ISL21009-25 and ISL60002-30 Capacitive Load Drive Capability

TB475
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Introduction

This report describes the capacitive load drive capability of the ISL21009-25 and ISL60002-30 voltage references. ISL21009-25 is a 2.500V reference and is specified to operate in a supply range of 3.5V to 16.5V, and comes in an 8 Ld SOIC package. ISL60002-30 is a 3.000V reference specified to operate in the range of 3.2V to 5.5V. It is available in a 3 Ld SOT package.

Test Conditions

- Both the references were tested for capacitive load drive capability at room temperature and 5.0V_{IN}.
- ISL21009-25 was tested under the following C_{OUT} conditions and a ±7mA load:

  a) No Load

  b) nF

  c) 10nF||1µF

  d) 100nF||10µF

- ISL60002-30 was tested under the following C_{OUT} conditions and a ±500µA load:

  a) No Load

  b) nF

  c) 10nF||1µF

  d) 100nF||10µF

All the capacitors used were of surface mount X7R/X5R ceramic chip type. The DUT was placed in an appropriate socket mounted on a milled copper board. The ±7mA and ±500µA loads were generated by means of a voltage pulse through a suitable through-hole resistor.

The supply voltage was provided by an Agilent 3631A. The aforementioned pulse was generated using HP3245A, and the DUT output was probed using a TDS744A oscilloscope.

Figures 1 thru 12 shows the bench test results for ISL21009-25 as a function of varying load capacitors, and Figures 13 thru 16 for ISL60002-30. The board schematic for this test setup is outlined in Figures 21 and 22.

Bench Test Results for ISL21009-25

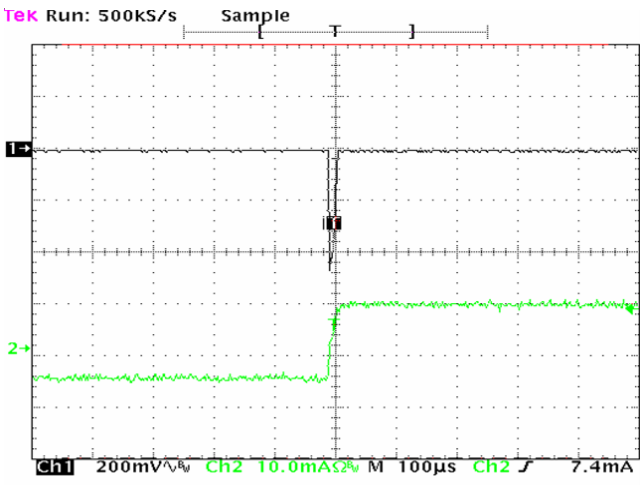

FIGURE 1. NO CAPACITIVE LOAD, V_{IN} = 5.0V, I_LOAD = ±7mA

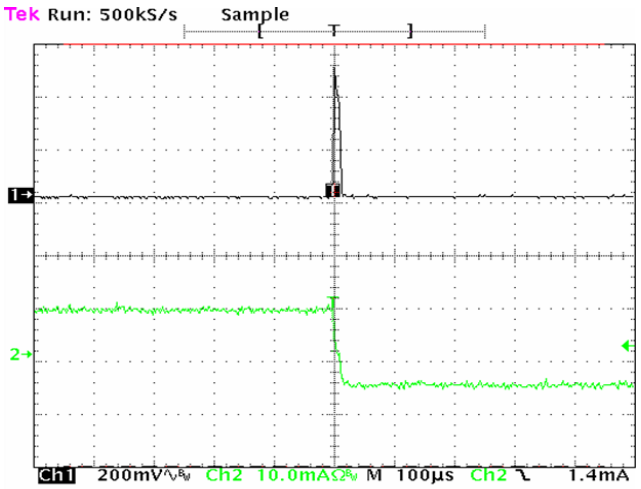

FIGURE 2. NO CAPACITIVE LOAD, V_{IN} = 5.0V, I_LOAD = ±7mA

Bench Test Results for ISL21009-25 (Continued)

