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Precision Low Power FGA Voltage References

ISL60002

The ISL60002 FGA voltage references are very high precision analog voltage references fabricated in Intersil's proprietary Floating Gate Analog (FGA) technology and feature low supply voltage operation at ultra-low 350nA operating current.

Additionally, the ISL60002 family features guaranteed initial accuracy as low as ±1.0mV and 20ppm/°C temperature coefficient. The initial accuracy and temperature stability performance of the ISL60002 family, plus the low supply voltage and 350nA power consumption, eliminates the need to compromise thermal stability for reduced power consumption, making it an ideal companion to high resolution, low power data conversion systems.

Special Note: Post-assembly x-ray inspection may lead to permanent changes in device output voltage and should be minimized or avoided. For further information, please see "Applications Information" on page 34 and AN1533, "X-Ray Effects on Intersil FGA References".

Applications

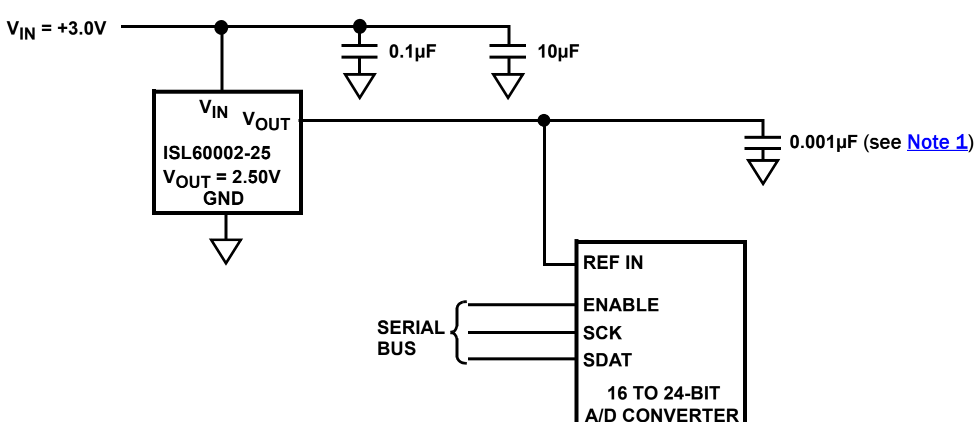
- High resolution A/Ds and D/As
- Digital meters
- Bar code scanners
- Mobile communications
- PDAs and notebooks
- Medical systems

Features

- Reference voltages . . . . . 1.024V, 1.2V, 1.25V, 1.8V, 2.048V, 2.5V, 2.6V, 3.0V, and 3.3V
- Absolute initial accuracy options . . . . ±1.0mV, ±2.5mV and ±5.0mV
- Supply voltage range
  - ISL60002-10, -11, -12, -18, -20, -25 . . . . 2.7V to 5.5V
  - ISL60002-26 . . . . 2.8V to 5.5V
  - ISL60002-30 . . . . 3.2V to 5.5V
  - ISL60002-33 . . . . 3.5V to 5.5V
- Ultra-low supply current. . . . . 350nA typ
- Low 20ppm/°C temperature coefficient
- I_{SOURCE} and I_{SINK} = 7mA
- I_{SOURCE} and I_{SINK} = 20mA for ISL60002-33 only
- ESD protection . . . . 5.5V (Human Body Model)
- Standard 3 Ld SOT-23 packaging
- Operating temperature range
  - ISL60002-10, -11, -12, -18, -20, -25, -26, -30 . . . . -40°C to +85°C
  - ISL60002-33 . . . . -40°C to +105°C
- Pb-free (RoHS compliant)

Related Literature

- For a full list of related documents, visit our website
  - ISL60002 product page



NOTE:
1. *Also see Figure 118 on page 35 in Applications Information.

FIGURE 1. TYPICAL APPLICATION

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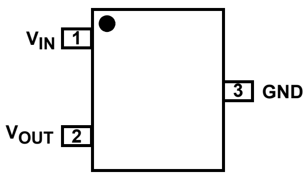
Pin Configuration

ISL60002
(3 LD SOT-23)
TOP VIEW



Pin Descriptions

PIN #	PIN NAME	DESCRIPTION
1	V_{IN}	Power Supply Input
2	V_{OUT}	Voltage Reference Output
3	GND	Ground

Ordering Information

PART NUMBER (Notes 2, 3, 4)	PART MARKING (Note 5)	V_{OUT} (V)	GRADE	TEMP. RANGE (°C)	TAPE AND REEL (UNITS)	PACKAGE (RoHS COMPLIANT)	PKG. DWG. #
ISL60002BIH310Z-T7A	DFB	1.024	±1.0mV, 20ppm/°C	-40 to +85	250	3 Ld SOT-23	P3.064A
ISL60002BIH310Z-TK	DFB	1.024	±1.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002CIH310Z-TK	DFC	1.024	±2.5mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002DIH310Z-T7A	DFD	1.024	±5.0mV, 20ppm/°C	-40 to +85	250	3 Ld SOT-23	P3.064A
ISL60002DIH310Z-TK	DFD	1.024	±5.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002BIH311Z-TK	APM	1.200	±1.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002CIH311Z-TK	AOR	1.200	±2.5mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002DIH311Z-TK	AOY	1.200	±5.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002BIH312Z-TK	AOM	1.250	±1.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002CIH312Z-TK	AOS	1.250	±2.5mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002DIH312Z-T7A	APA	1.250	±5.0mV, 20ppm/°C	-40 to +85	250	3 Ld SOT-23	P3.064A
ISL60002DIH312Z-TK	APA	1.250	±5.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002BIH318Z-TK	DEO	1.800	±1.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002CIH318Z-TK	DEP	1.800	±2.5mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002DIH318Z-TK	DEQ	1.800	±5.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002BIH320Z-T7A	DEY	2.048	±1.0mV, 20ppm/°C	-40 to +85	250	3 Ld SOT-23	P3.064A
ISL60002BIH320Z-TK	DEY	2.048	±1.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002CIH320Z-TK	DEZ	2.048	±2.5mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002DIH320Z-TK	DFA	2.048	±5.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002BIH325Z-T7A	AON	2.500	±1.0mV, 20ppm/°C	-40 to +85	250	3 Ld SOT-23	P3.064A
ISL60002BIH325Z-TK	AON	2.500	±1.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002CIH325Z-T7A	AOT	2.500	±2.5mV, 20ppm/°C	-40 to +85	250	3 Ld SOT-23	P3.064A
ISL60002CIH325Z-TK	AOT	2.500	±2.5mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002DIH325Z-T7A	APB	2.500	±5.0mV, 20ppm/°C	-40 to +85	250	3 Ld SOT-23	P3.064A
ISL60002DIH325Z-TK	APB	2.500	±5.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002BIH326Z-TK	DFK	2.600	±1.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002CIH326Z-TK	DFL	2.600	±2.5mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002DIH326Z-TK	DFM	2.600	±5.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A

Ordering Information (Continued)

PART NUMBER (Notes 2, 3, 4)	PART MARKING (Note 5)	V_{OUT} (V)	GRADE	TEMP. RANGE (°C)	TAPE AND REEL (UNITS)	PACKAGE (RoHS COMPLIANT)	PKG. DWG. #
ISL60002BIH330Z-TK	DFI	3.000	±1.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002CIH330Z-TK	DFJ	3.000	±2.5mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002DIH330Z-T7A	DFH	3.000	±5.0mV, 20ppm/°C	-40 to +85	250	3 Ld SOT-23	P3.064A
ISL60002DIH330Z-TK	DFH	3.000	±5.0mV, 20ppm/°C	-40 to +85	1k	3 Ld SOT-23	P3.064A
ISL60002BAH333Z-T7A	AOP	3.300	±1.0mV, 20ppm/°C	-40 to +105	250	3 Ld SOT-23	P3.064A
ISL60002BAH333Z-TK	AOP	3.300	±1.0mV, 20ppm/°C	-40 to +105	1k	3 Ld SOT-23	P3.064A
ISL60002CAH333Z-TK	AOU	3.300	±2.5mV, 20ppm/°C	-40 to +105	1k	3 Ld SOT-23	P3.064A
ISL60002DAH333Z-T7A	APC	3.300	±5.0mV, 20ppm/°C	-40 to +105	250	3 Ld SOT-23	P3.064A
ISL60002DAH333Z-TK	APC	3.300	±5.0mV, 20ppm/°C	-40 to +105	1k	3 Ld SOT-23	P3.064A

NOTES:

2. Refer to TB347 for details on reel specifications.
3. These Intersil Pb-free plastic packaged products employ special Pb-free material sets, molding compounds/die attach materials, and 100% matte tin plate plus anneal (e3 termination finish, which is RoHS compliant and compatible with both SnPb and Pb-free soldering operations). Intersil Pb-free products are MSL classified at Pb-free peak reflow temperatures that meet or exceed the Pb-free requirements of IPC/JEDEC J STD-020.
4. For Moisture Sensitivity Level (MSL), see device information page for ISL60002. For more information on MSL see techbrief TB363.
5. The part marking is located on the bottom of the part.

Absolute Maximum Ratings

Maximum Voltage V_{IN} to GND. . . . . -0.5V to +6.5V
Maximum Voltage V_{OUT} to GND (10s) . . . . -0.5V to $+V_{OUT}$ + 1V
Voltage on "DNC" Pins . . . . .No connections permitted to these pins
ESD Ratings
Human Body Model 5500V
Machine Model 550V
Charged Device Model. 2kV

Environmental Operating Conditions

X-Ray Exposure (Note 6) 10mRem

Thermal Information

Thermal Resistance (Typical)	θ_{JA} (°C/W)	θ_{JC} (°C/W)
3 Ld SOT-23 (Notes 7, 8)	275	110

Continuous Power Dissipation (T_A = +85°C) 99mW
Maximum Junction Temperature (Plastic Package) . . . .+107°C
Storage Temperature Range. . . . .-65°C to +150°C
Pb-Free Reflow Profile . . . . see TB493

Recommended Operating Conditions

Temperature Range
Industrial . . . .-40°C to +85°C
3.3V Version . . . .-40°C to +105°C

CAUTION: Do not operate at or near the maximum ratings listed for extended periods of time. Exposure to such conditions may adversely impact product reliability and result in failures not covered by warranty.

