User's Manual

ISL71010BM25EV1Z

User's Manual: Evaluation Board

High Reliability

Rev.0.00 Nov 2017

ISL71010BM25EV1Z

Evaluation Board

UG135
Rev.0.00
Nov 2, 2017

1. Overview

The ISL71010BM25EV1Z evaluation board measures the performance of the high precision 2.5V ISL71010B25 voltage reference. The reference has a wide input voltage range from 4V to 30V and an initial accuracy of ±0.05%. The voltage noise of 1.9µV_{P-P} in the 0.1Hz to 10Hz range and maximum output voltage temperature coefficient of 10ppm/°C makes the ISL71010B25 ideal for high end applications.

The evaluation board includes voltage input test points (VIN and GND) for a power supply input, as well as a pair of test points for the output (VOUT and GND). The resistor location designated as R2 and the capacitor location designated as C3 allow VOUT output load testing. The R2 resistor location accepts surface mount or through-hole style resistors and C3 comes populated with a 0.1µF load capacitor. Additionally, an R-C damper network can be connected to VOUT by installing a jumper at J1.

1.1 Key Features

- Voltage input test points for power supply connection
- Convenient output test points to measure the voltage reference VOUT
- R2 and C3 allow for VOUT output load testing
- An additional R-C damper network can be connected at VOUT by installing a jumper at J1

1.2 Specifications

This evaluation board is configured and optimized for the following conditions:

- VIN = 4V to 30V
- 10µF and 0.1µF input decoupling capacitors, 1nF compensation capacitor, and 0.1µF load capacitor
- R2 load resistance of ≥ 125Ω
- Selectable 10µF and 2.21kΩ damper network at the output by installing a jumper at J1
- Board temperature: +25°C

1.3 Ordering Information

Part Number	Output Voltage (V)	Description
ISL71010BM25EV1Z	2.5V	Evaluation board

1.4 Related Literature

For a full list of related documents, visit our website:

- ISL71010B25 product page

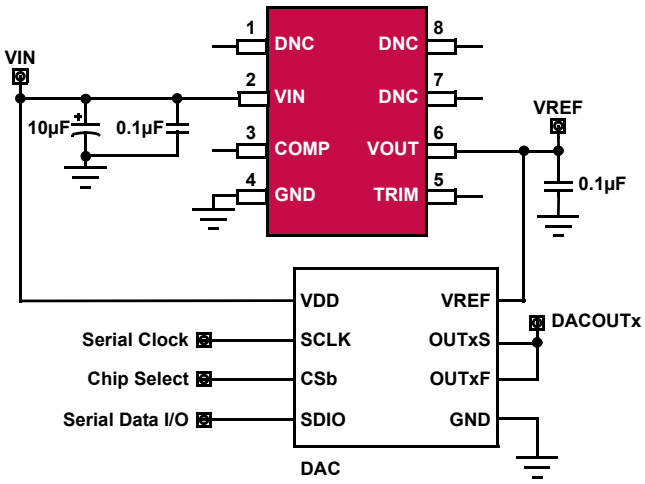

Figure 1. ISL71010BM25EV1Z Block Diagram

2. Functional Description

The ISL71010BM25EV1Z evaluation board provides a simple platform to demonstrate the features and evaluate the performance of the ISL71010B25 voltage reference. It provides easy access to the ISL710101B25 IC pins. The schematic, bill of materials, and top silkscreen for the board are available on pages 6 through 8.

Figures 8 through 18 show performance data taken using the ISL71010BM25EV1Z evaluation board and basic lab equipment.

The following sections explain how to use the evaluation board.

2.1 Basic Layout of the Evaluation Board

Figure 3 on page 6 shows the basic layout of the evaluation board.

Figure 4 shows the evaluation board schematic. The ISL71010BM25EV1Z contains the ISL71010BMB25Z voltage reference (U1), input decoupling capacitors (C1, C2), a compensation capacitor (C5), and a load capacitor (C3). Different resistor values can be applied at (R2) for testing of the voltage reference at different loads. The R2 resistor location accepts surface mount or through-hole style resistors.

