

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 $\pm 7mA$ load:
 - No Load
 - nF
 - 10nF||1 μ F
 - 100nF||10 μ F

- ISL60002-30 was tested under the following C_{OUT} conditions and a $\pm 500\mu A$ load:

- No Load
- nF
- 10nF||1 μ F
- 100nF||10 μ F

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 $\pm 7mA$ and $\pm 500\mu A$ 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

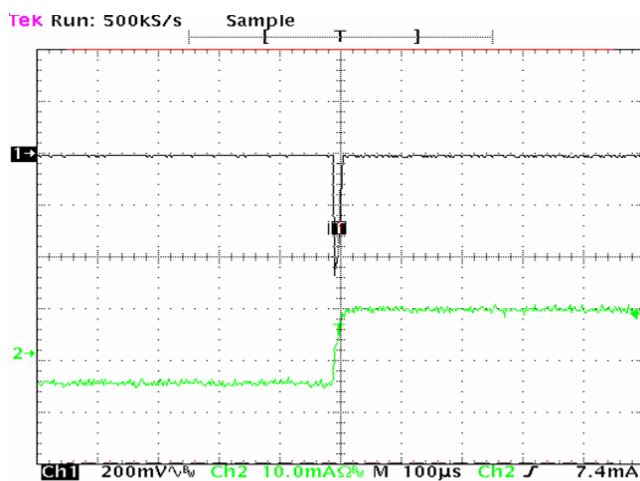


FIGURE 1. NO CAPACITIVE LOAD, $V_{IN} = 5.0V$, $I_{LOAD} = \pm 7mA$

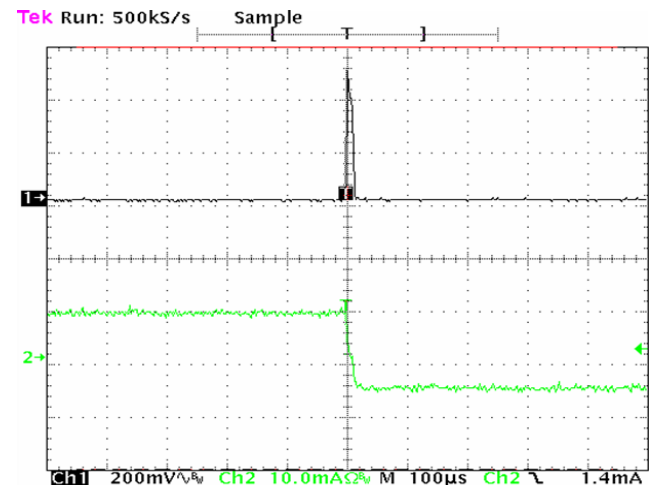


FIGURE 2. NO CAPACITIVE LOAD, $V_{IN} = 5.0V$, $I_{LOAD} = \pm 7mA$

Bench Test Results for ISL21009-25 (Continued)

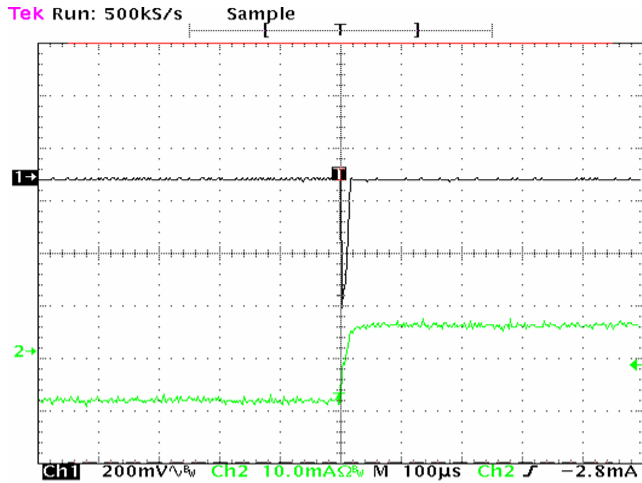


FIGURE 3. $C_{OUT} = 1\text{nF}$, $V_{IN} = 5.0\text{V}$, $I_{LOAD} = \pm 7\text{mA}$