NOTES:

6. Measured with no filtering, distance of 10" from source, intensity set to 55kV and 70mA current, 30s duration. Other exposure levels should be analyzed for Output Voltage drift effects. See "Applications Information" on page 34.
7. θ_{JA} is measured with the component mounted on a high-effective thermal conductivity test board in free air. See Tech Brief TB379 for details.
8. For θ_{JC}, the "case temp" location is taken at the package top center.
9. Post-reflow drift for the ISL60002 devices will range from 100µV to 1.0mV based on experimental results with devices on FR4 double-sided boards. The design engineer must take this into account when considering the reference voltage after assembly.
10. Post-assembly X-ray inspection may also lead to permanent changes in device output voltage and should be minimized or avoided. Initial accuracy can change 10mV or more under extreme radiation. Most inspection equipment will not affect the FGA reference voltage, but if X-ray inspection is required, it is advisable to monitor the reference output voltage to verify excessive shift has not occurred.

Electrical Specifications ISL60002-10, V_{OUT} = 1.024V

(Additional specifications on page 9, "Common Electrical Specifications"). Operating conditions: V_{IN} = 3.0V, I_{OUT} = 0mA, C_{OUT} = 0.001µF, T_A = -40 to +85°C, unless otherwise specified. **Boldface limits apply across the operating temperature range, -40°C to +85°C**.

SYMBOL	PARAMETER	TEST CONDITIONS	MIN (Note 11)	TYP	MAX (Note 11)	UNIT
V_{OUT}	Output Voltage			1.024		V
V_{OA}	V_{OUT} Accuracy (Notes 10, 12)	T_A = +25°C				
		ISL60002B10	-1.0		1.0	mV
		ISL60002C10	-2.5		2.5	mV
		ISL60002D10	-5.0		5.0	mV
V_{IN}	Input Voltage Range		**2.7**		**5.5**	V

Electrical Specifications ISL60002-11, V_{OUT} = 1.200V

(Additional specifications on page 9, "Common Electrical Specifications"). Operating conditions: V_{IN} = 3.0V, I_{OUT} = 0mA, C_{OUT} = 0.001µF, T_A = -40 to +85°C, unless otherwise specified. **Boldface limits apply across the operating temperature range, -40°C to +85°C.**

SYMBOL	PARAMETER	TEST CONDITIONS	MIN (Note 11)	TYP	MAX (Note 11)	UNIT
V_{OUT}	Output Voltage			1.200		V
V_{OA}	V_{OUT} Accuracy (Note 12)	T_A = +25°C				
		ISL60002B11	-1.0		1.0	mV
		ISL60002C11	-2.5		2.5	mV
		ISL60002D11	-5.0		5.0	mV
V_{IN}	Input Voltage Range		**2.7**		**5.5**	V

Electrical Specifications ISL60002-12, V_{OUT} = 1.250V

(Additional specifications on page 9, "Common Electrical Specifications"). Operating conditions: V_{IN} = 3.0V, I_{OUT} = 0mA, C_{OUT} = 0.001µF, T_A = -40 to +85°C, unless otherwise specified. **Boldface limits apply across the operating temperature range, -40°C to +85°C.**

SYMBOL	PARAMETER	TEST CONDITIONS	MIN (Note 11)	TYP	MAX (Note 11)	UNIT
V_{OUT}	Output Voltage			1.250		V
V_{OA}	V_{OUT} Accuracy (Note 12)	T_A = +25°C				
		ISL60002B12	-1.0		1.0	mV
		ISL60002C12	-2.5		2.5	mV
		ISL60002D12	-5.0		5.0	mV
V_{IN}	Input Voltage Range		**2.7**		**5.5**	V

Electrical Specifications ISL60002-18, V_{OUT} = 1.800V

(Additional specifications on page 9, "Common Electrical Specifications"). Operating conditions: V_{IN} = 3.0V, I_{OUT} = 0mA, C_{OUT} = 0.001µF, T_A = -40 to +85°C, unless otherwise specified. **Boldface limits apply across the operating temperature range, -40°C to +85°C.**

SYMBOL	PARAMETER	TEST CONDITIONS	MIN (Note 11)	TYP	MAX (Note 11)	UNIT
V_{OUT}	Output Voltage			1.800		V
V_{OA}	V_{OUT} Accuracy (Note 12)	T_A = +25°C				
		ISL60002B18	-1.0		1.0	mV
		ISL60002C18	-2.5		2.5	mV
		ISL60002D18	-5.0		5.0	mV
V_{IN}	Input Voltage Range		**2.7**		**5.5**	V

Electrical Specifications ISL60002-20, V_{OUT} = 2.048V

(Additional specifications on page 9, "Common Electrical Specifications"). Operating Conditions: V_{IN} = 3.0V, I_{OUT} = 0mA, C_{OUT} = 0.001µF, T_A = -40 to +85°C, unless otherwise specified. **Boldface limits apply across the operating temperature range, -40°C to +85°C.**

SYMBOL	PARAMETER	TEST CONDITIONS	MIN (Note 11)	TYP	MAX (Note 11)	UNIT
V_{OUT}	Output Voltage			2.048		V
V_{OA}	V_{OUT} Accuracy (Note 12)	T_A = +25°C				
		ISL60002B20	-1.0		1.0	mV
		ISL60002C20	-2.5		2.5	mV
		ISL60002D20	-5.0		5.0	mV
V_{IN}	Input Voltage Range		**2.7**		**5.5**	V

Electrical Specifications ISL60002-25, V_{OUT} = 2.500V

(Additional specifications on page 9, "Common Electrical Specifications"). Operating conditions: V_{IN} = 3.0V, I_{OUT} = 0mA, C_{OUT} = 0.001µF, T_A = -40 to +85°C, unless otherwise specified. **Boldface limits apply across the operating temperature range, -40°C to +85°C.**

SYMBOL	PARAMETER	TEST CONDITIONS	MIN (Note 11)	TYP	MAX (Note 11)	UNIT
V_{OUT}	Output Voltage			2.500		V
V_{OA}	V_{OUT} Accuracy (Note 12)	T_A = +25°C				
		ISL60002B25	-1.0		1.0	mV
		ISL60002C25	-2.5		2.5	mV
		ISL60002D25	-5.0		5.0	mV
V_{IN}	Input Voltage Range		**2.7**		**5.5**	V

Electrical Specifications ISL60002-26, V_{OUT} = 2.600V

(Additional specifications on page 9, "Common Electrical Specifications"). Operating conditions: V_{IN} = 3.0V, I_{OUT} = 0mA, C_{OUT} = 0.001µF, T_A = -40 to +85°C, unless otherwise specified. **Boldface limits apply across the operating temperature range, -40°C to +85°C.**

SYMBOL	PARAMETER	TEST CONDITIONS	MIN (Note 11)	TYP	MAX (Note 11)	UNIT
V_{OUT}	Output Voltage			2.600		V
V_{OA}	V_{OUT} Accuracy (Note 12)	T_A = +25°C				
		ISL60002B26	-1.0		1.0	mV
		ISL60002C26	-2.5		2.5	mV
		ISL60002D26	-5.0		5.0	mV
V_{IN}	Input Voltage Range		**2.8**		**5.5**	V
TC V_{OUT}	Output Voltage Temperature Coefficient (Note 12)				**20**	ppm/°C
I_{IN}	Supply Current			350	**900**	nA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	$+2.8V \le V_{IN} \le +5.5V$		80	**350**	µV/V
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	$0mA \le I_{SOURCE} \le 7mA$		25	**100**	µV/mA
		$-7mA \le I_{SINK} \le 0mA$		50	**250**	µV/mA
$\Delta V_{OUT}/\Delta T_A$	Thermal Hysteresis (Note 13)	ΔT_A = +125°C		100		ppm
$\Delta V_{OUT}/\Delta t$	Long Term Stability (Note 14)	T_A = +25°C; first 1khrs		50		ppm
I_{SC}	Short-Circuit Current (to GND)	T_A = +25°C		50		mA
V_N	Output Voltage Noise	$0.1Hz \le f \le 10Hz$		30		μV_{P-P}

Electrical Specifications ISL60002-30, V_{OUT} = 3.000V

Operating conditions: V_{IN} = 5.0V, I_{OUT} = 0mA, C_{OUT} = 0.001µF, T_A = -40 to +85°C, unless otherwise specified. **Boldface limits apply across the operating temperature range, -40°C to +85°C.**

SYMBOL	PARAMETER	TEST CONDITIONS	MIN (Note 11)	TYP	MAX (Note 11)	UNIT
V_{OUT}	Output Voltage			3.000		V
V_{OA}	V_{OUT} Accuracy (Note 12)	T_A = +25°C				
		ISL60002B30	-1.0		1.0	mV
		ISL60002C30	-2.5		2.5	mV
		ISL60002D30	-5.0		5.0	mV
V_{IN}	Input Voltage Range		**3.2**		**5.5**	V
TC V_{OUT}	Output Voltage Temperature Coefficient (Note 12)				**20**	ppm/°C
I_{IN}	Supply Current			350	**900**	nA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	+3.2V ≤ V_{IN} ≤ +5.5V		80	**250**	µV/V
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	0mA ≤ I_{SOURCE} ≤ 7mA		25	**100**	µV/mA
		-7mA ≤ I_{SINK} ≤ 0mA		50	**150**	µV/mA
$\Delta V_{OUT}/\Delta T_A$	Thermal Hysteresis (Note 13)	ΔT_A = +125°C		100		ppm
$\Delta V_{OUT}/\Delta t$	Long Term Stability (Note 14)	T_A = +25°C; first 1khrs		50		ppm
I_{SC}	Short-Circuit Current (to GND)	T_A = +25°C		50		mA
V_N	Output Voltage Noise	0.1Hz ≤ f ≤ 10Hz		30		μV_{P-P}

Electrical Specifications ISL60002-33, V_{OUT} = 3.300V

Operating conditions: V_{IN} = 5.0V, I_{OUT} = 0mA, C_{OUT} = 0.001µF, T_A = -40 to +105°C, unless otherwise specified. **Boldface limits apply across the operating temperature range, -40°C to +105°C.**

