Inquiring about abnormal output characteristics of

TI TPS7A2036DBVR

1. Summary:

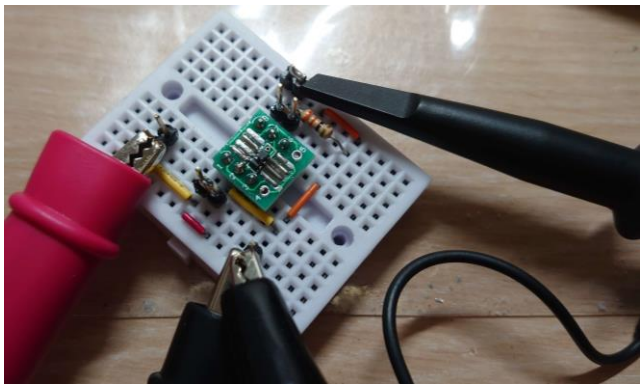
   After purchasing the TPS7A2036DBVR from Mouser, I conducted detailed circuit testing and found highly abnormal waveforms at the output. I hope TI can provide some technical support or problem analysis.

2. Experimental Instruments and Circuit:

   a. Testing Circuit:

   The circuit was tested using a breadboard. I am aware of the potential stability issues with electrical connections on breadboards. Therefore, after noticing abnormal LDO output, I replaced several breadboards and used a desktop multimeter to measure resistance at all circuit nodes to ensure stable connections.

   For the LDO IC, I used a PCB adapter board to expose DIP Pins, and I ensured good electrical connections in this part as well.



b. The testing circuit using the Typical Application provided in the datasheet. Both input and output capacitors are GRT188R61C106KE13J 10uF X5R 0603 MLCCs. Additionally, I experimented with larger electrolytic capacitors and various types of capacitors, but the abnormal conditions persisted without significant changes.

The ENABLE pin is directly connected to the input (5V), which, according to the datasheet, should not pose any issues.

8.2 Typical Application

Figure 8-4 shows the typical application circuit for the TPS7A20. Input and output capacitances may need to be increased above the 1 µF minimum for some applications.

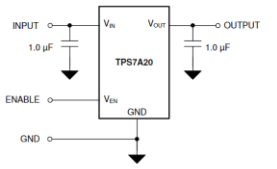
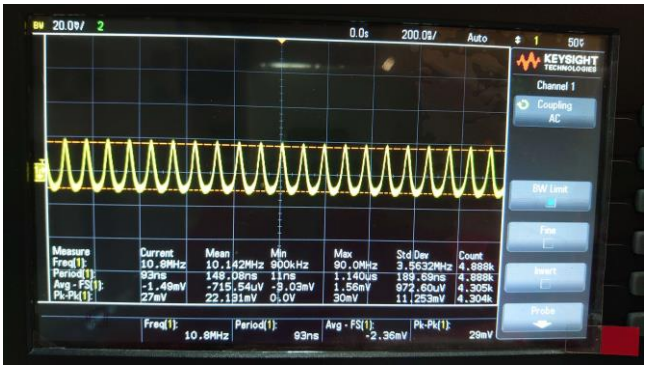


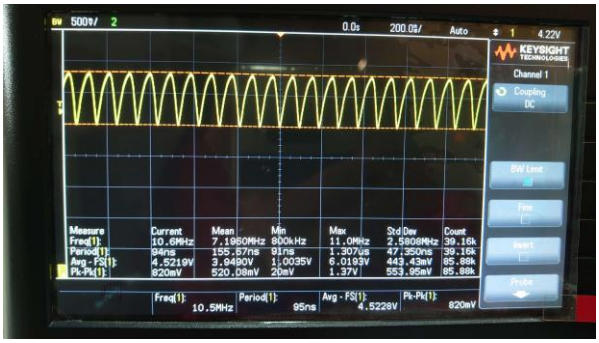
Figure 8-4. TPS7A20 Typical Application

c. The input power is supplied to the experimental circuit using an adjustable linear power supply, adjusted to provide a 5V output at 0.6A CC. Later, to rule out potential supply-related issues, I adjusted it to 3A CC, but it had no effect on the abnormal behavior.

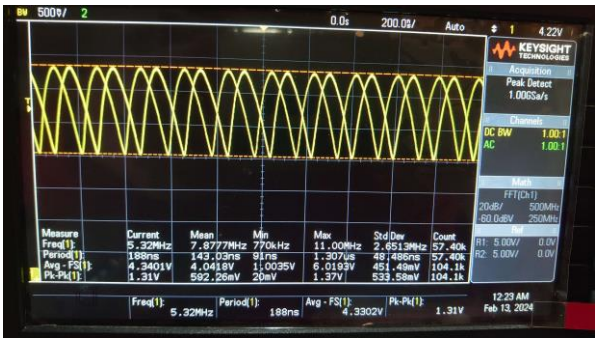
The voltage waveform at the input breakpoint on the Breadboard is depicted in the provided image. This waveform was recorded when there was a 20Ω load at the LDO output. The peak-to-peak voltage is approximately 2mV under no-load conditions.



3. The detailed abnormal conditions are as follows:
    a. Under no-load conditions, the LDO can output 3.6V as measured using a desktop multimeter. Additionally, in AC coupling mode on the oscilloscope, there is no significant ripple observed. Everything appears to be normal under this condition.
    b. Subsequently, when applying a 330Ω load between the output and GND, the output starts to behave abnormally. Significant voltage ripple can be observed on the oscilloscope, and measurement with a desktop multimeter reveals an output voltage of 4.53V, as shown in the image.



    c. Upon removing the 330Ω load and replacing it with a 20Ω load, the output still exhibits abnormalities. This step was taken to ascertain any differences between light and heavy loads.
    d. Finally, upon completely removing the load and returning to a no-load condition, it is observed that the output does not return to 3.6V as expected. Instead, there is a significant voltage fluctuation observed on the oscilloscope, as depicted in the image.



    e. Replace 5 identical LDOs and test them one by one according to the above steps. The abnormal status and performance are exactly the same.