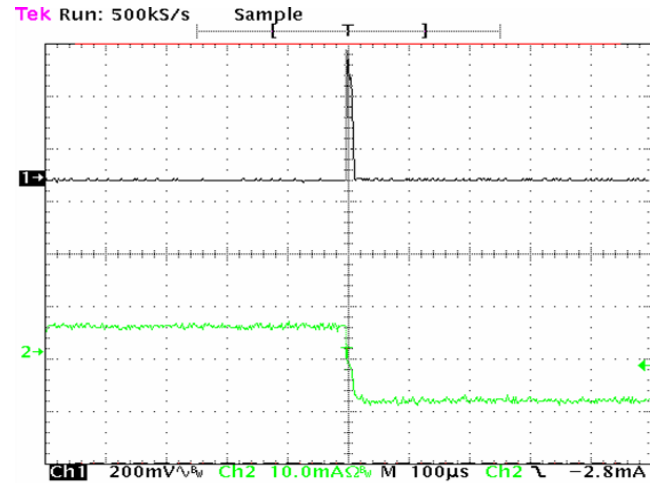


FIGURE 4. $C_{OUT} = 1\text{nF}$, $V_{IN} = 5.0\text{V}$, $I_{LOAD} = \pm 7\text{mA}$

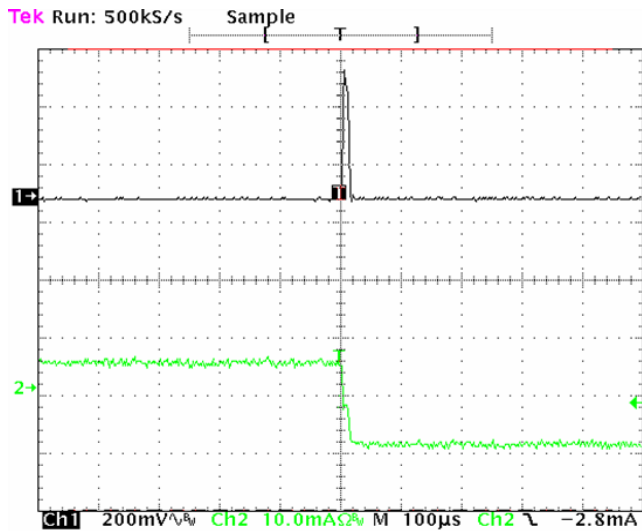


FIGURE 5. $C_{OUT} = 10\text{nF}$, $V_{IN} = 5.0\text{V}$, $I_{LOAD} = \pm 7\text{mA}$

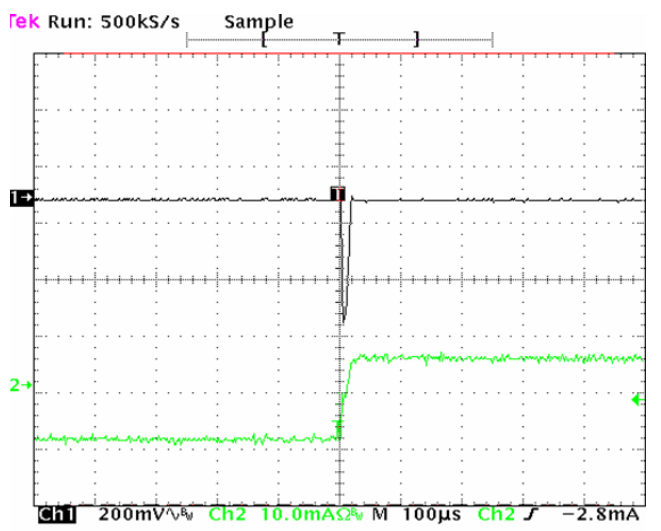


FIGURE 6. $C_{OUT} = 10\text{nF}$, $V_{IN} = 5.0\text{V}$, $I_{LOAD} = \pm 7\text{mA}$