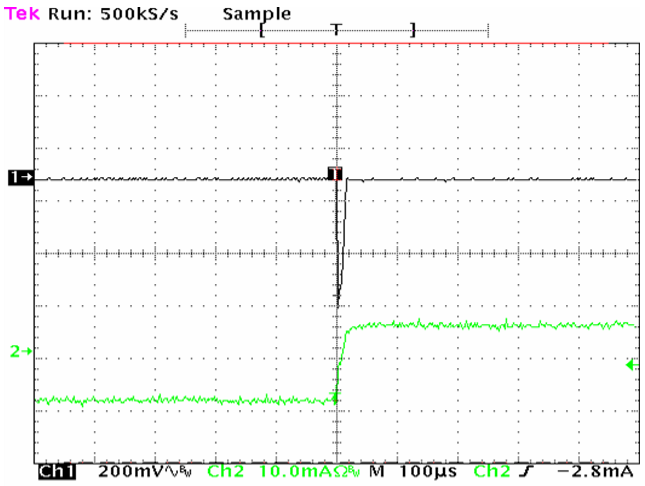

FIGURE 3. C_{OUT} = 1nF, V_{IN} = 5.0V, I_LOAD = ±7mA

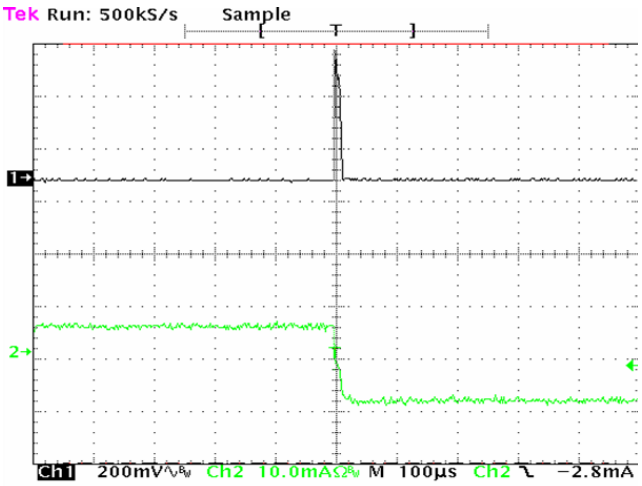

FIGURE 4. C_{OUT} = 1nF, V_{IN} = 5.0V, I_LOAD = ±7mA

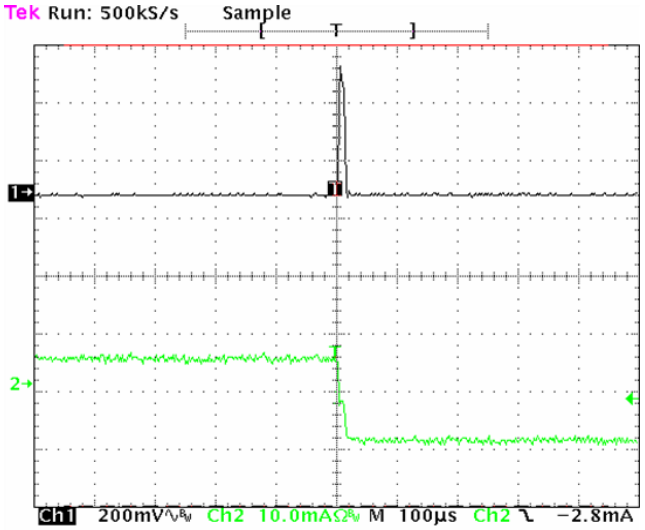

FIGURE 5. C_{OUT} = 10nF, V_{IN} = 5.0V, I_LOAD = ±7mA

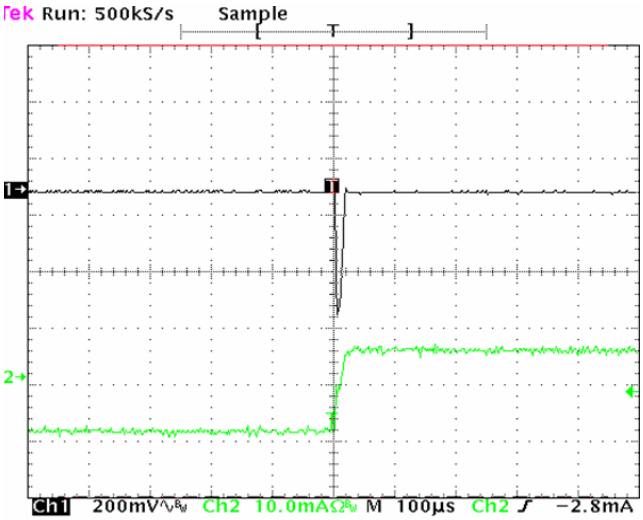