SYMBOL	PARAMETER	TEST CONDITIONS	MIN (Note 11)	TYP	MAX (Note 11)	UNIT
V_{OUT}	Output Voltage			3.300		V
V_{OA}	V_{OUT} Accuracy (Note 12)	T_A = +25°C				
		ISL60002B33	-1.0		1.0	mV
		ISL60002C33	-2.5		2.5	mV
		ISL60002D33	-5.0		5.0	mV
TC V_{OUT}	Output Voltage Temperature Coefficient (Note 12)				**20**	ppm/°C
V_{IN}	Input Voltage Range		**3.5**		**5.5**	V
I_{IN}	Supply Current			350	**700**	nA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	+3.5V ≤ V_{IN} ≤ +5.5V		80	**200**	µV/V
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	0mA ≤ I_{SOURCE} ≤ 20mA		25	**100**	µV/mA
		-20mA ≤ I_{SINK} ≤ 0mA		50	**150**	µV/mA
$\Delta V_{OUT}/\Delta T_A$	Thermal Hysteresis (Note 13)	ΔT_A = +145°C		100		ppm
$\Delta V_{OUT}/\Delta t$	Long Term Stability (Note 14)	T_A = +25°C; first 1khrs		50		ppm
I_{SC}	Short-Circuit Current (to GND)	T_A = +25°C		50		mA
V_N	Output Voltage Noise	0.1Hz ≤ f ≤ 10Hz		30		μV_{P-P}

Common Electrical Specifications ISL60002 -10, -11, -12, -18, -20, and -25

Operating conditions: V_{IN} = 3.0V, I_{OUT} = 0mA, C_{OUT} = 0.001µF, T_A = -40 to +85°C, unless otherwise specified. **Boldface limits apply across the operating temperature range, -40°C to +85°C.**

SYMBOL	PARAMETER	TEST CONDITIONS	MIN (Note 11)	TYP	MAX (Note 11)	UNIT
TC V_{OUT}	Output Voltage Temperature Coefficient (Note 12)				**20**	ppm/°C
I_{IN}	Supply Current			350	**900**	nA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	+2.7V ≤ V_{IN} ≤ +5.5V		80	**250**	µV/V
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	0mA ≤ I_{SOURCE} ≤ 7mA		25	**100**	µV/mA
		-7mA ≤ I_{SINK} ≤ 0mA		50	**150**	µV/mA
$\Delta V_{OUT}/\Delta T_A$	Thermal Hysteresis (Note 13)	ΔT_A = +125°C		100		ppm
$\Delta V_{OUT}/\Delta t$	Long Term Stability (Note 14)	T_A = +25°C; first 1khrs		50		ppm
I_{SC}	Short-Circuit Current (to GND) (Note 15)	T_A = +25°C		50		mA
V_N	Output Voltage Noise	0.1Hz ≤ f ≤ 10Hz		30		$µV_{P-P}$

NOTES:

11. Compliance to datasheet limits is assured by one or more methods: production test, characterization, and/or design.
12. Across the specified temperature range. Temperature coefficient is measured by the box method whereby the change in V_{OUT} is divided by the temperature range: (-40°C to +85°C = +125°C, or -40°C to +105°C = +145°C for the ISL60002-33).
13. Thermal hysteresis is the change in V_{OUT} measured at T_A = +25°C after temperature cycling over a specified range, ΔT_A, V_{OUT} is read initially at T_A = +25°C for the device under test. The device is temperature cycled and a second V_{OUT} measurement is taken at +25°C. The difference between the initial V_{OUT} reading and the second V_{OUT} reading is then expressed in ppm. For ΔT_A = +125°C, the device under test is cycled from +25°C to +85°C to -40°C to +25°C, and for ΔT_A = +145°C, the device under test is cycled from +25°C to +105°C to -40°C to +25°C.
14. Long term drift is logarithmic in nature and diminishes over time. Drift after the first 1000 hours will be approximately 10ppm.
15. Short-circuit current (to V_{CC}) for ISL60002-25 at V_{IN} = 5.0V and +25°C is typically around 30mA. Shorting V_{OUT} to V_{CC} is not recommended due to risk of resetting the part.

Typical Performance Characteristic Curves, V_{OUT} = 1.024V V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified.

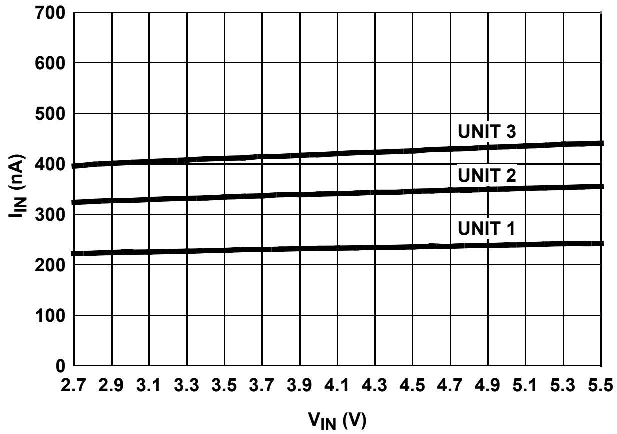


FIGURE 1. I_{IN} vs V_{IN}, 3 UNITS

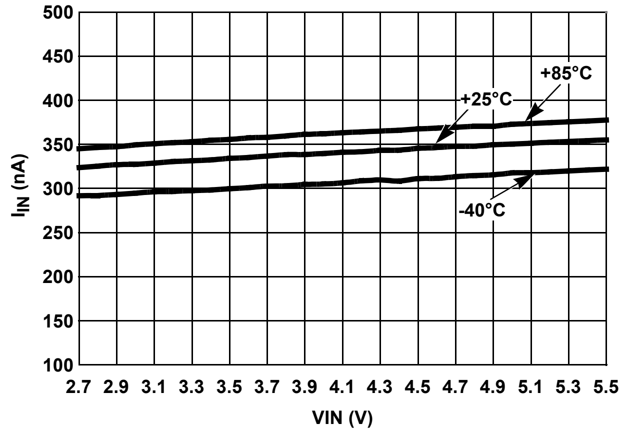


FIGURE 2. I_{IN} vs V_{IN} OVER-TEMPERATURE

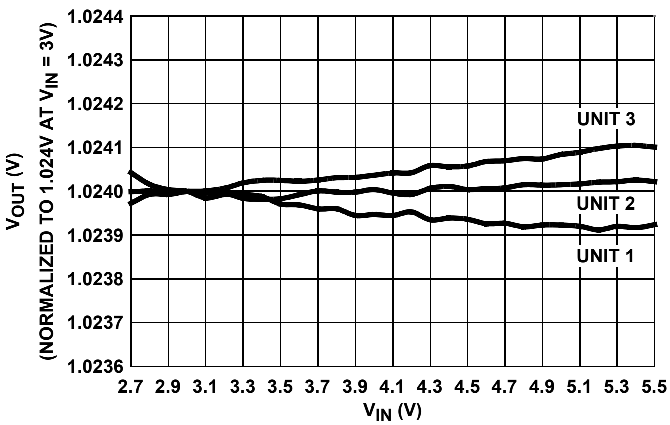


FIGURE 3. LINE REGULATION, 3 UNITS

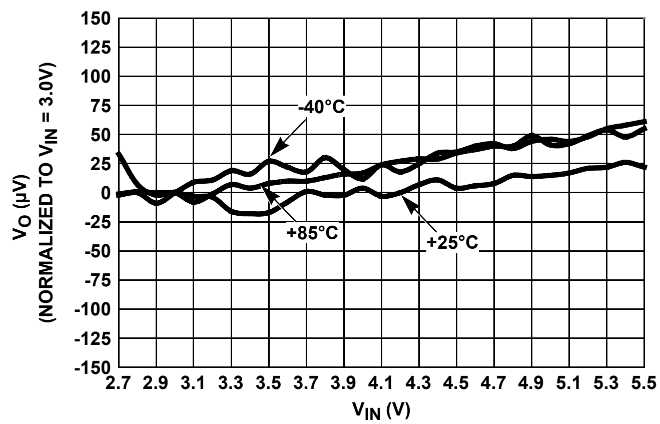


FIGURE 4. LINE REGULATION OVER-TEMPERATURE

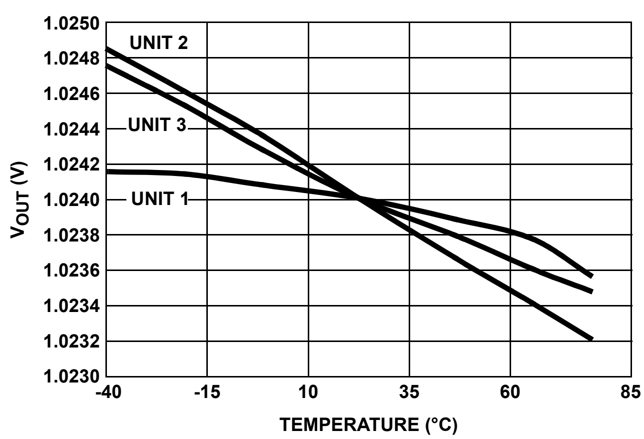


FIGURE 5. V_{OUT} vs TEMPERATURE NORMALIZED to +25°C

Typical Performance Characteristic Curves, V_{OUT} = 1.024V V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified. (Continued)