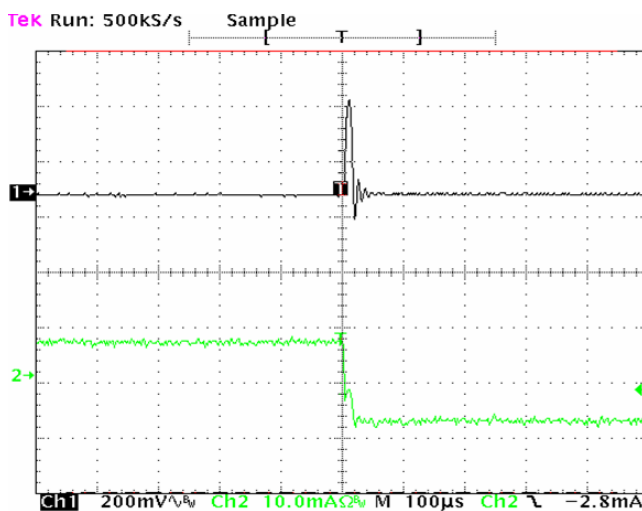


FIGURE 7. $C_{OUT} = 100\text{nF}$, $V_{IN} = 5.0\text{V}$, $I_{LOAD} = \pm 7\text{mA}$

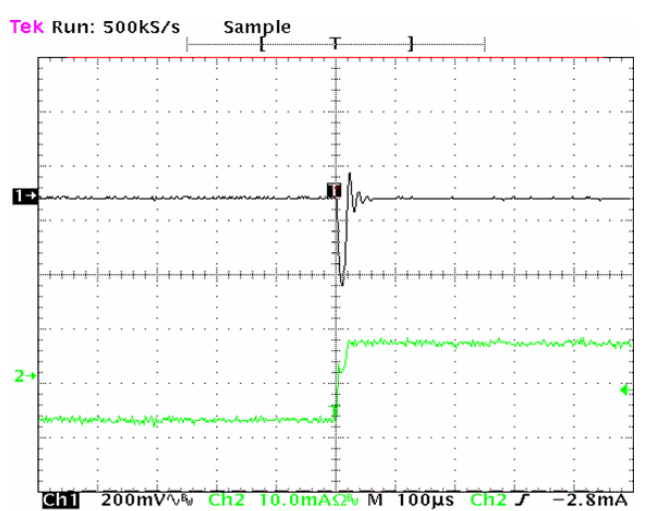


FIGURE 8. $C_{OUT} = 100\text{nF}$, $V_{IN} = 5.0\text{V}$, $I_{LOAD} = \pm 7\text{mA}$

Bench Test Results for ISL21009-25 (Continued)