FIGURE 6. C_{OUT} = 10nF, V_{IN} = 5.0V, I_LOAD = ±7mA

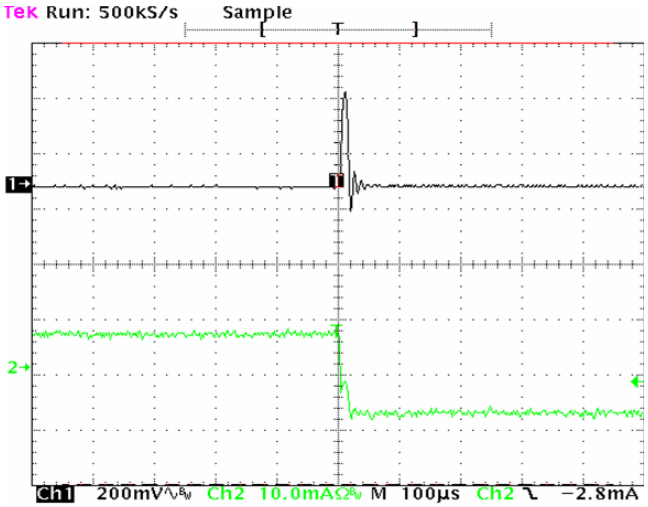

FIGURE 7. C_{OUT} = 100nF, V_{IN} = 5.0V, I_LOAD = ±7mA

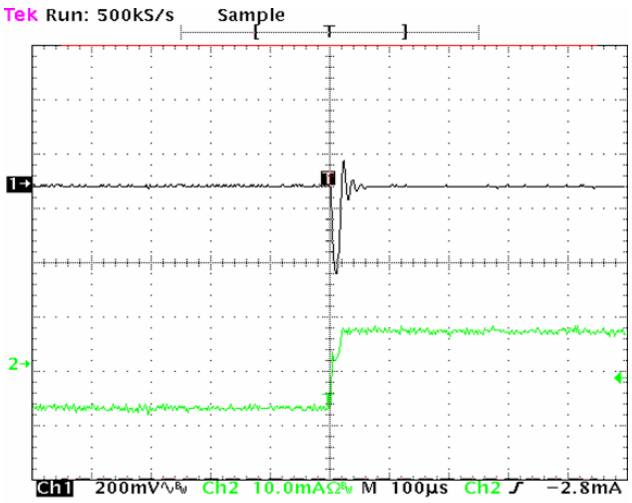

FIGURE 8. C_{OUT} = 100nF, V_{IN} = 5.0V, I_LOAD = ±7mA

Bench Test Results for ISL21009-25 (Continued)