The power supply leads attach to TP1 and TP2 (VIN, GND). The ISL71010B25 IC requires a DC supply in the range of 4.0V to 30V for proper operation. The power supply should be capable of delivering 100mA of current.

The output is measured at test points TP3 and TP4 (VOUT, GND), and is best measured with a high precision voltmeter, such as the Keysight 3458A digital multimeter, 8 1/2 digits.

The R-C damper network (R1, C4) is populated and can be connected to the reference output by adding a shunt to the R-C jumper (J1). The damper network improves stability by reducing transient load ringing with high value (>0.47µF) load capacitance.

Table 1. Board Components List

Designator	Value	Description
C1	10µF	Bypass Capacitor
C2	0.01µF	Bypass Capacitor
C3	0.1µF	Load Capacitor
C4	10µF	Damper Capacitor
C5	1nF	Compensation Capacitor
R1	2.21kΩ	Damper Resistor
R2	DNP	Optional Load Resistor
U1	ISL71010BMB25Z	SOIC 8-Pin Package
J1	DNP	Damper Jumper

2.2 Operating Range

The ISL71010B25 IC requires a V_{IN} DC supply in the range of 4.0V to 30V for proper operation. The power supply should be capable of delivering 100mA of current.

The ISL71010B25 IC V_{OUT} can source 20mA of current and sink -10mA of current. For normal operation, the R2 load resistor should be selected to be ≥125Ω.
Note: With V_{OUT} shorted to ground, the IC will limit the current to ≤75mA.

2.3 Quick Start Guide

(1) Gather the external supply and equipment needed to operate the board:

(a) 4V to 30V DC power supply

(b) Precision Voltmeter (Agilent 3458A digital multimeter or equivalent)

(2) Attach the evaluation board to a DC power supply at test points TP1 and TP2 labeled VIN and GND as shown in Figure 2. Place the positive terminal at VIN (TP1) and the negative terminal at GND. The supply should be capable of delivering 4V to 30V of power and 100mA of current.

(3) Connect a precision voltmeter at test points TP3 and TP4 labeled VOUT and GND as shown in Figure 2.

(4) Set the supply voltage to 5V.

(5) Turn the DC power supply ON. The voltmeter should read 2.5V ± 0.05%.

(6) Change the DC power supply voltage to 10V. The voltmeter should continue to read 2.5V.

(7) Vary the DC power supply voltage over the range of 4V to 30V. The voltmeter should continue to read 2.5V.

(8) Performance at different resistive loads can be evaluated by changing R2 with different resistor values.

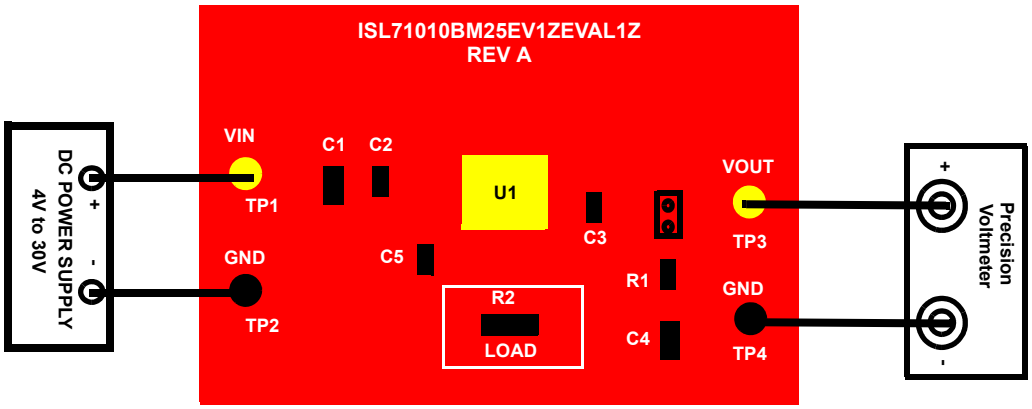

Figure 2. Basic Evaluation Test Setup Block Diagram (Measuring Voltage Reference VOUT)