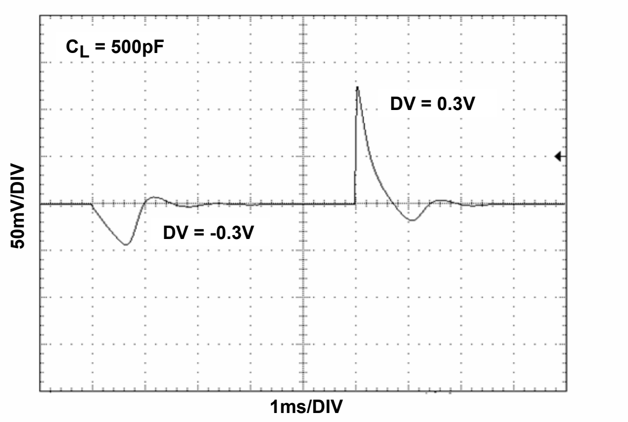


FIGURE 6. LINE TRANSIENT RESPONSE, WITH CAPACITIVE LOAD

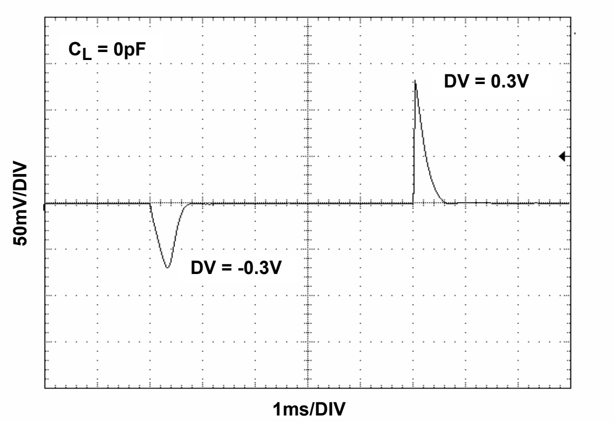


FIGURE 7. LINE TRANSIENT RESPONSE

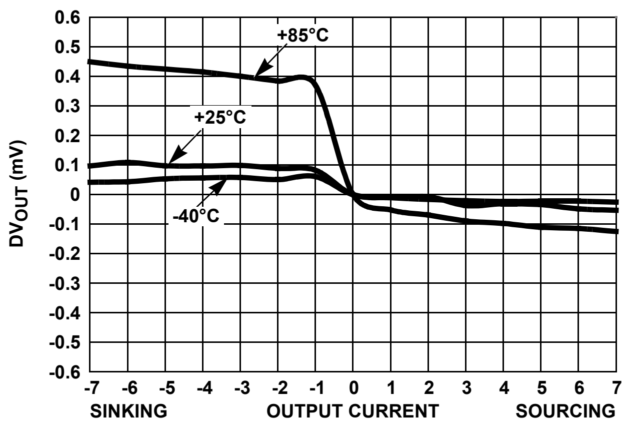


FIGURE 8. LOAD REGULATION OVER-TEMPERATURE

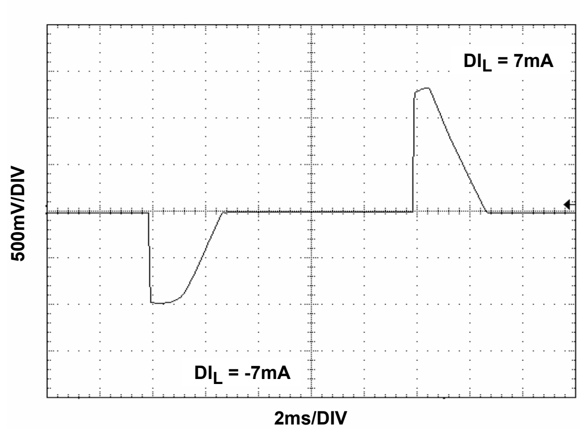


FIGURE 9. LOAD TRANSIENT RESPONSE

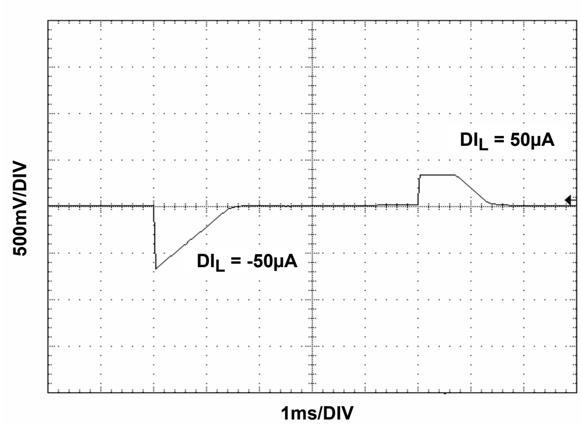


FIGURE 10. LOAD TRANSIENT RESPONSE

Typical Performance Characteristic Curves, V_{OUT} = 1.024V V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified. (Continued)

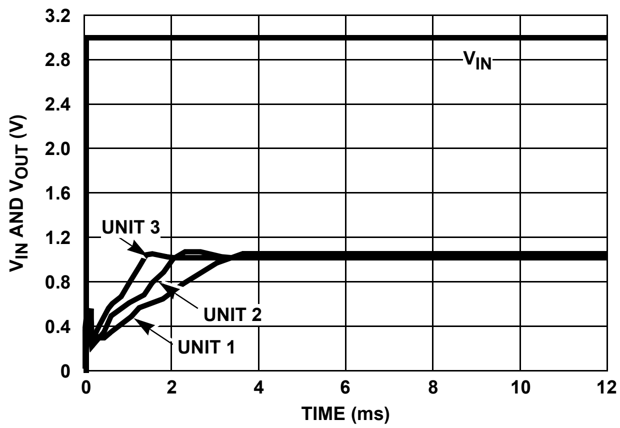


FIGURE 11. TURN-ON TIME (+25°C)

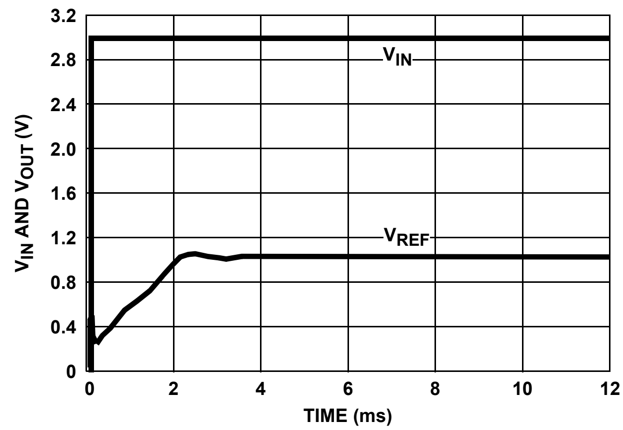


FIGURE 12. TURN-ON TIME (+25°C)

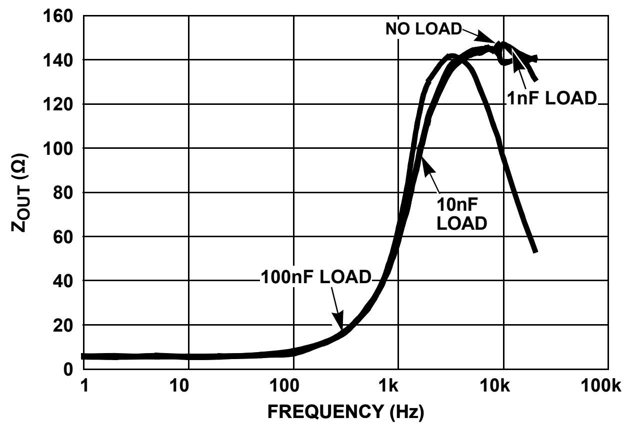


FIGURE 13. Z_{OUT} vs FREQUENCY

Typical Performance Characteristic Curves, V_{OUT} = 1.20V
V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified.

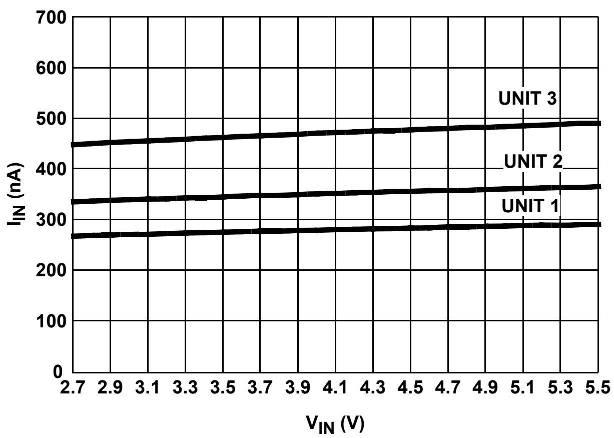


FIGURE 14. I_{IN} vs V_{IN}, 3 UNITS

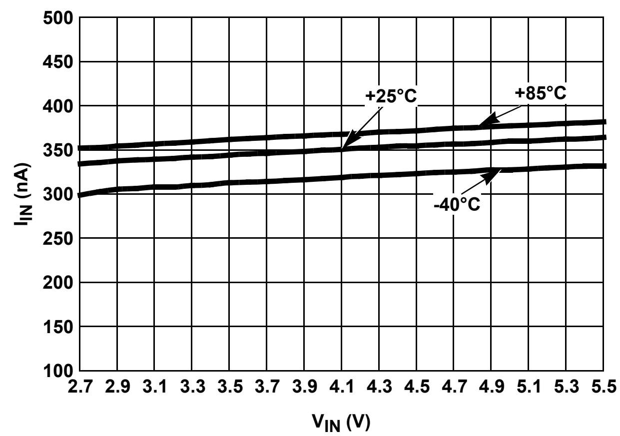


FIGURE 15. I_{IN} vs V_{IN} OVER-TEMPERATURE

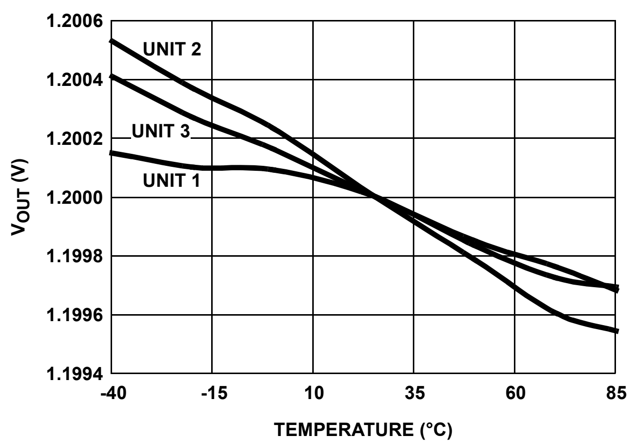


FIGURE 16. V_{OUT} vs TEMPERATURE NORMALIZED TO +25°C

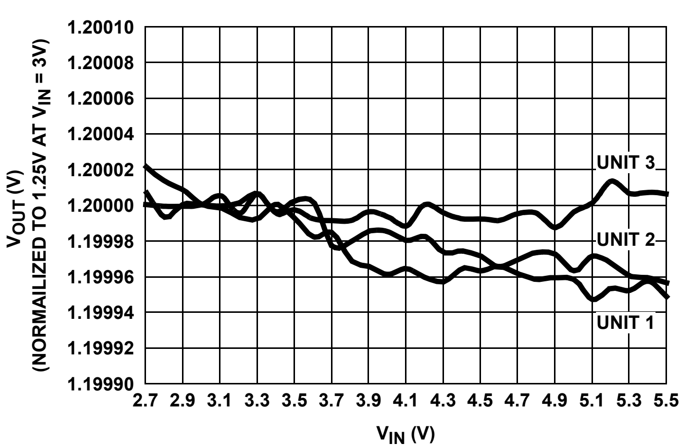


FIGURE 17. LINE REGULATION, 3 UNITS

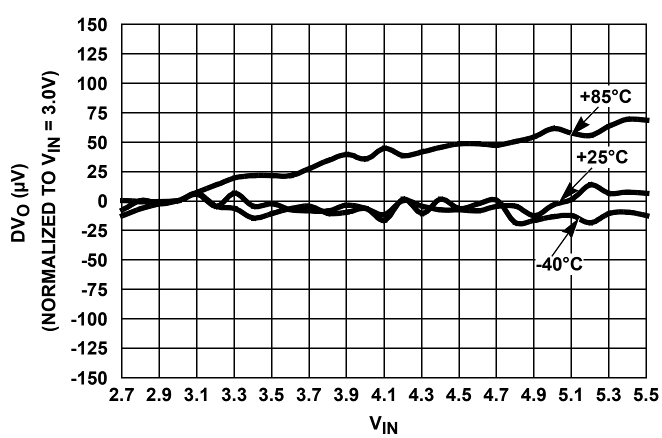


FIGURE 18. LINE REGULATION OVER-TEMPERATURE

Typical Performance Characteristic Curves, V_{OUT} = 1.20V V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified. (Continued)