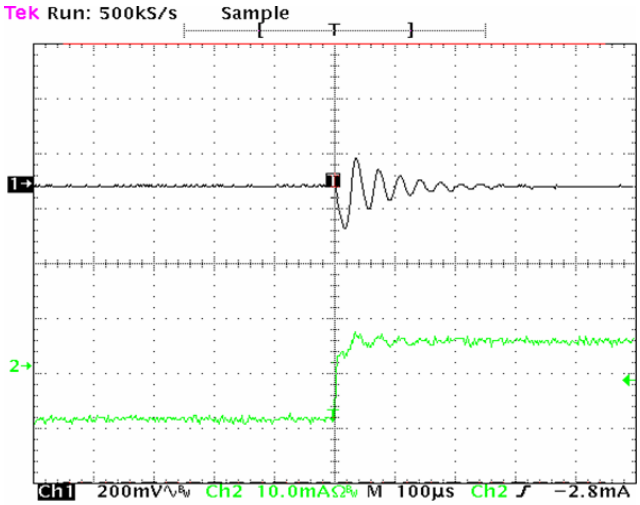

FIGURE 9. C_{OUT} = 1µF, V_{IN} = 5.0V, I_LOAD = ±7mA

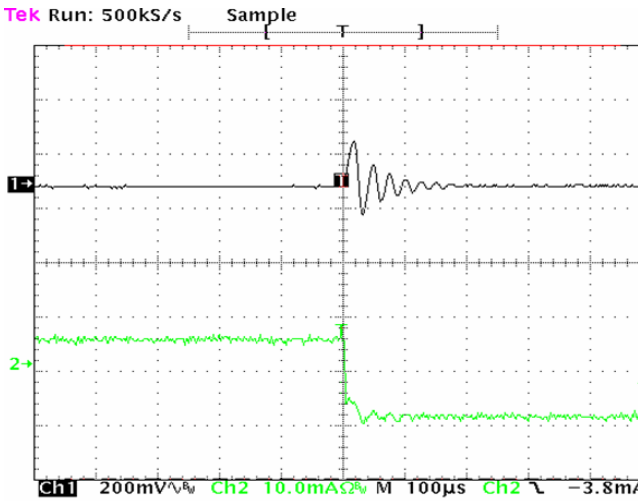

FIGURE 10. C_{OUT} = 1µF, V_{IN} = 5.0V, I_LOAD = ±7mA

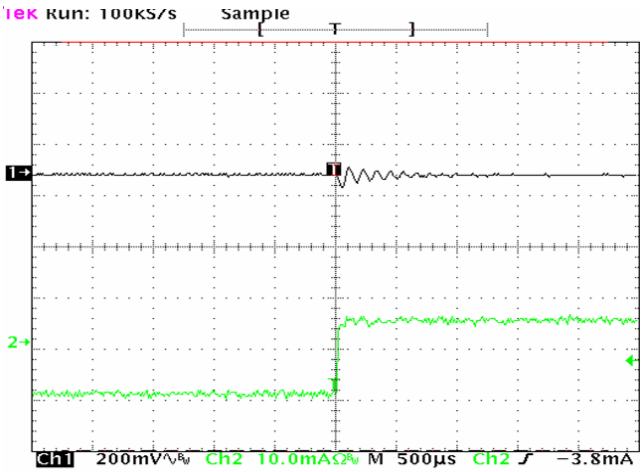

FIGURE 11. C_{OUT} = 10µF, V_{IN} = 5.0V, I_LOAD = ±7mA

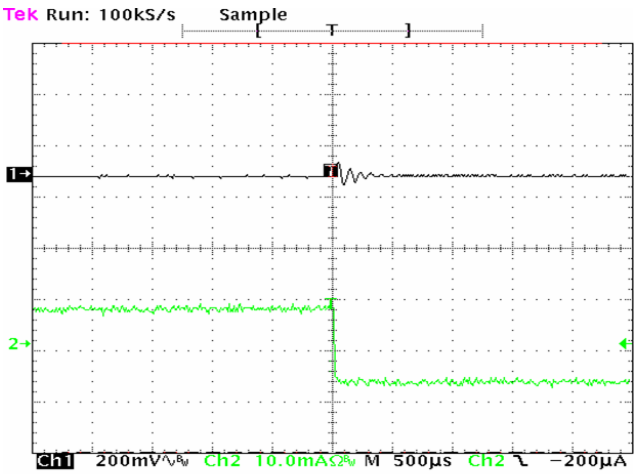

FIGURE 12. C_{OUT} = 10µF, V_{IN} = 5.0V, I_LOAD = ±7mA