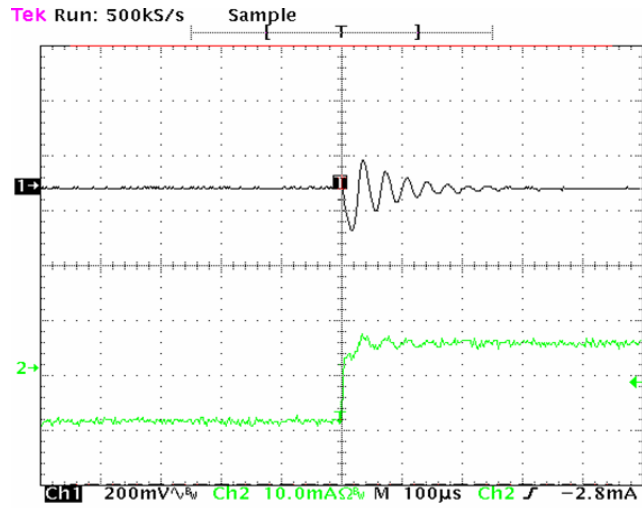


FIGURE 9. $C_{OUT} = 1\mu F$, $V_{IN} = 5.0V$, $I_{LOAD} = \pm 7mA$

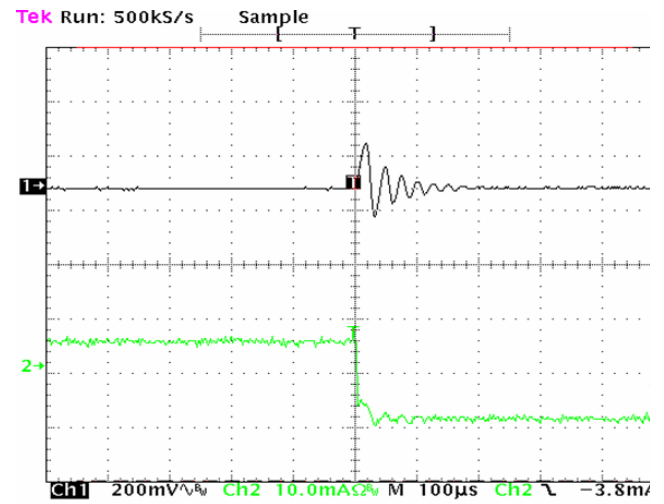


FIGURE 10. $C_{OUT} = 1\mu F$, $V_{IN} = 5.0V$, $I_{LOAD} = \pm 7mA$

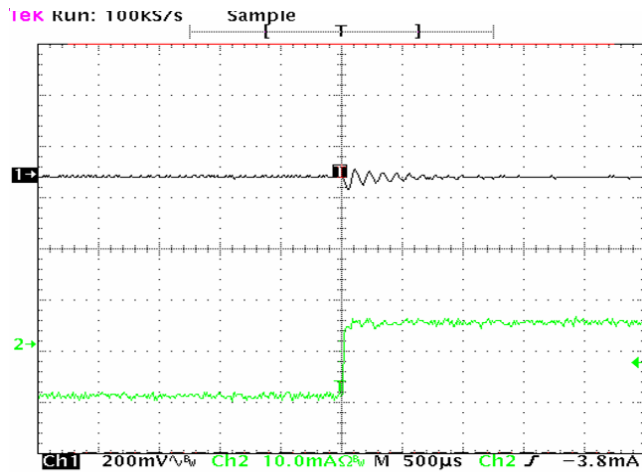


FIGURE 11. $C_{OUT} = 10\mu F$, $V_{IN} = 5.0V$, $I_{LOAD} = \pm 7mA$

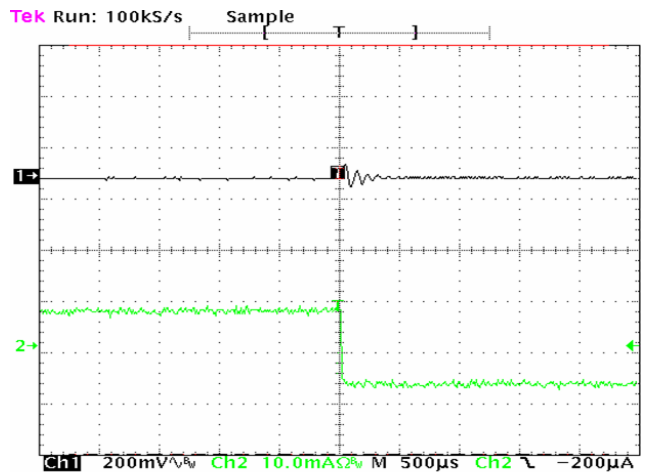


FIGURE 12. $C_{OUT} = 10\mu F$, $V_{IN} = 5.0V$, $I_{LOAD} = \pm 7mA$

Bench Test Results for ISL60002-30

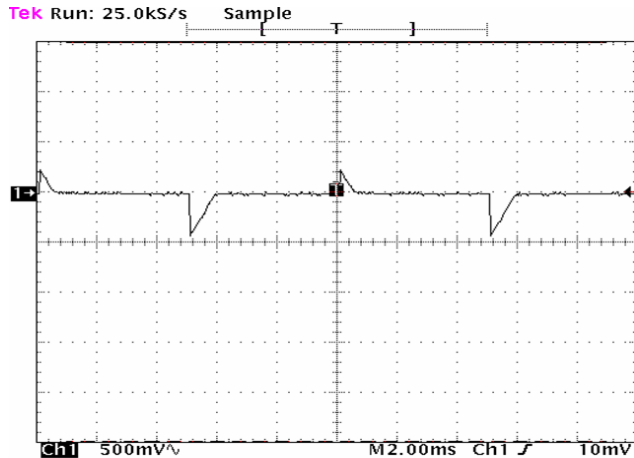