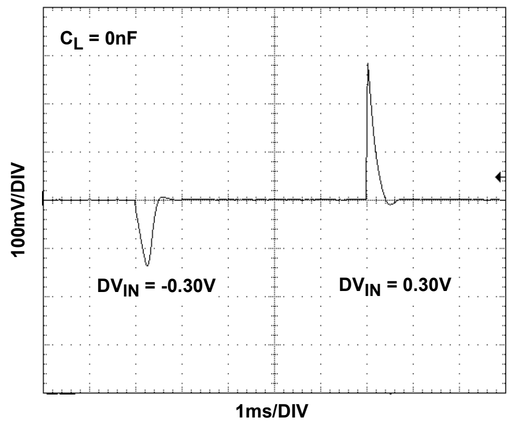


FIGURE 19. LINE TRANSIENT RESPONSE

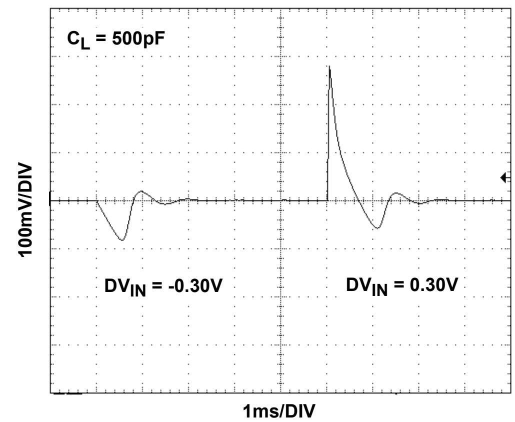


FIGURE 20. LINE TRANSIENT RESPONSE WITH CAPACITIVE LOAD

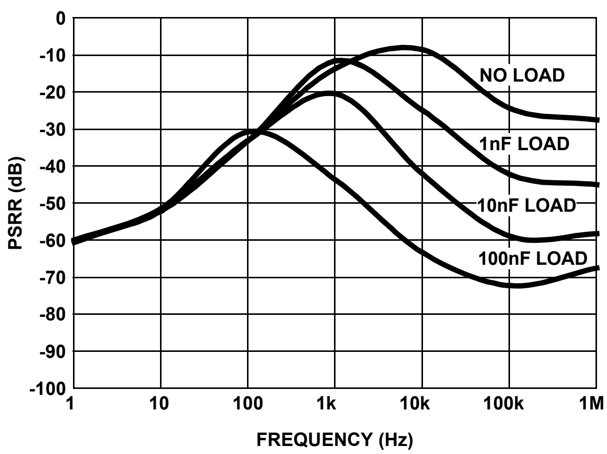


FIGURE 21. PSRR vs CAPACITIVE LOAD

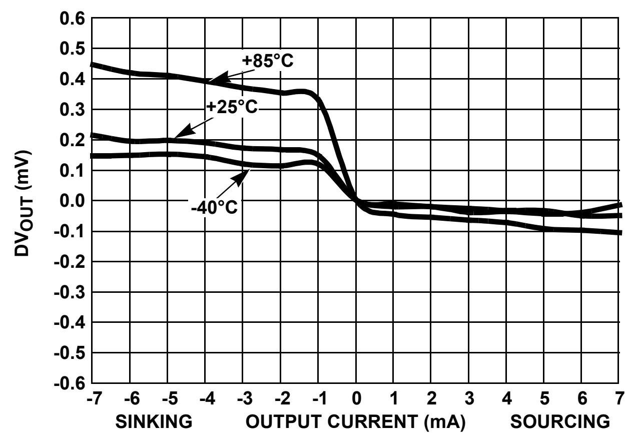


FIGURE 22. LOAD REGULATION OVER-TEMPERATURE

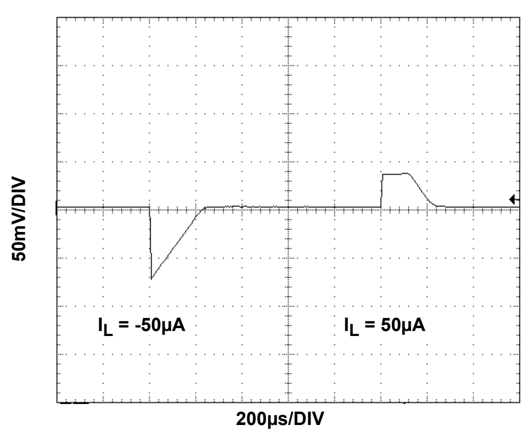


FIGURE 23. LOAD TRANSIENT RESPONSE

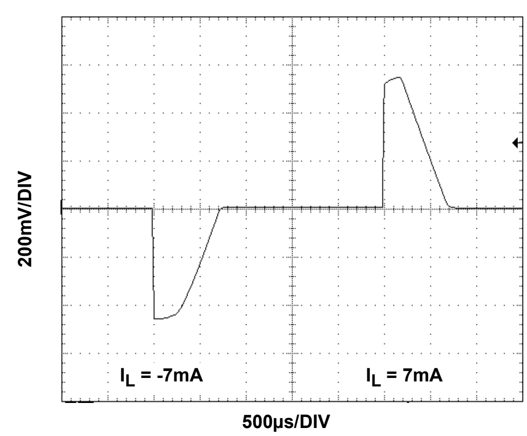


FIGURE 24. LOAD TRANSIENT RESPONSE

Typical Performance Characteristic Curves, V_{OUT} = 1.20V V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified. (Continued)

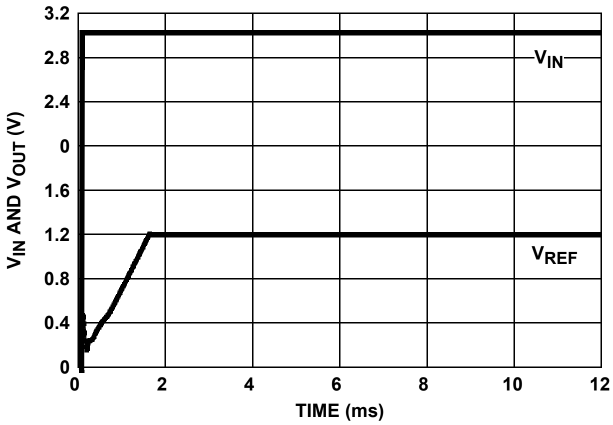


FIGURE 25. TURN-ON TIME (+25°C)

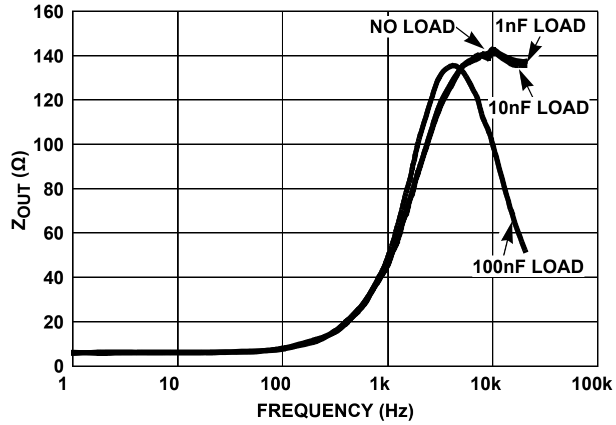


FIGURE 26. Z_{OUT} vs FREQUENCY

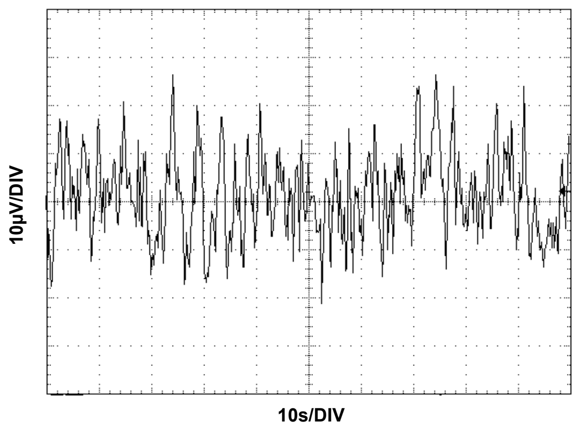


FIGURE 27. V_{OUT} NOISE

Typical Performance Characteristic Curves, V_{OUT} = 1.25V V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified.