Bench Test Results for ISL60002-30

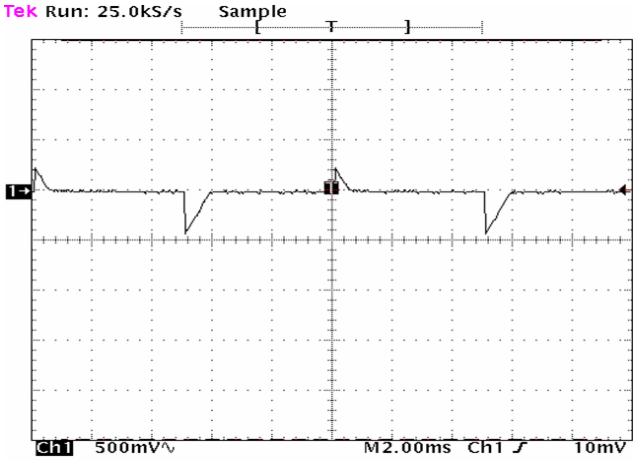

FIGURE 13. C_{OUT} = 0, V_{IN} = 5.0V, FREQ = 100Hz, I_LOAD = ±500µA

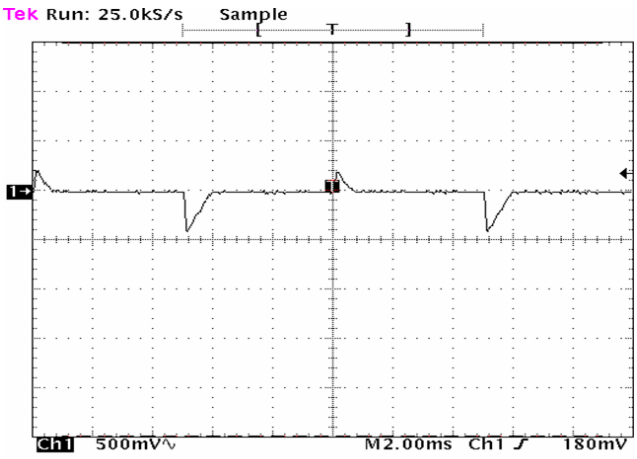

FIGURE 14. C_{OUT} = 100nF, V_{IN} = 5.0V, FREQ = 100Hz, I_LOAD = ±500µA

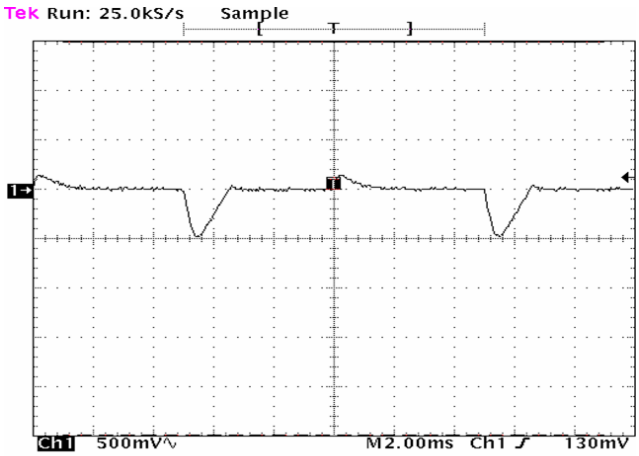

FIGURE 15. C_{OUT} = 100nF||1µF, V_{IN} = 5.0V, FREQ = 100Hz, I_LOAD = ±500µA

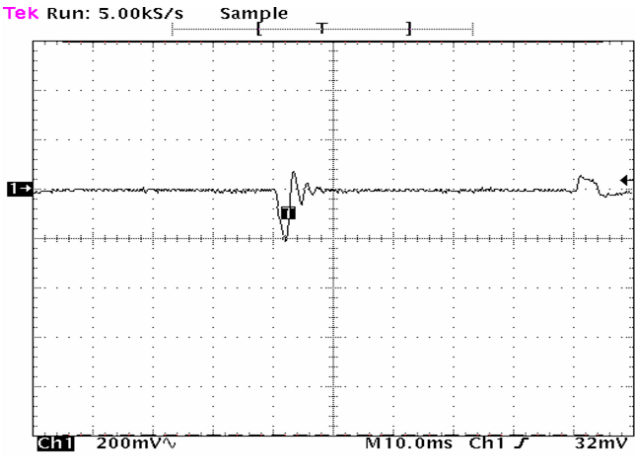