3. PCB Layout Guidelines

3.1 ISL71010BM25EV1Z Evaluation Board

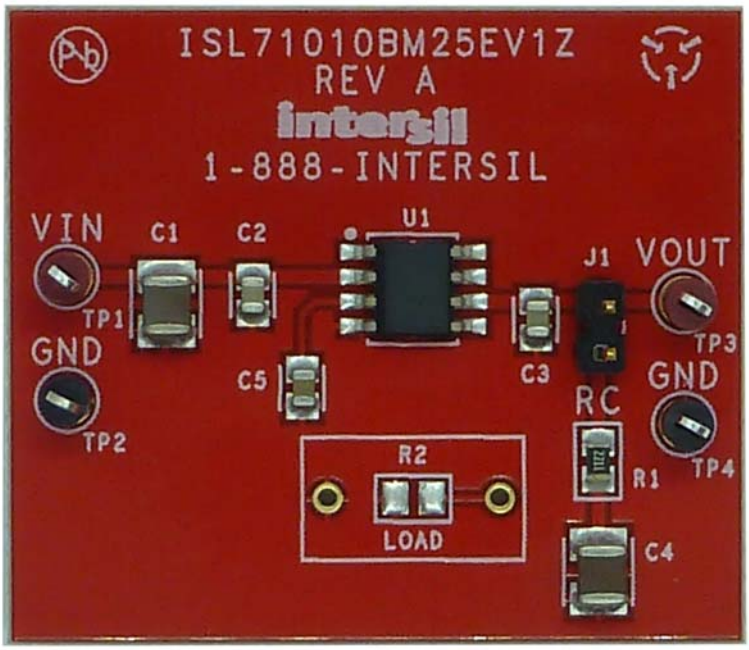

Figure 3. ISL71010BM25EV1Z Evaluation Board

3.2 ISL71010BM25EV1Z Evaluation Board Schematic

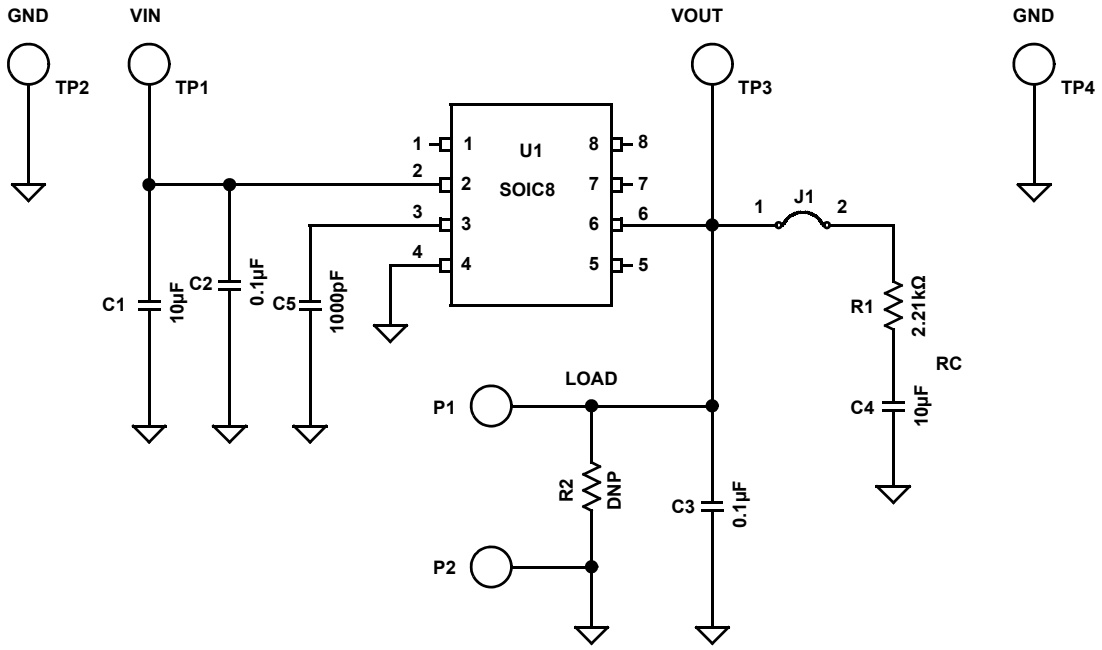

Figure 4. ISL71010BM25EV1Z Evaluation Board Schematic

3.3 Bill of Materials

Qty	Reference Designator	Description	Mfr	Manufacturer Part Number
1	-	PWB-PCB, ISL71010BM25EV1Z, Rev A, ROHS	IMAGINEERING INC	ISL71010BM25EV1ZREVAPCB
1	C5	CAP, SMD, 0805, 1000pF, 50V, 10%, X7R, ROHS	PANASONIC	ECJ-2VB1H102K
2	C2,C3	CAP, SMD, 0805, 0.1µF, 50V, 10%, X7R, ROHS	KEMET	C0805C104K5RACTU
2	C1,C4	CAP, SMD, 1210, 10µF, 50V, 10%, X5R, ROHS	TAIYO YUDEN	UMK325BJ106KM-T
2	TP1, TP3	CONN - MINI TEST PT, VERTICAL, RED, ROHS	KEYSTONE	5000
2	TP2, TP4	CONN - MINI TEST PT, VERTICAL, BLK, ROHS	KEYSTONE	5001
1	J1	CONN-HEADER, 1X2, RETENTIVE, 2.54mm, 0.230X0.120, ROHS	BERG/FCI	69190-202HFL
1	U1	IC - PREC. VOLTAGE REFERENCE, 8P, SOIC, 2.5VOUT, ROHS	INTERSIL	ISL71010BMB25Z-TK
1	R2	RESISTOR, SMD, 0805, DNP	-	-
1	R1	RESISTOR, SMD, 0805, 2.21KΩ, 1/8W, 1%, TF, ROHS	YAGEO	RC0805FR-072K21L
1	Place assy in bag	BAG, STATIC, 2X3, ZIP LOC	-	2X3-STATIC-BAG
1	-	LABEL-DATE CODE_LINE 1: YRWK/REV#, LINE 2: BOM NAME	INTERSIL	LABEL-DATE CODE

