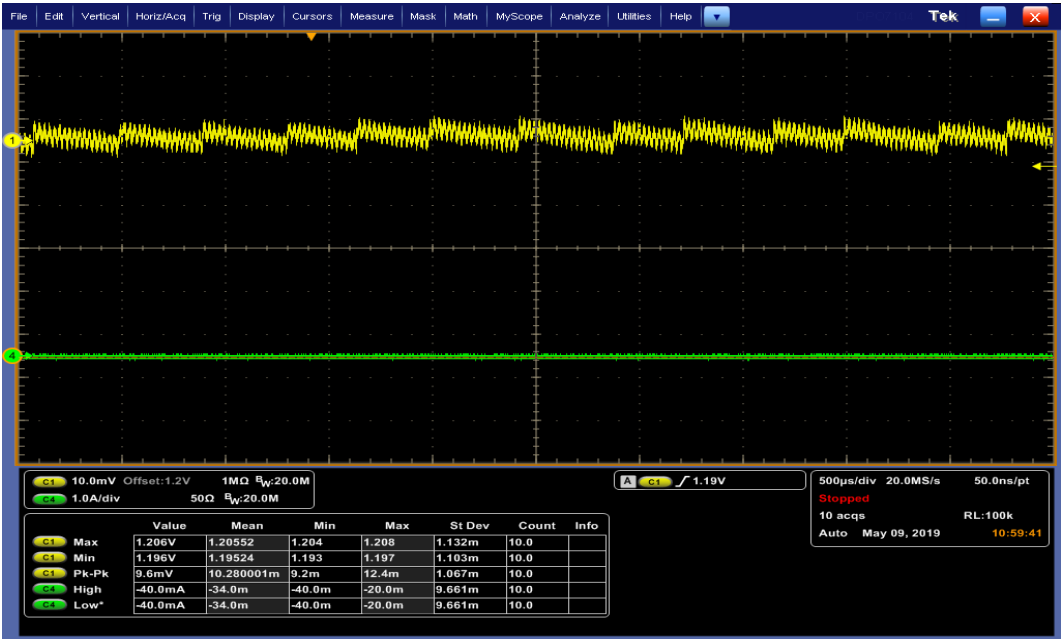
## Efficiency Chart:



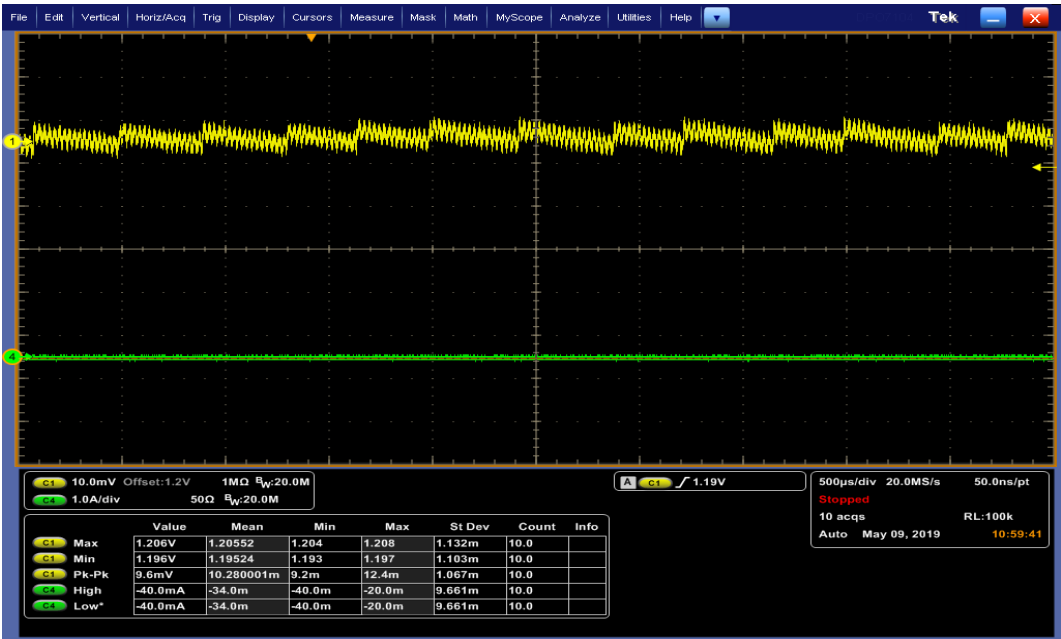
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2. Ripple

0A:



2A:



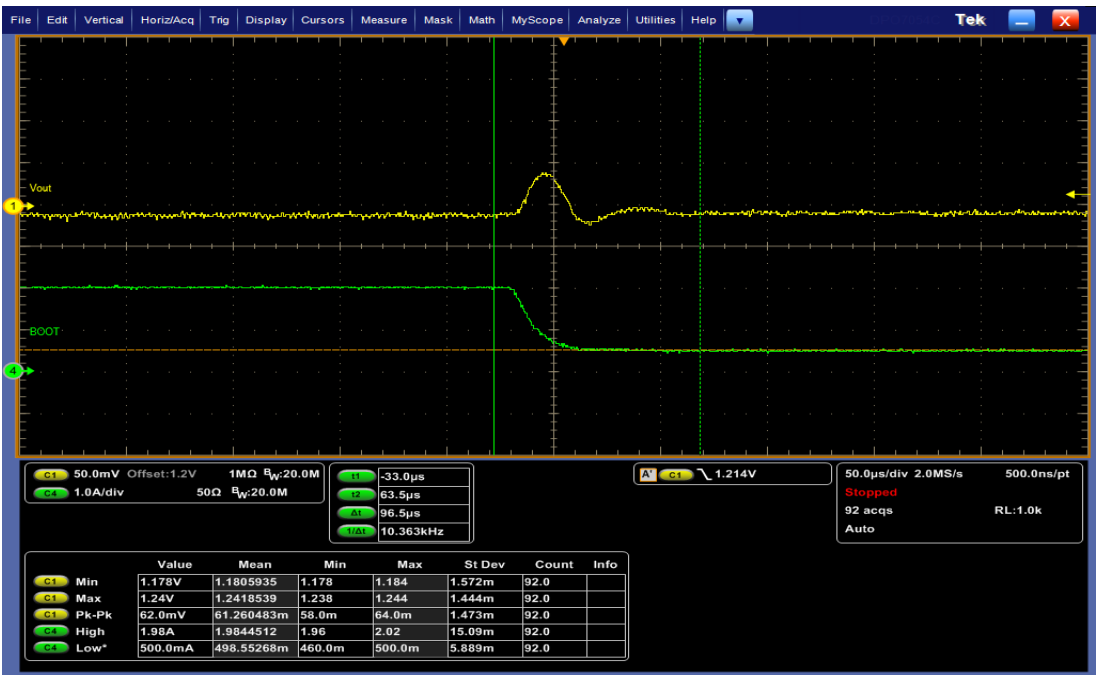
|    | Measure(V) | Spec(V) |           | Pass/Fail |
|----|------------|---------|-----------|-----------|
| 0A | 1.206      | 1.32    | Max       | Pass      |
|    | --         | 1.2     | Typical   | --        |
|    | 1.196      | 1.08    | Min       | Pass      |
|    | 0.010      | 0.240   | Vmax-Vmin | Pass      |
| 2A | 1.206      | 1.32    | Max       | Pass      |
|    | --         | 1.2     | Typical   | --        |
|    | 1.196      | 1.08    | Min       | Pass      |
|    | 0.010      | 0.240   | Vmax-Vmin | Pass      |

3. Load transient

0.5A→2A:



2A→0.5A:



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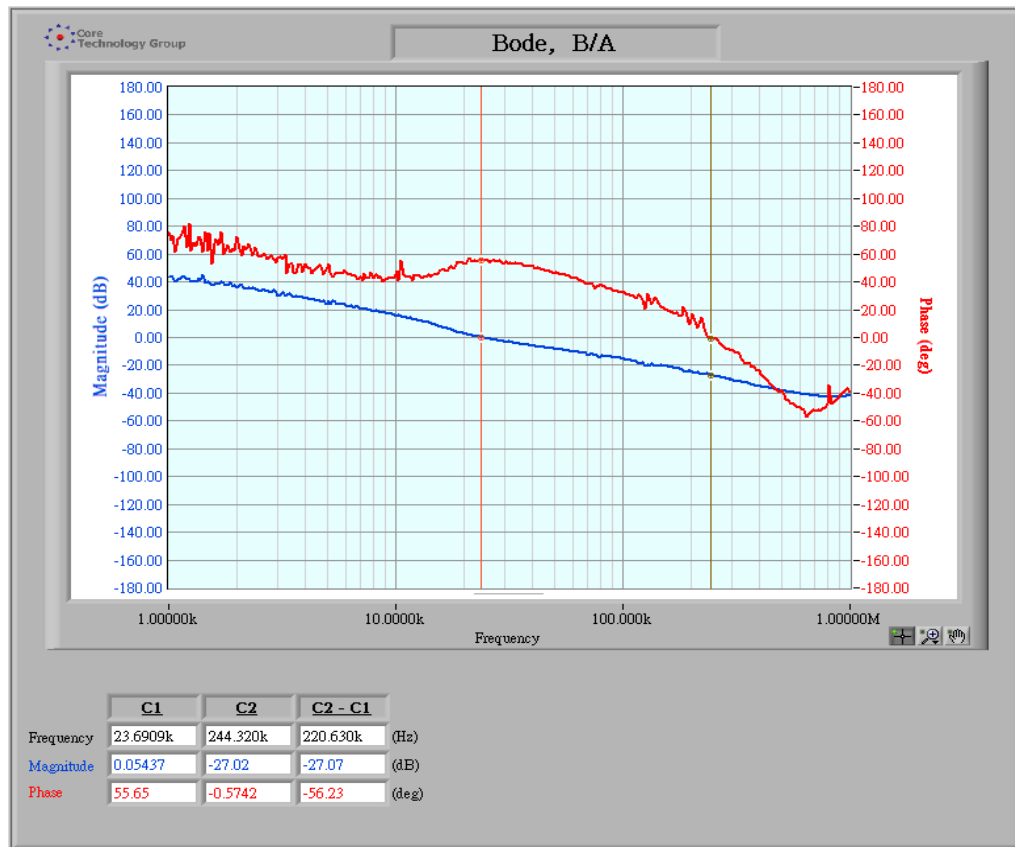
0.5A↔2A:



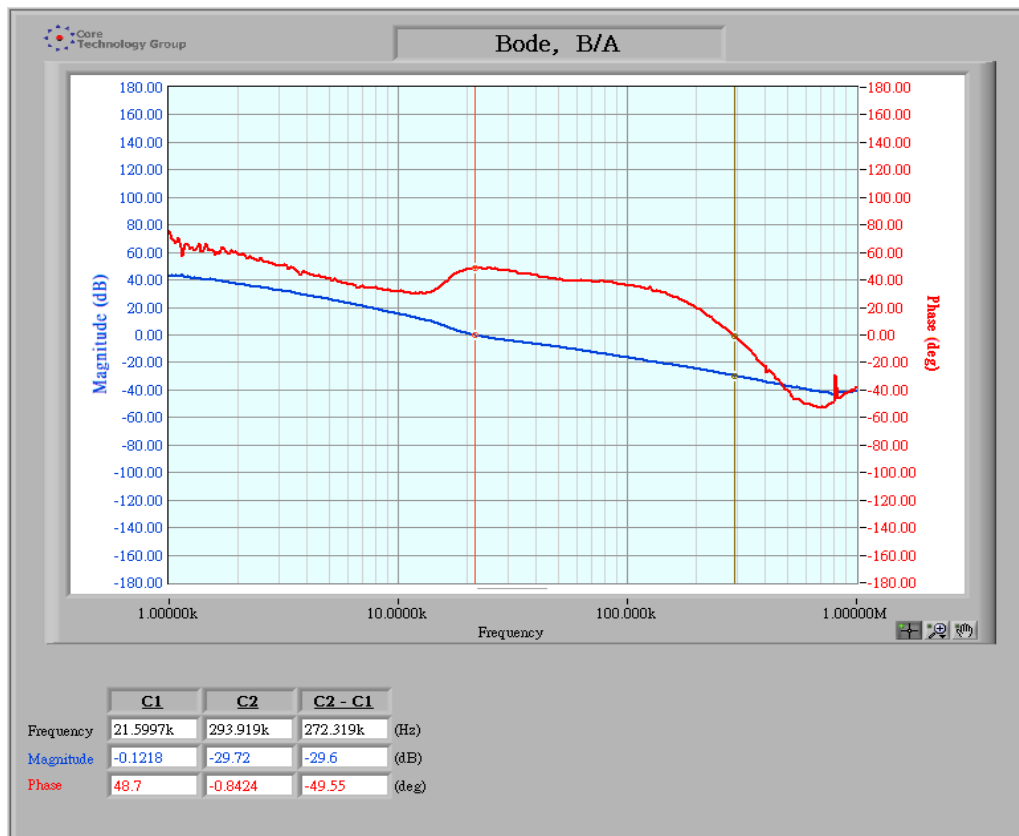
|           | Measure(V) | Spec(V) | Pass/Fail |
|-----------|------------|---------|-----------|
| 0.5-->2A  | 1.208      | 1.32    | Pass      |
|           | 1.14       | 1.08    | Pass      |
|           | 0.068      | 0.240   | Pass      |
| 2A-->0.5A | 1.24       | 1.32    | Pass      |
|           | 1.178      | 1.08    | Pass      |
|           | 0.062      | 0.240   | Pass      |
| 0.5<-->2A | 1.24       | 1.32    | Pass      |
|           | 1.136      | 1.08    | Pass      |
|           | 0.104      | 0.240   | Pass      |

#### 4. bode plot

0.3A:



2A:



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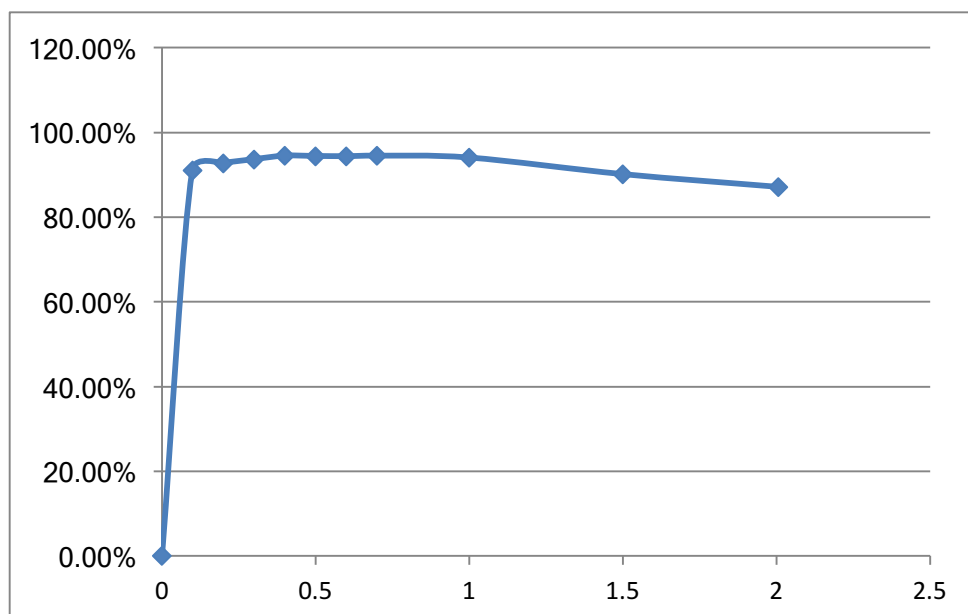
|      | Measure(V) | Spec(V)                 | Pass/Fail |
|------|------------|-------------------------|-----------|
| 0.5A | 27.07      | $\geq 12\text{dB}$      | Pass      |
|      | 56.23      | $\geq 45\text{ degree}$ | Pass      |
| 2A   | 29.6       | $\geq 12\text{dB}$      | Pass      |
|      | 49.55      | $\geq 45\text{ degree}$ | Pass      |

## 4. P3V3

### 1. Efficiency

| Vin    | Iin    | Vout   | Iout   | Eff    | Loss   | Pass/Fail |
|--------|--------|--------|--------|--------|--------|-----------|
| 5.1648 | 0.001  | 3.326  | 0      | 0.00%  | 0.00%  | --        |
| 5.1505 | 0.07   | 3.327  | 0.0987 | 91.08% | 8.92%  | Pass      |
| 5.1348 | 0.1385 | 3.3178 | 0.1987 | 92.70% | 7.30%  | Pass      |
| 5.1206 | 0.2064 | 3.3132 | 0.2987 | 93.64% | 6.36%  | Pass      |
| 5.1047 | 0.2742 | 3.3116 | 0.3993 | 94.47% | 5.53%  | Pass      |
| 5.0891 | 0.3436 | 3.31   | 0.4987 | 94.40% | 5.60%  | Pass      |
| 5.062  | 0.4153 | 3.3128 | 0.5987 | 94.35% | 5.65%  | Pass      |
| 5.05   | 0.4851 | 3.312  | 0.6987 | 94.46% | 5.54%  | Pass      |
| 5.0057 | 0.7017 | 3.3026 | 1      | 94.02% | 5.98%  | Pass      |
| 4.9136 | 1.1173 | 3.2963 | 1.5006 | 90.10% | 9.90%  | Pass      |
| 4.8255 | 1.5709 | 3.2912 | 2.006  | 87.10% | 12.90% | Fail      |