FIGURE 16. C_{OUT} = 100nF||10µF, V_{IN} = 5.0V, FREQ = 100Hz, I_LOAD = ±500µA

Bench Test at -40°C and +125°C

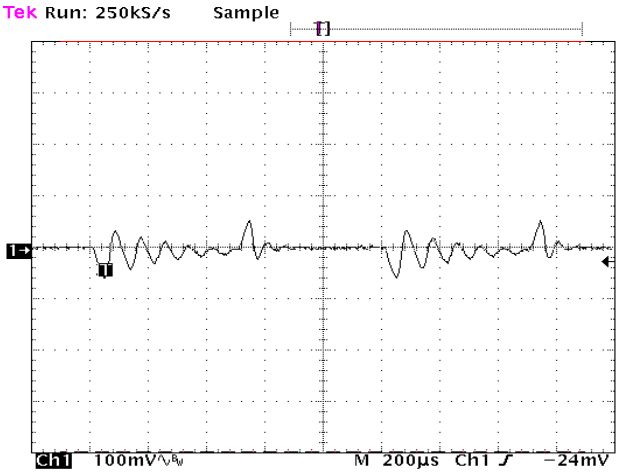

FIGURE 17. ISL21009-25
C_{OUT} = 10µF, V_{IN} = 5.0V, I_LOAD = ±500µA, -40°C

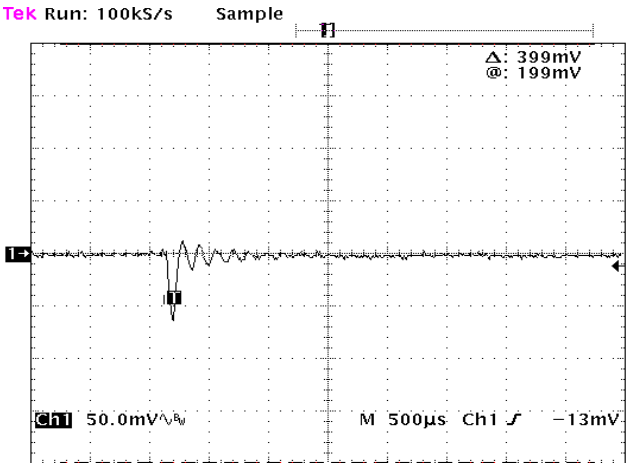

FIGURE 18. ISL21009-25
C_{OUT} = 10µF, V_{IN} = 5.0V, I_LOAD = ±500µA, +125°C

Bench Test at -40°C and +125°C (Continued)