3.4 Board Layout

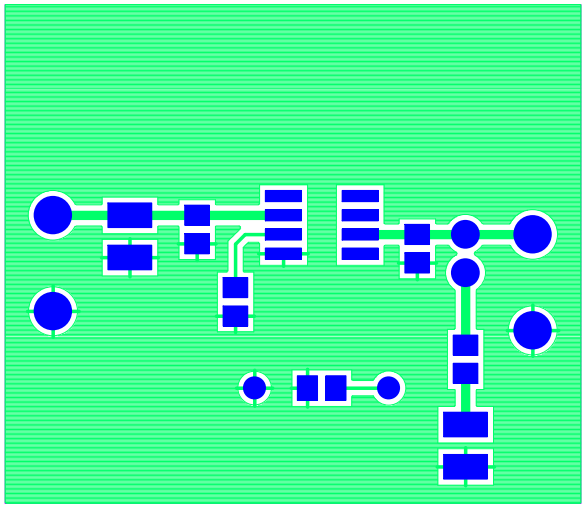

Figure 5. Top Layer

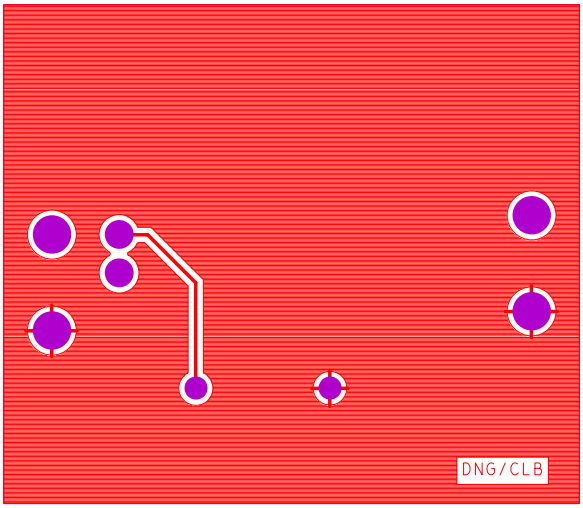

Figure 6. Bottom Layer

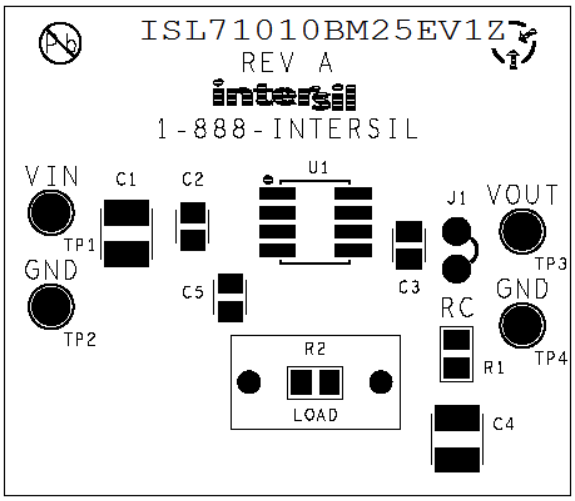

Figure 7. Top Layer Silk Screen

4. Typical Performance Curves

Recommended operation conditions, unless noted: V_{IN} = 5V, I_{OUT} = 0mA, C_{OUT} = 0.1µF, COMP = 1nF, T_A = +25°C