FIGURE 13. $C_{OUT} = 0$, $V_{IN} = 5.0V$, FREQ = 100Hz,
 $I_{LOAD} = \pm 500\mu A$

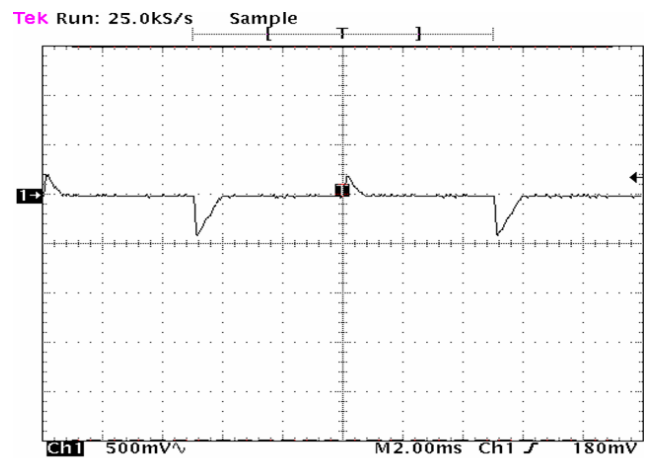


FIGURE 14. $C_{OUT} = 100nF$, $V_{IN} = 5.0V$, FREQ = 100Hz,
 $I_{LOAD} = \pm 500\mu A$

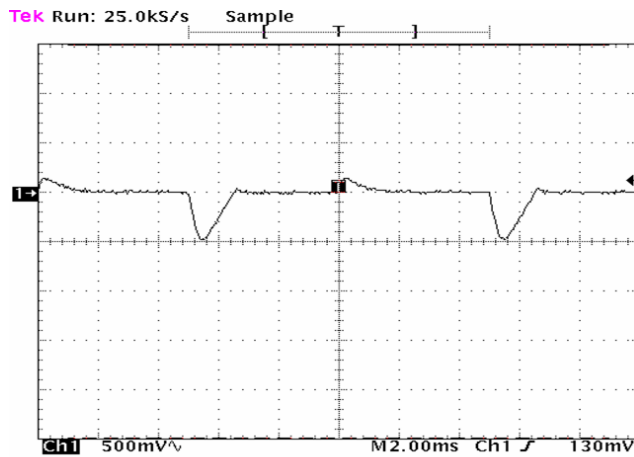


FIGURE 15. $C_{OUT} = 100nF || 1\mu F$, $V_{IN} = 5.0V$, FREQ = 100Hz,
 $I_{LOAD} = \pm 500\mu A$

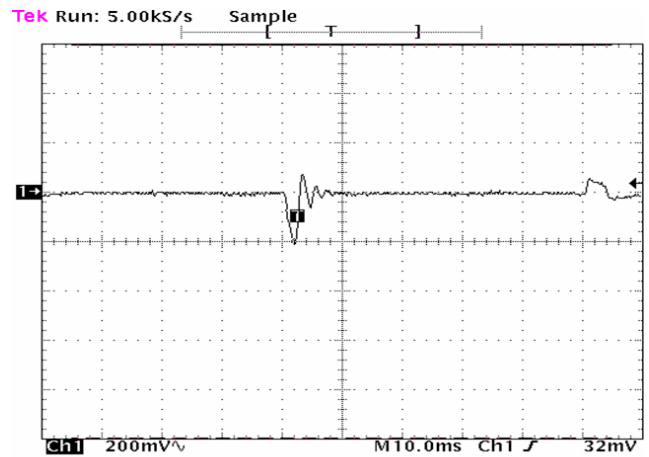


FIGURE 16. $C_{OUT} = 100nF || 10\mu F$, $V_{IN} = 5.0V$, FREQ = 100Hz,
 $I_{LOAD} = \pm 500\mu A$