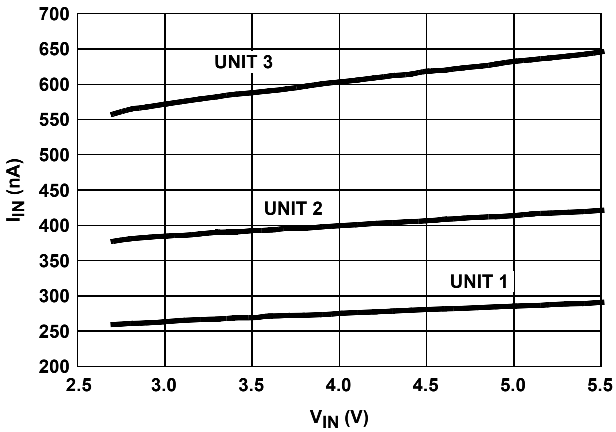


FIGURE 28. I_{IN} vs V_{IN}, 3 UNITS

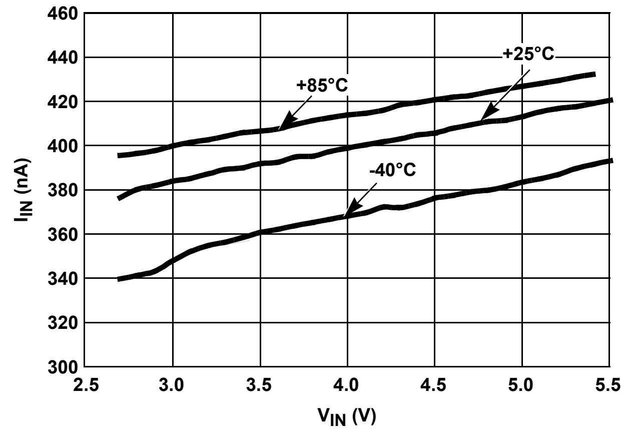


FIGURE 29. I_{IN} vs V_{IN} OVER-TEMPERATURE

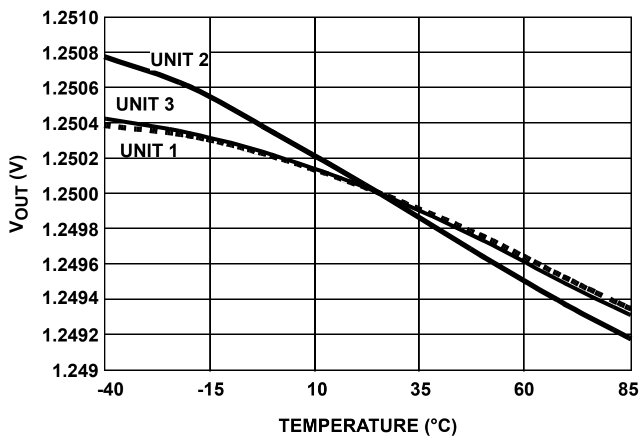


FIGURE 30. V_{OUT} vs TEMPERATURE NORMALIZED TO +25°C

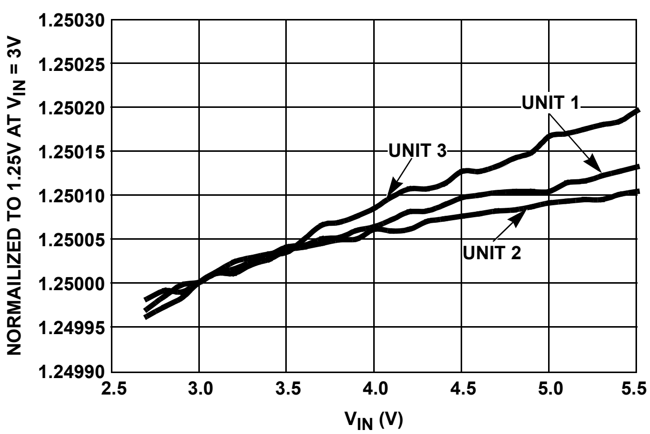


FIGURE 31. LINE REGULATION, 3 UNITS

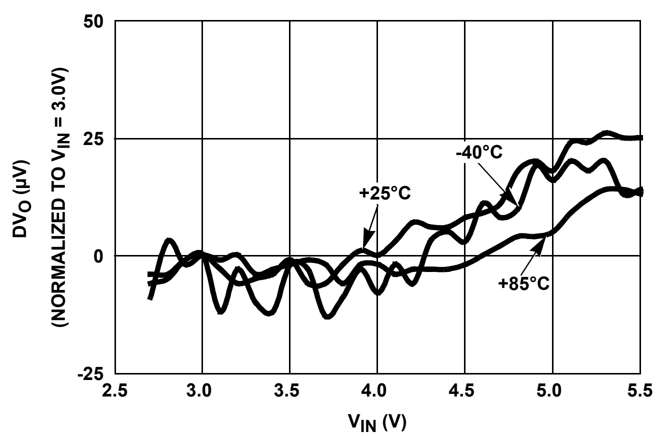


FIGURE 32. LINE REGULATION OVER-TEMPERATURE

Typical Performance Characteristic Curves, V_{OUT} = 1.25V V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified. (Continued)

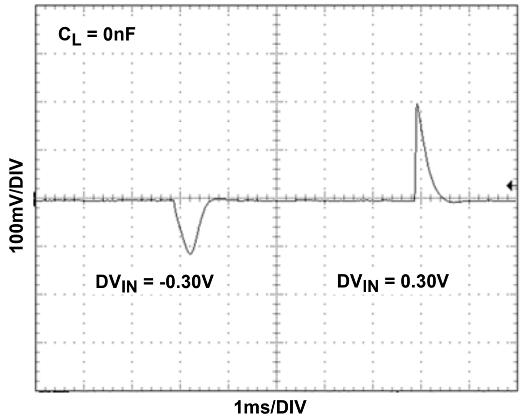


FIGURE 33. LINE TRANSIENT RESPONSE

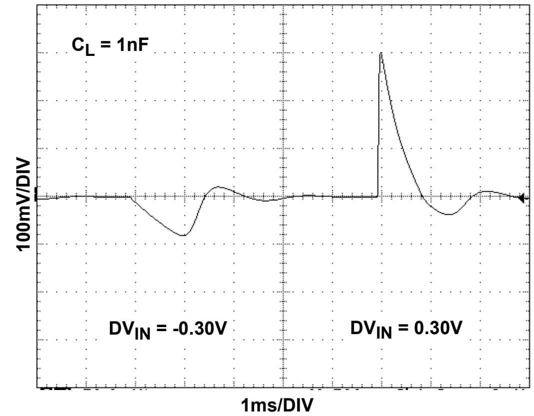


FIGURE 34. LINE TRANSIENT RESPONSE, WITH CAPACITIVE LOAD

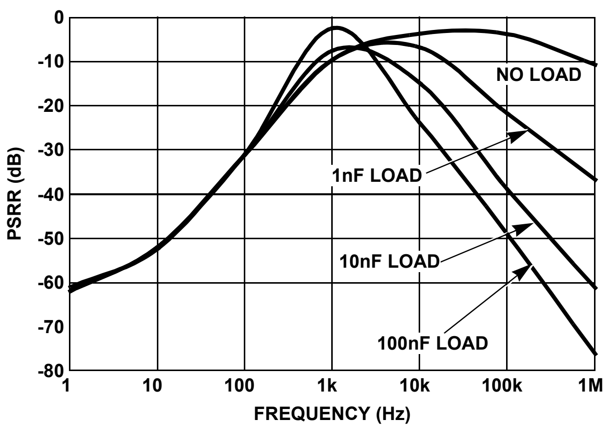


FIGURE 35. PSRR vs CAPACITIVE LOAD

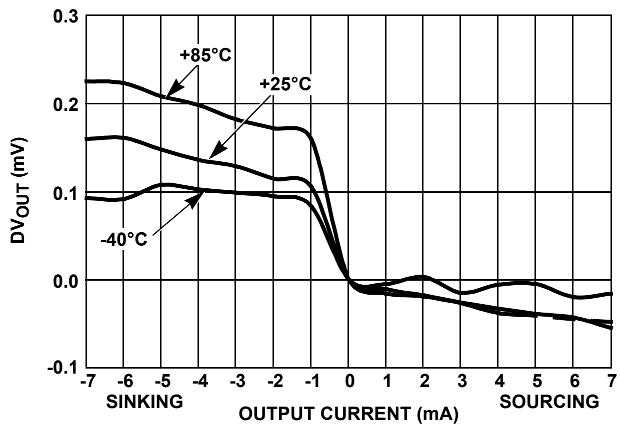


FIGURE 36. LOAD REGULATION

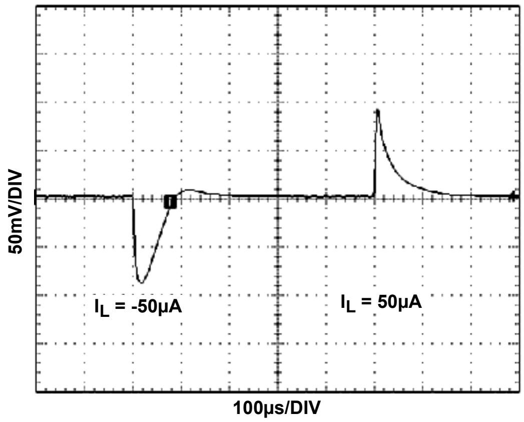


FIGURE 37. LOAD TRANSIENT RESPONSE

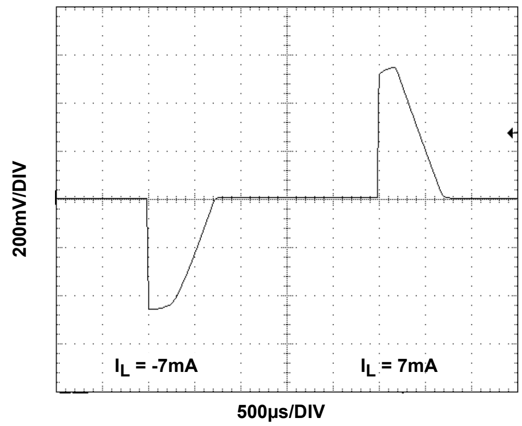


FIGURE 38. LOAD TRANSIENT RESPONSE

Typical Performance Characteristic Curves, V_{OUT} = 1.25V V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified. (Continued)

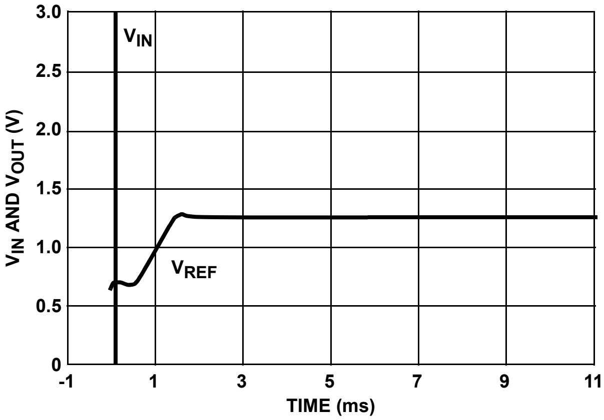


FIGURE 39. TURN-ON TIME (+25°C)

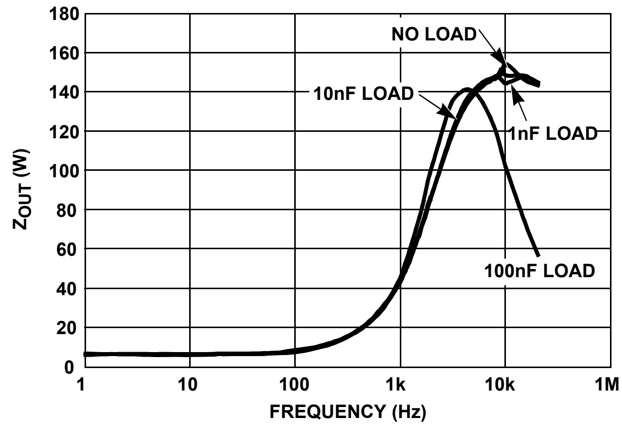


FIGURE 40. Z_{OUT} vs FREQUENCY

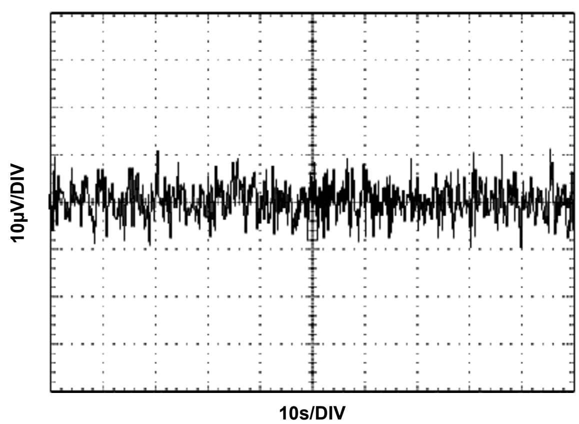


FIGURE 41. V_{OUT} NOISE

Typical Performance Curves, V_{OUT} = 1.8V

V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified.