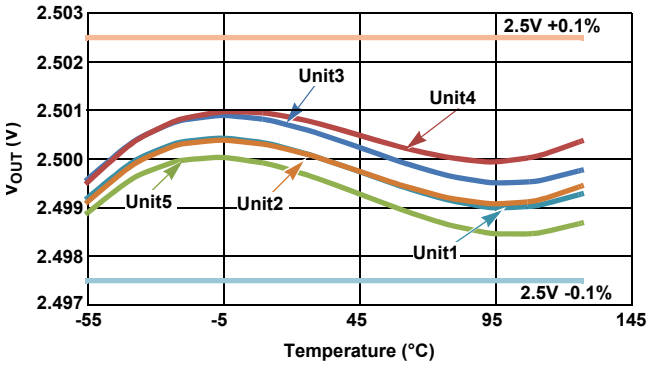

Figure 8. V_{OUT} vs Temperature, Five Units

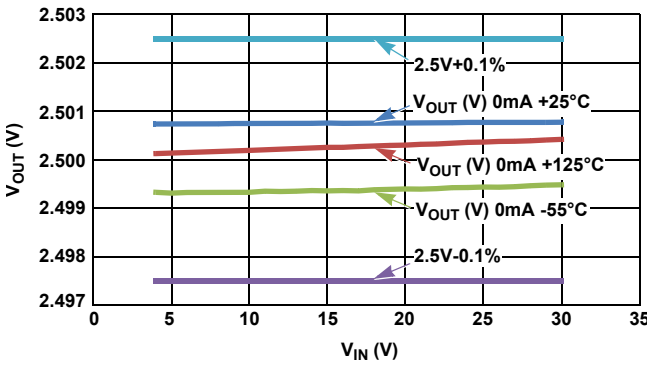

Figure 9. V_{OUT} Accuracy Over Temperature

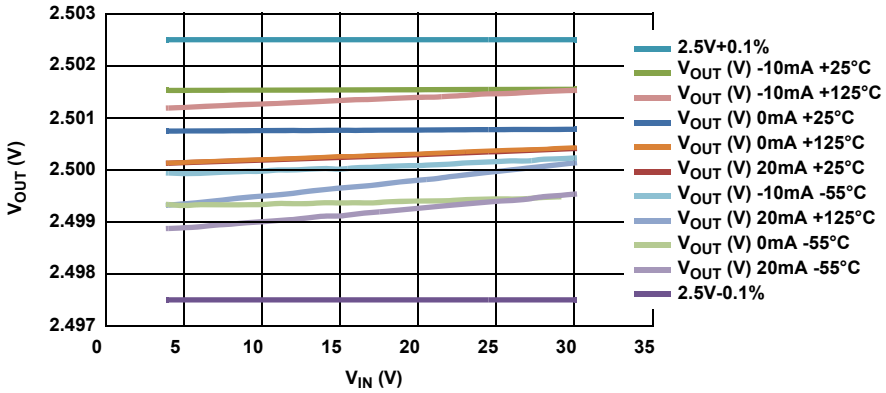

Figure 10. V_{OUT} vs V_{IN} at 0mA, 20mA, and -10mA

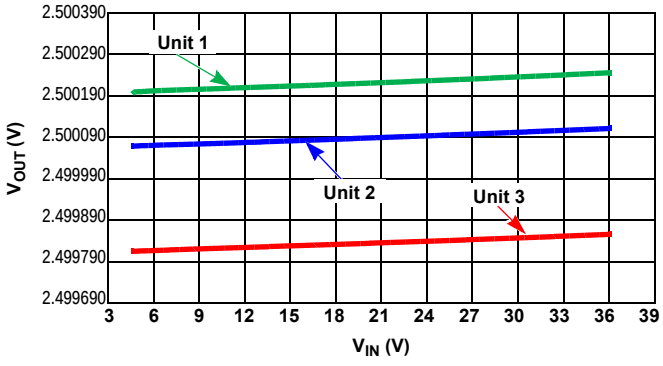

Figure 11. Line Regulation, Three Units

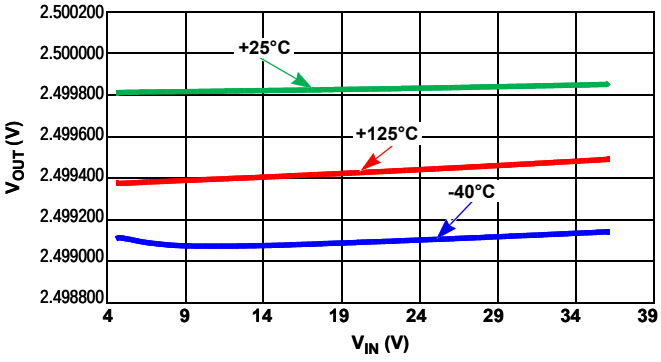

Figure 12. Line Regulation, Three Temperatures

Recommended operation conditions, unless noted: V_{IN} = 5V, I_{OUT} = 0mA, C_{OUT} = 0.1µF, COMP = 1nF, T_A = +25°C **(Continued)**