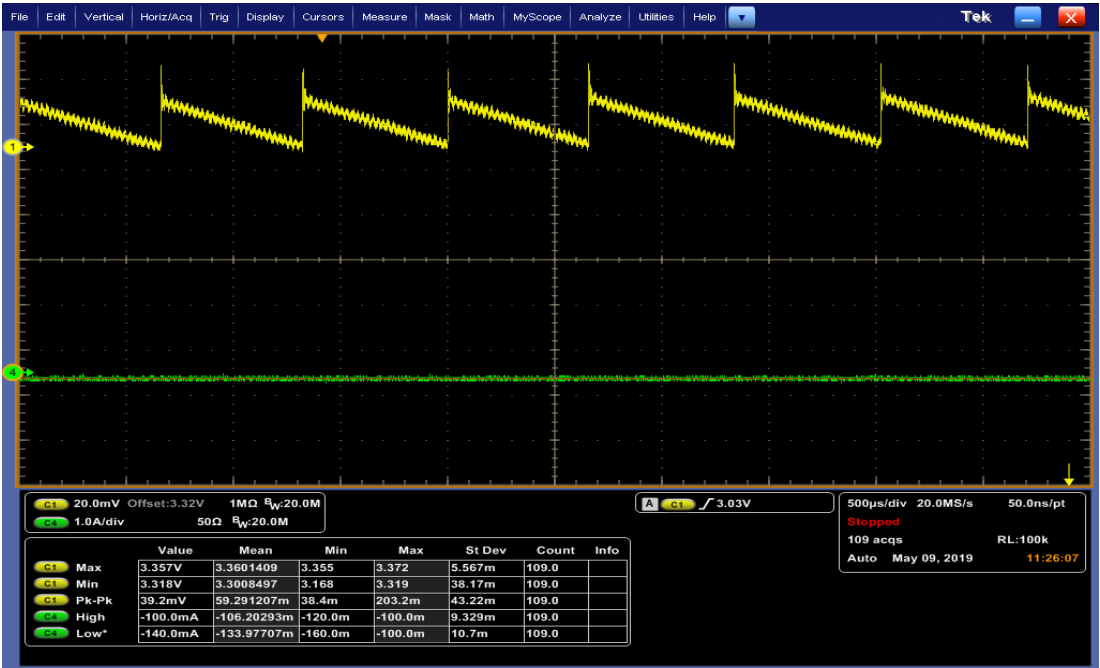
### Efficiency Chart:



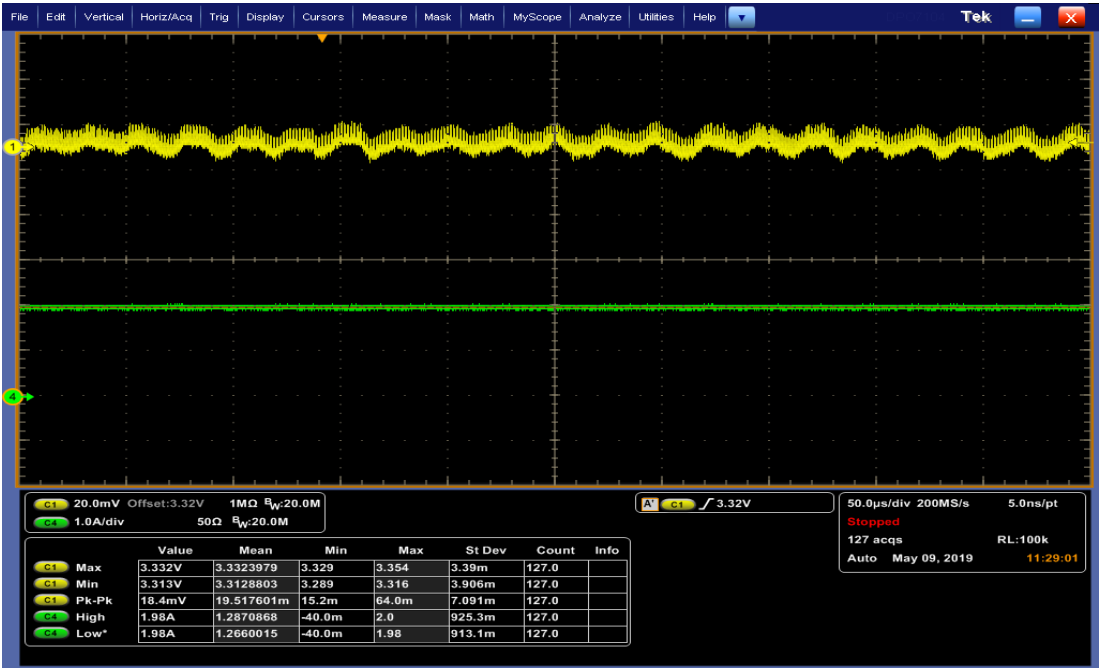
### 2. Ripple

0A:

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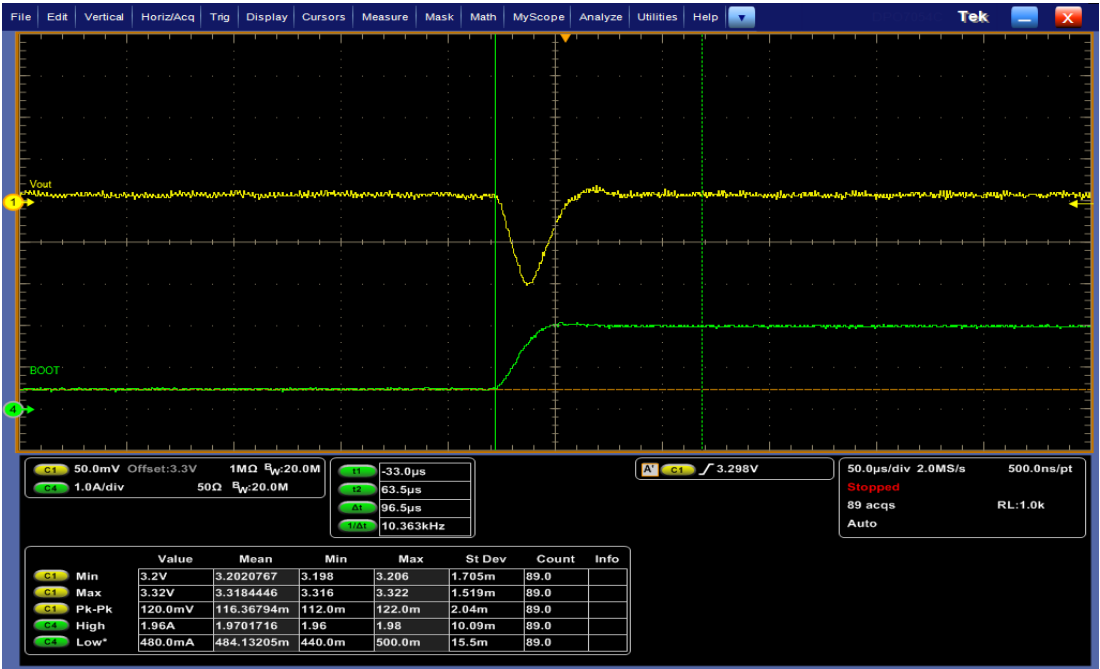
2A:



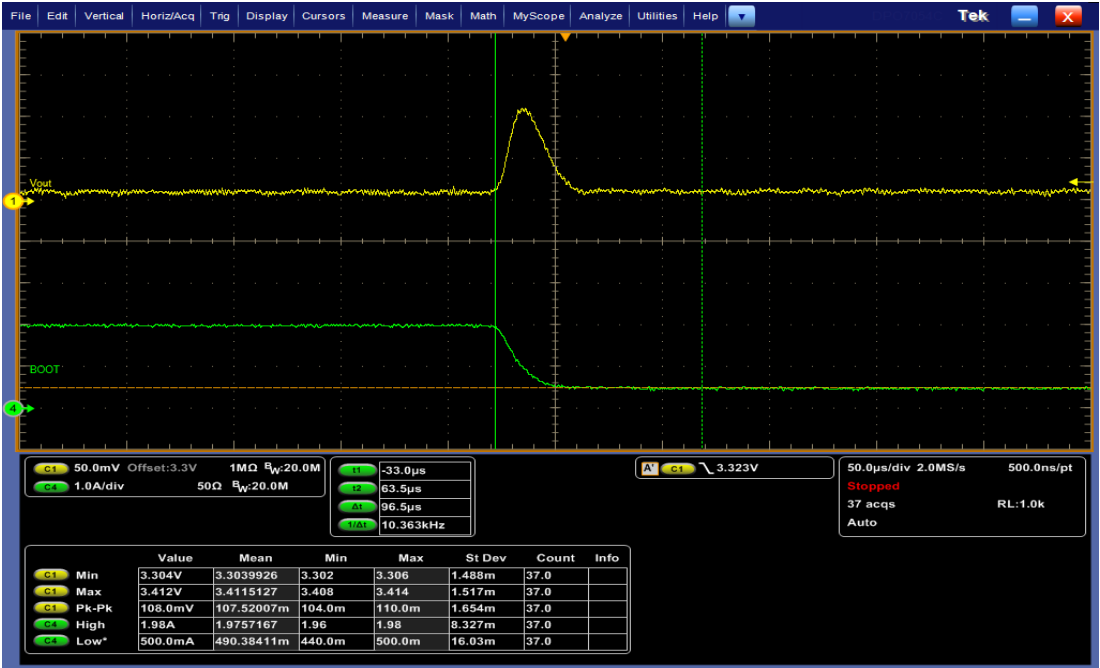
|    | Measure(V) | Spec(V) |           | Pass/Fail |
|----|------------|---------|-----------|-----------|
| 0A | 3.357      | 3.63    | Max       | Pass      |
|    | --         | 3.3     | Typical   | --        |
|    | 3.318      | 2.97    | Min       | Pass      |
|    | 0.039      | 0.66    | Vmax-Vmin | Pass      |
| 2A | 3.332      | 3.63    | Max       | Pass      |
|    | --         | 3.3     | Typical   | --        |
|    | 3.313      | 2.97    | Min       | Pass      |
|    | 0.019      | 0.66    | Vmax-Vmin | Pass      |