Bench Test at $-40^{\circ}C$ and $+125^{\circ}C$

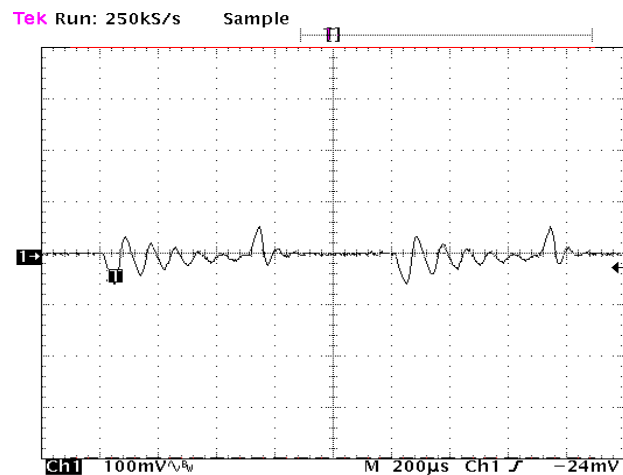


FIGURE 17. ISL21009-25
 $C_{OUT} = 10\mu F$, $V_{IN} = 5.0V$, $I_{LOAD} = \pm 500\mu A$, $-40^{\circ}C$

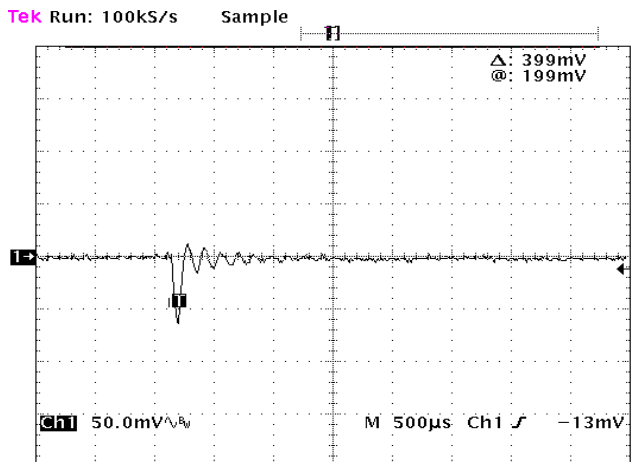


FIGURE 18. ISL21009-25
 $C_{OUT} = 10\mu F$, $V_{IN} = 5.0V$, $I_{LOAD} = \pm 500\mu A$,
 $+125^{\circ}C$

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

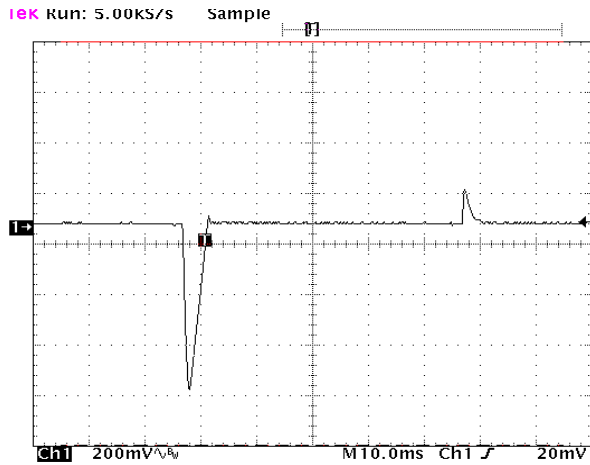


FIGURE 19. ISL60002-30
 $C_{OUT} = 100\text{nF}||1\mu\text{F}$, $V_{IN} = 5.0\text{V}$, $I_{LOAD} = \pm 500\mu\text{A}$,
-40°C