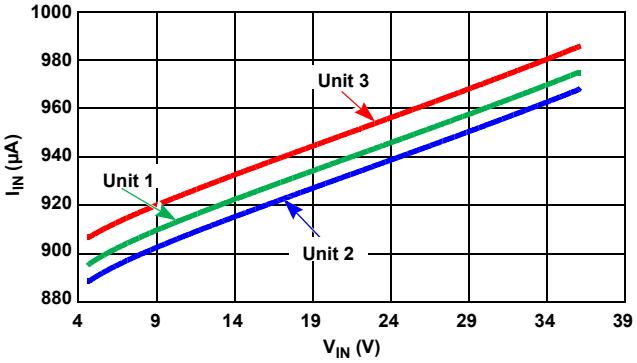

Figure 13. I_{IN} vs V_{IN}, Three Units

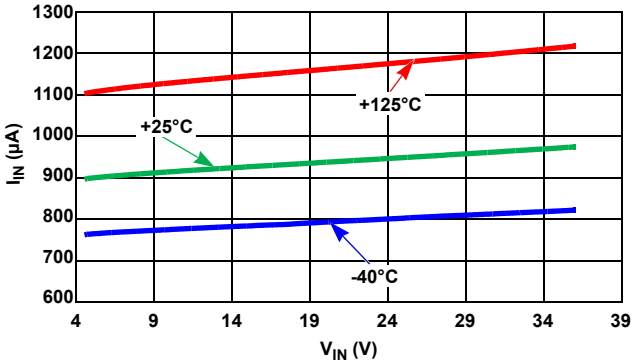

Figure 14. I_{IN} vs V_{IN}, Three Temperatures

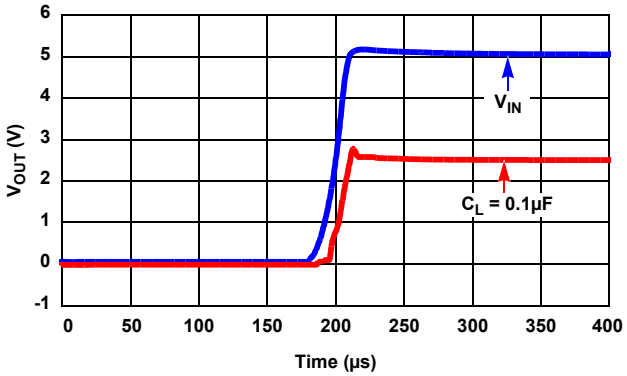

Figure 15. Turn-On Time with 0.1µF

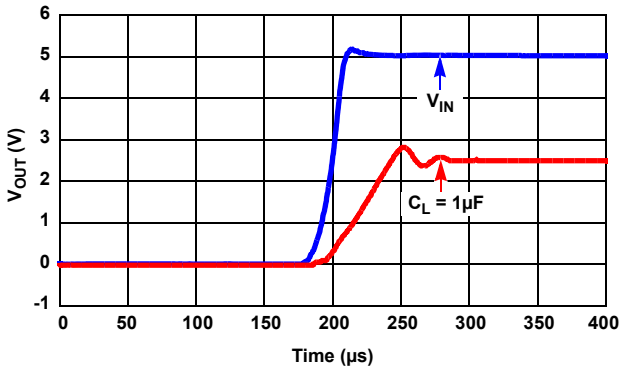

Figure 16. Turn-On Time with 1µF

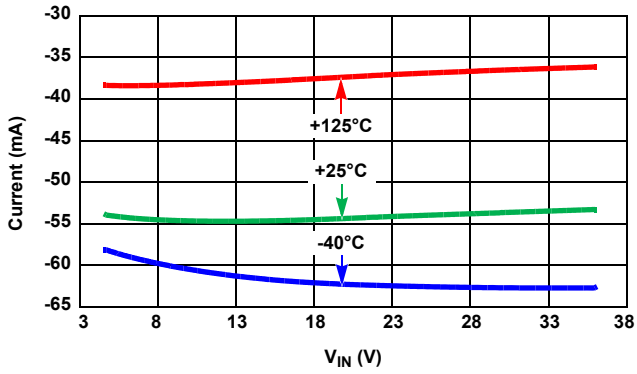

Figure 17. Short-Circuit to GND

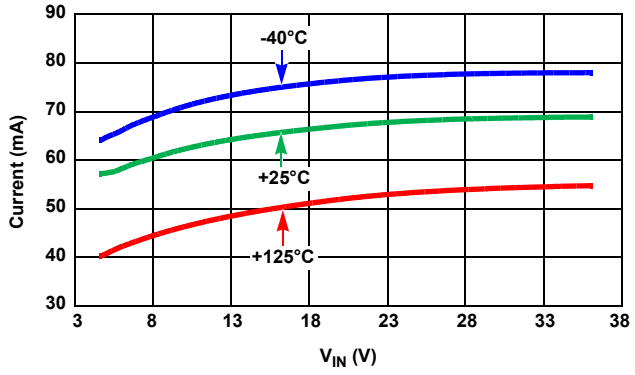

Figure 18. Short-Circuit to V_{IN}

5. Revision History

Rev.	Date	Description
0.00	Nov 2, 2017	Initial release

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(Rev.1.0 Mar 2020)

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