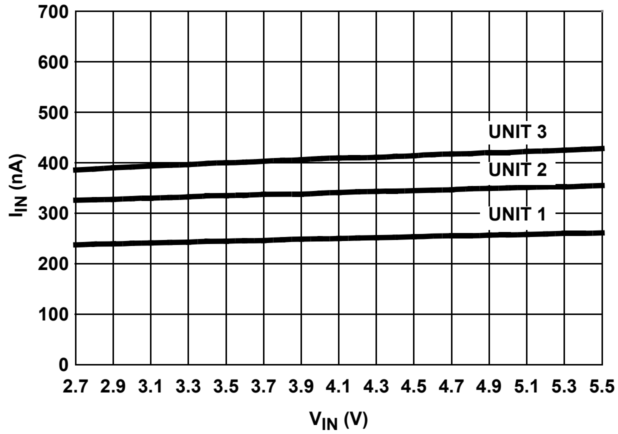


FIGURE 42. I_{IN} vs V_{IN}, 3 UNITS

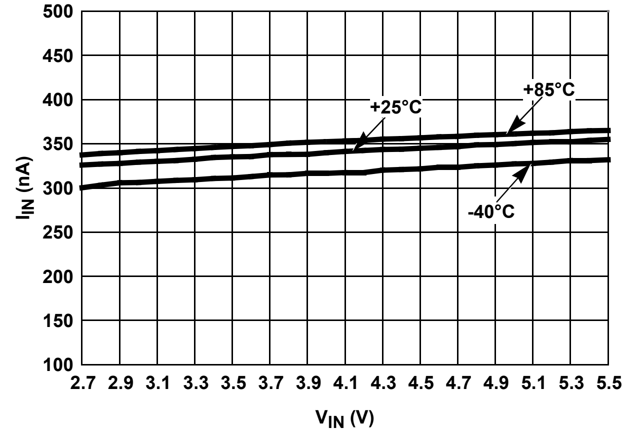


FIGURE 43. I_{IN} vs V_{IN} OVER-TEMPERATURE

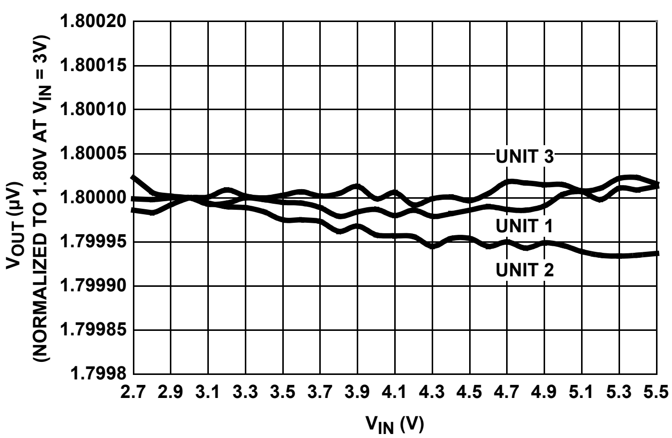


FIGURE 44. LINE REGULATION (3 REPRESENTATIVE UNITS)

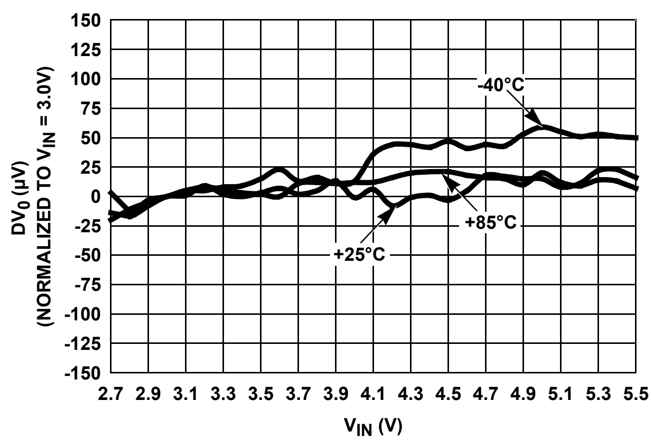


FIGURE 45. LINE REGULATION OVER-TEMPERATURE

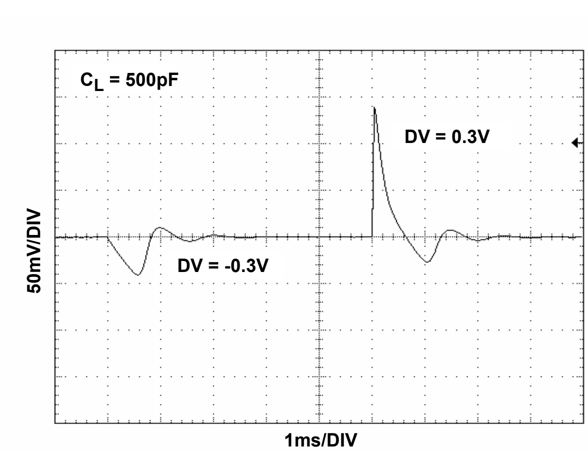


FIGURE 46. LINE TRANSIENT RESPONSE, WITH CAPACITIVE LOAD

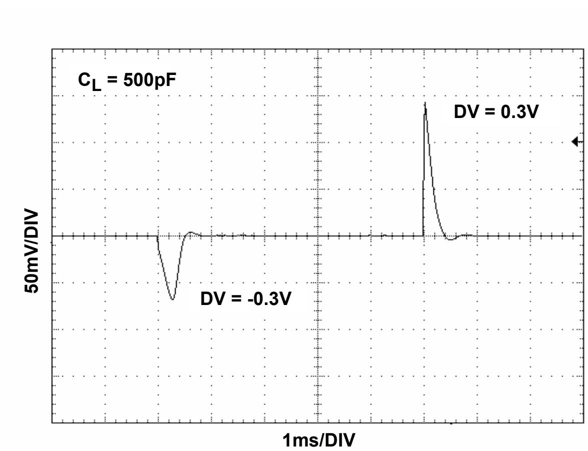


FIGURE 47. LINE TRANSIENT RESPONSE

Typical Performance Curves, V_{OUT} = 1.8V V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified. (Continued)

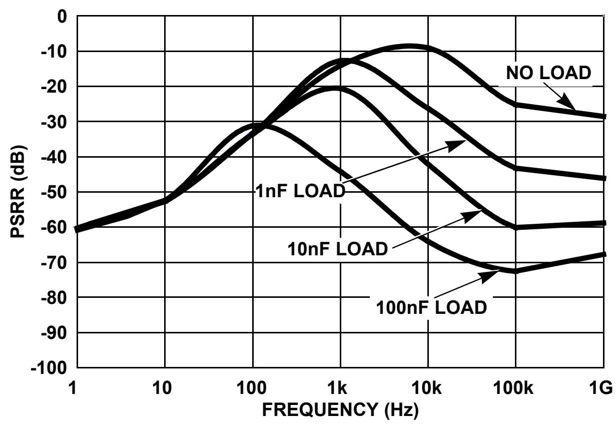


FIGURE 48. PSRR vs CAPACITIVE LOAD

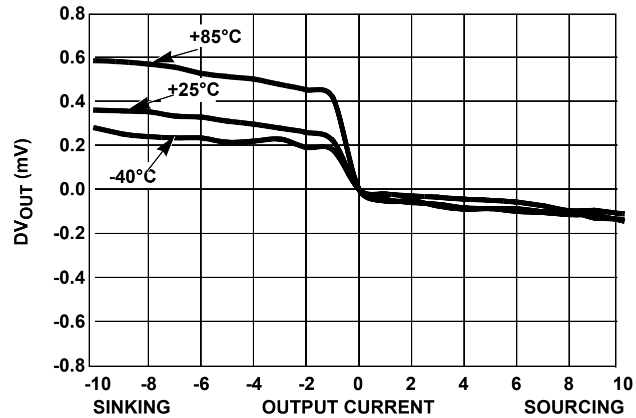


FIGURE 49. LOAD REGULATION OVER-TEMPERATURE

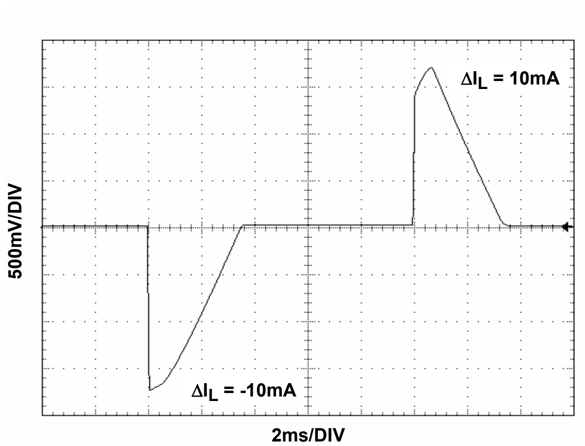


FIGURE 50. LOAD TRANSIENT RESPONSE

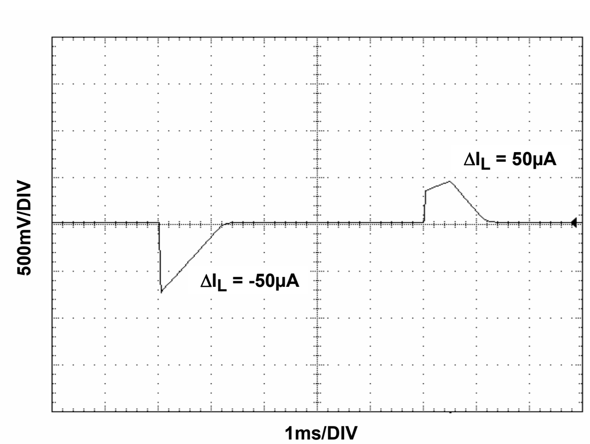


FIGURE 51. LOAD TRANSIENT RESPONSE

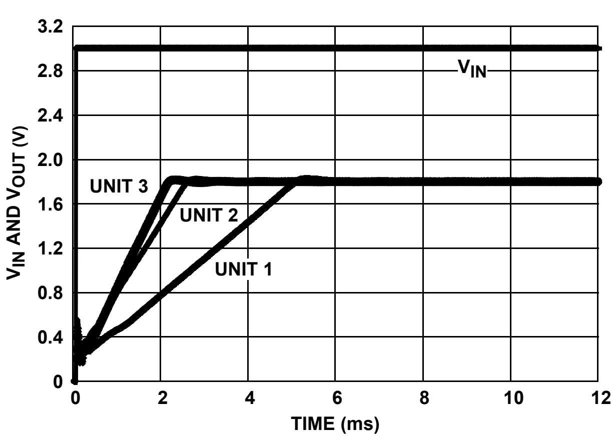


FIGURE 52. TURN-ON TIME (+25°C)