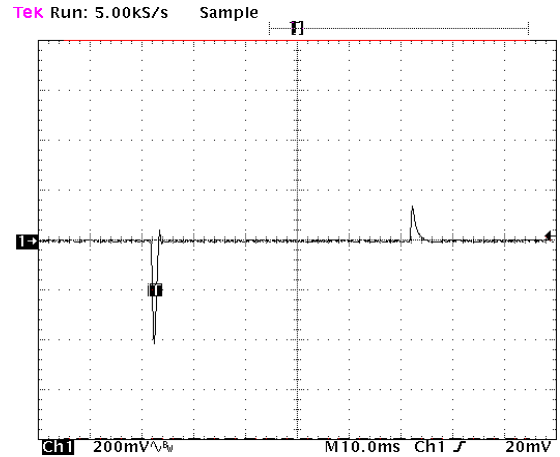


FIGURE 20. ISL60002-30
 $C_{OUT} = 100\text{nF}||1\mu\text{F}$, $V_{IN} = 5.0\text{V}$, $I_{LOAD} = \pm 500\mu\text{A}$,
+125°C

Board Schematics

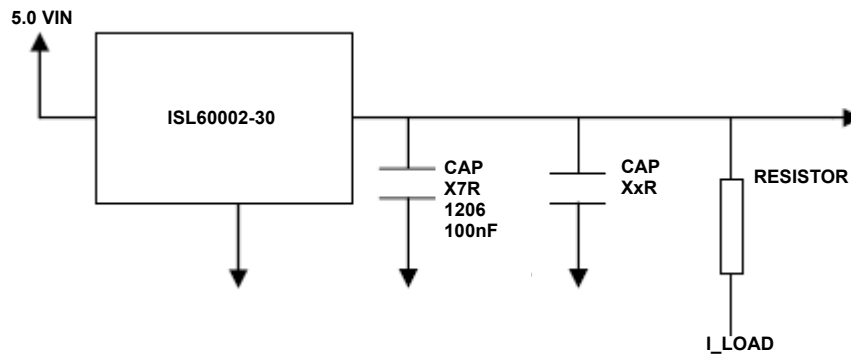


FIGURE 21. ISL60002-30 DUT TEST SETUP

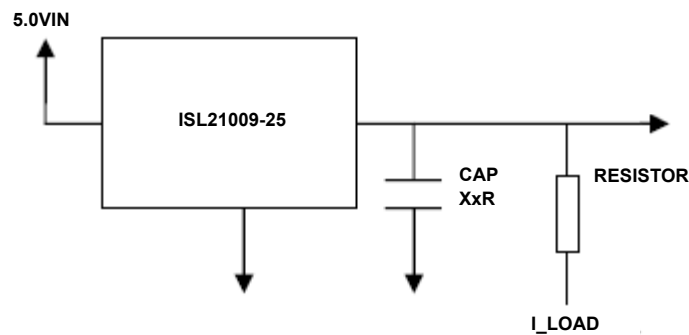


FIGURE 22. ISL21009-25 DUT TEST SETUP

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 $10\mu F$, and C_{OUT} conditions of ISL60002-30 were no load, $100nF$, $100nF||1\mu F$, and $100nF||10\mu F$. 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.

Contact Information

Intersil Corporation
1001 Murphy Ranch Rd.
Milpitas, CA 95035
U.S.A.

Applications Manager:

Jim Pflasterer
jpflaste@intersil.com

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Renesas Electronics America Inc.
1001 Murphy Ranch Road, Milpitas, CA 95035, U.S.A.
Tel: +1-408-432-8888, Fax: +1-408-434-5351

Renesas Electronics Canada Limited
9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3
Tel: +1-905-237-2004

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
Tel: +44-1628-651-700, Fax: +44-1628-651-804

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
Room 1709 Quantum Plaza, No.27 ZhichunLu, Haidian District, Beijing, 100191 P. R. China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, 200333 P. R. China
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited
Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2265-6688, Fax: +852-2886-9022

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan
Tel: +886-2-8175-9600, Fax: +886-2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.
Unit 1207, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics India Pvt. Ltd.
No.777C, 100 Feet Road, HAL 2nd Stage, Indiranagar, Bangalore 560 038, India
Tel: +91-80-67208700, Fax: +91-80-67208777

Renesas Electronics Korea Co., Ltd.
17F, KAMCO Yangjae Tower, 262, Gangnam-daero, Gangnam-gu, Seoul, 06265 Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5338