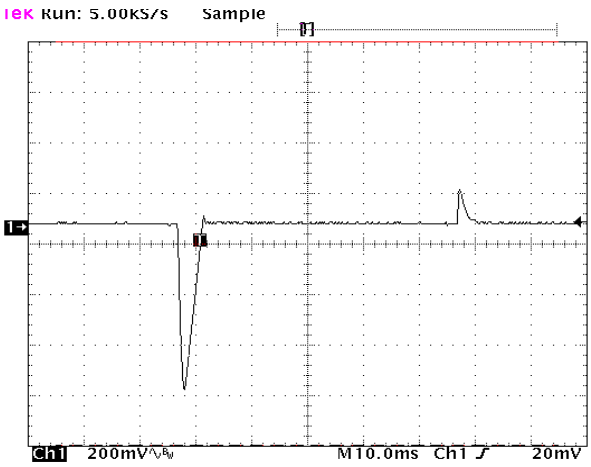

FIGURE 19. ISL60002-30
C_{OUT} = 100nF||1µF, V_{IN} = 5.0V, I_LOAD = ±500µA, -40°C

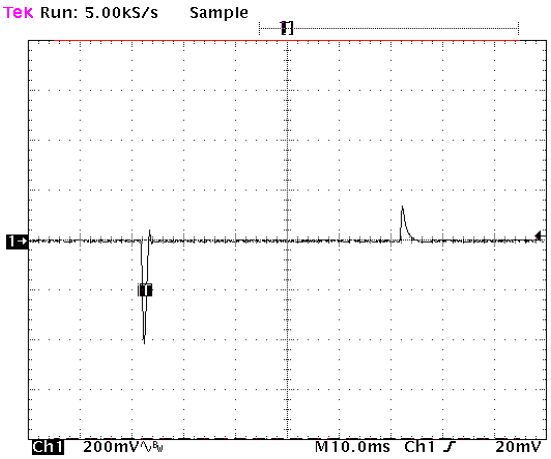

FIGURE 20. ISL60002-30
C_{OUT} = 100nF||1µF, V_{IN} = 5.0V, I_LOAD = ±500µA, +125°C

Board Schematics

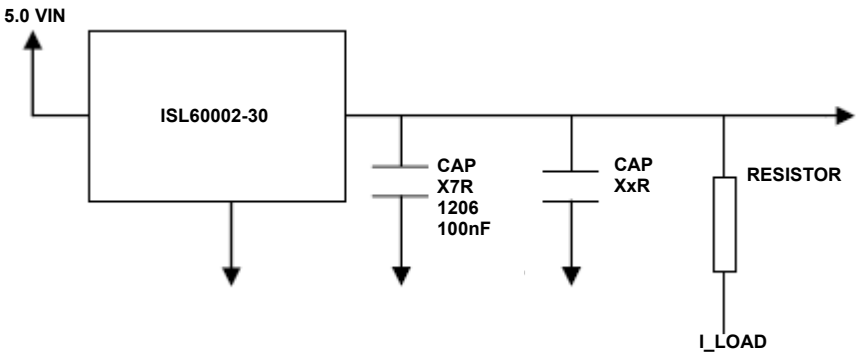

FIGURE 21. ISL60002-30 DUT TEST SETUP

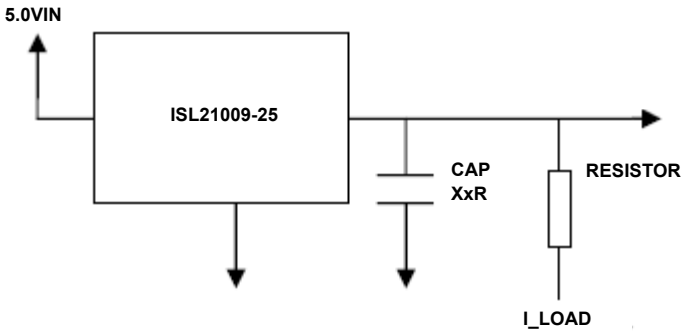

FIGURE 22. ISL21009-25 DUT TEST SETUP

Test Observation and Conclusion

Based on the bench testing of randomly picked units from available production material, the outputs of the ISL21009-25 and ISL60002-30 did not display a tendency to oscillate under varying C_{OUT} conditions. The ISL21009-25 C_{OUT} varied from no load to 10µF, and C_{OUT} conditions of ISL60002-30 were no load, 100nF, 100nF||1µF, and 100nF||10µF. As seen in the plots above, by varying output capacitors of surface mount XxR ceramic chip type, the ISL21009-25 and ISL60002-30 are not expected to oscillate.

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