3. Load transient

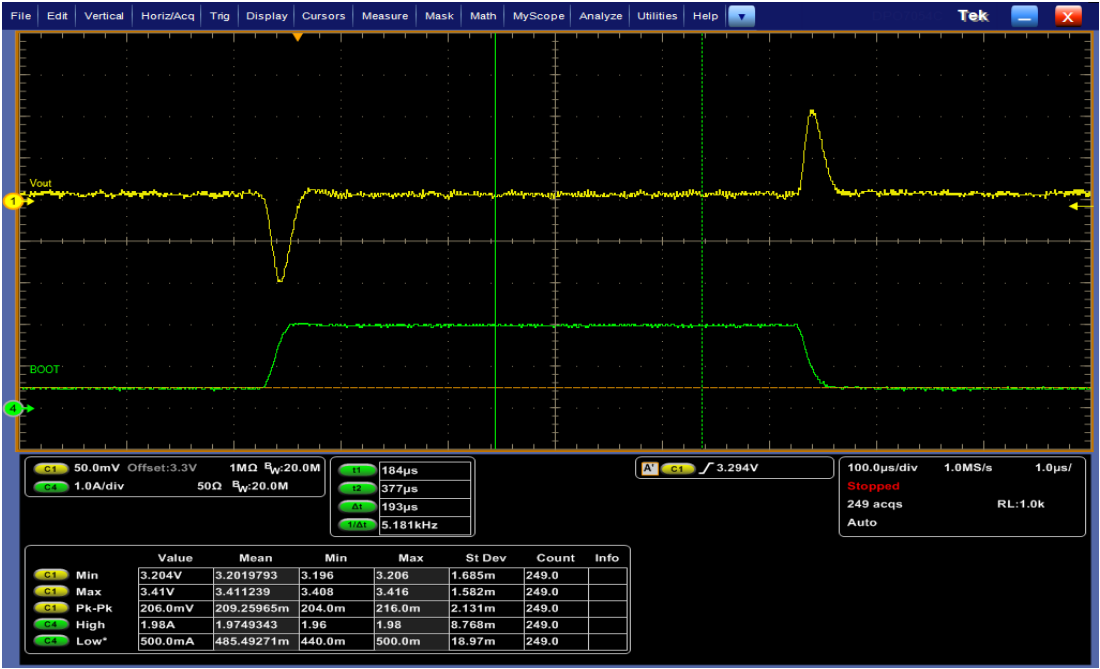
0.5A→2A:



2A→0.5A:



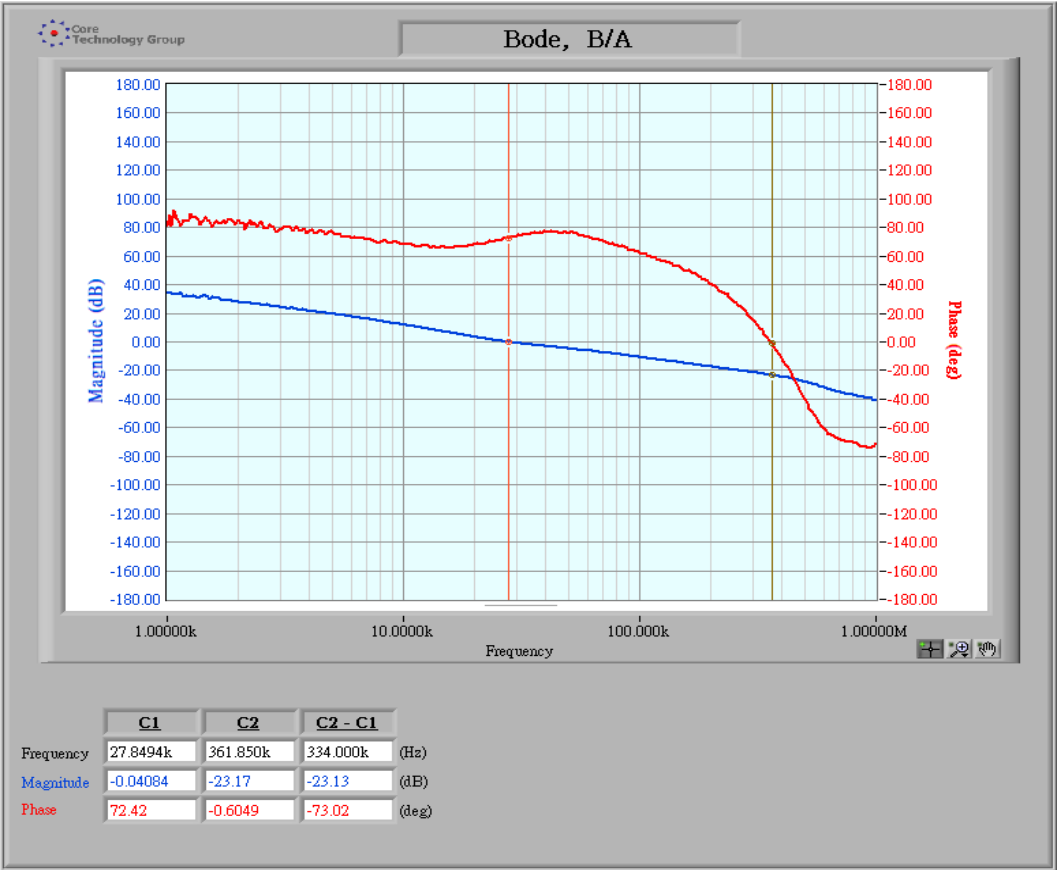
0.5A↔2A:



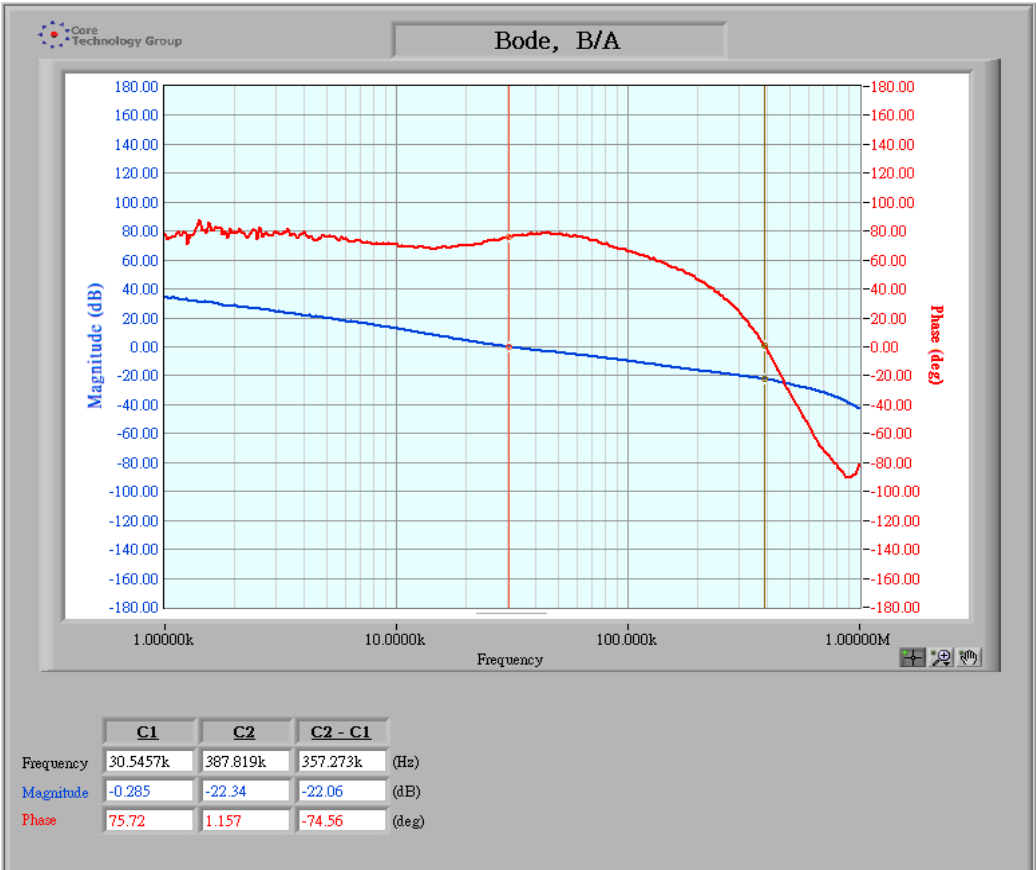
|           | Measure(V) | Spec(V) | Pass/Fail |
|-----------|------------|---------|-----------|
| 0.5-->2A  | 3.41       | 3.63    | Pass      |
|           | 3.204      | 2.97    | Pass      |
|           | 0.206      | 0.66    | Pass      |
| 2A-->0.5A | 3.412      | 3.63    | Pass      |
|           | 3.304      | 2.97    | Pass      |
|           | 0.108      | 0.66    | Pass      |
| 0.5<-->2A | 3.41       | 3.63    | Pass      |
|           | 3.204      | 2.97    | Pass      |
|           | 0.206      | 0.66    | Pass      |

4. bode plot

0.3A:



2A:



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|      | Measure(V) | Spec(V)                 | Pass/Fail |
|------|------------|-------------------------|-----------|
| 0.5A | 23.13      | $\geq 12\text{dB}$      | Pass      |
|      | 73.02      | $\geq 45\text{ degree}$ | Pass      |
| 2A   | 22.06      | $\geq 12\text{dB}$      | Pass      |
|      | 74.56      | $\geq 45\text{ degree}$ | Pass      |