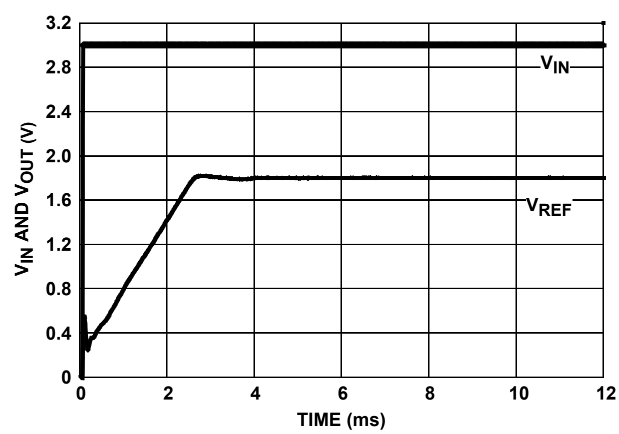


FIGURE 53. TURN-ON TIME (+25°C)

Typical Performance Curves, V_{OUT} = 1.8V V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified. (Continued)

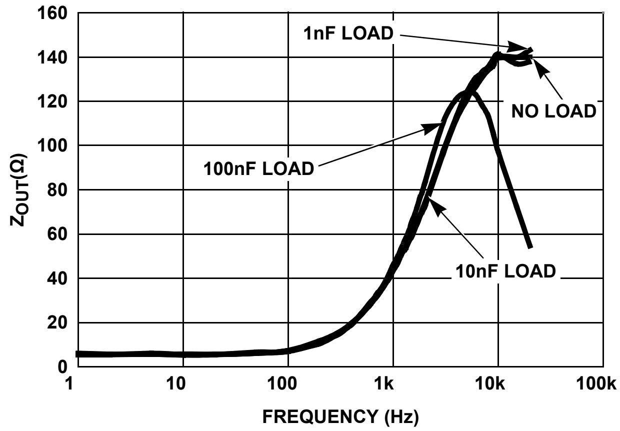


FIGURE 54. Z_{OUT} vs FREQUENCY

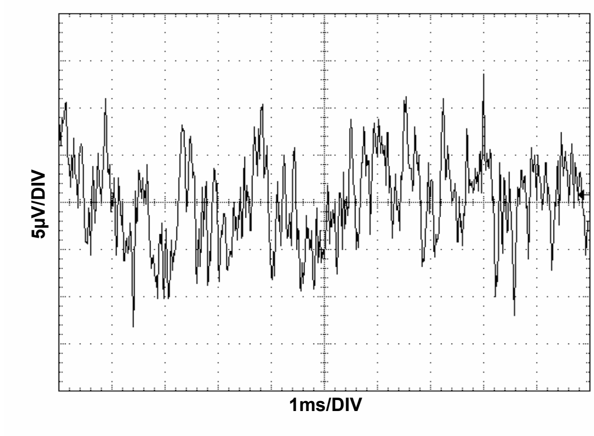


FIGURE 55. V_{OUT} NOISE

Typical Performance Curves, V_{OUT} = 2.048V V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified.

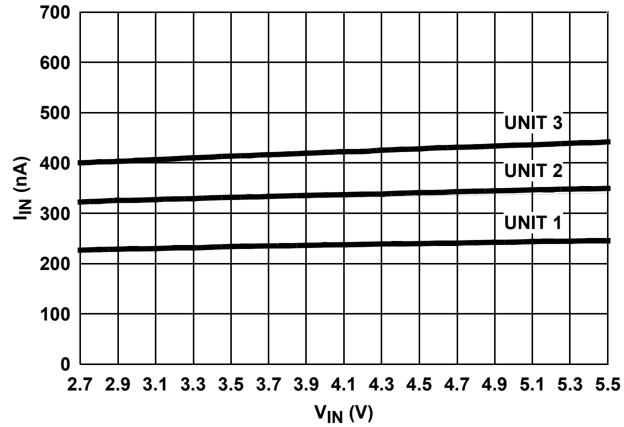


FIGURE 56. I_{IN} vs V_{IN} (3 REPRESENTATIVE UNITS)

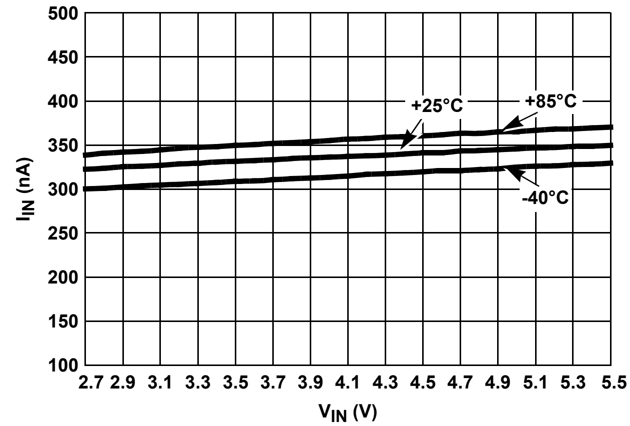


FIGURE 57. I_{IN} vs V_{IN} OVER-TEMPERATURE

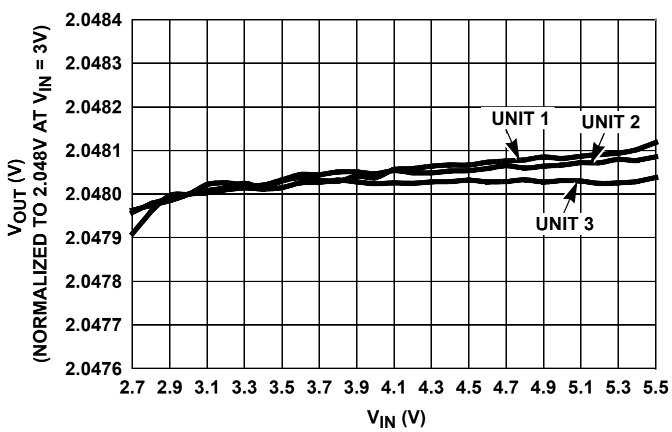


FIGURE 58. LINE REGULATION (3 REPRESENTATIVE UNITS)

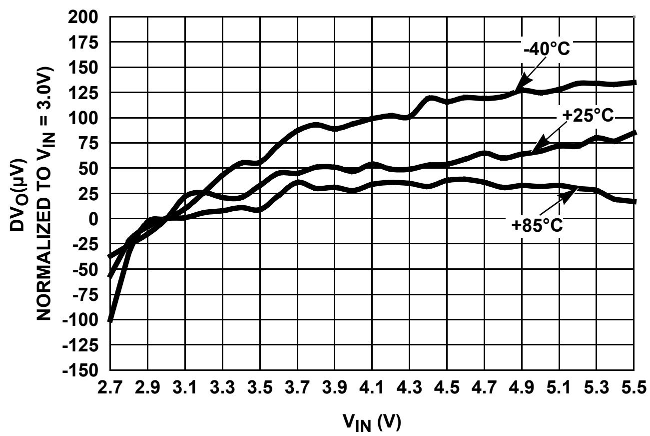


FIGURE 59. LINE REGULATION OVER-TEMPERATURE

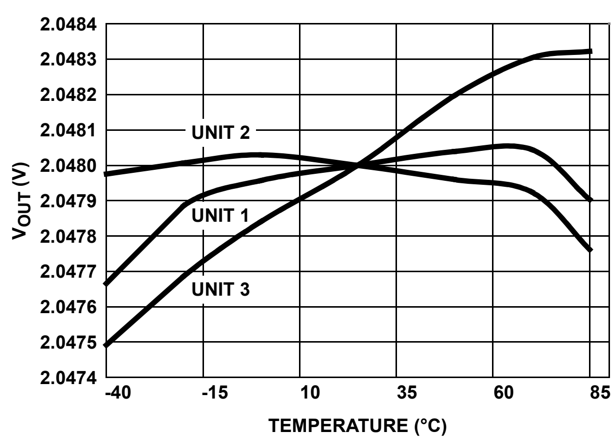


FIGURE 60. V_{OUT} vs TEMPERATURE NORMALIZED to +25°C

Typical Performance Curves, V_{OUT} = 2.048V V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified. (Continued)

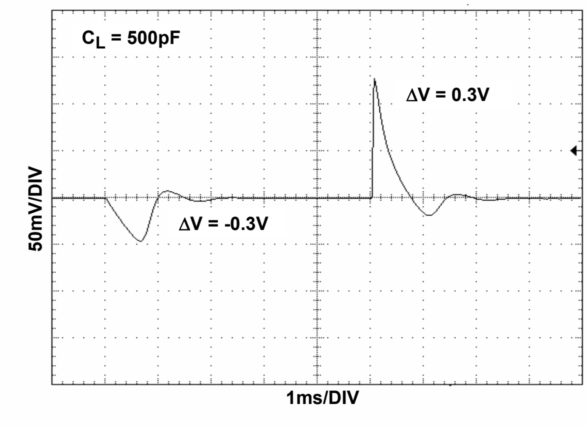


FIGURE 61. LINE TRANSIENT RESPONSE, WITH CAPACITIVE LOAD

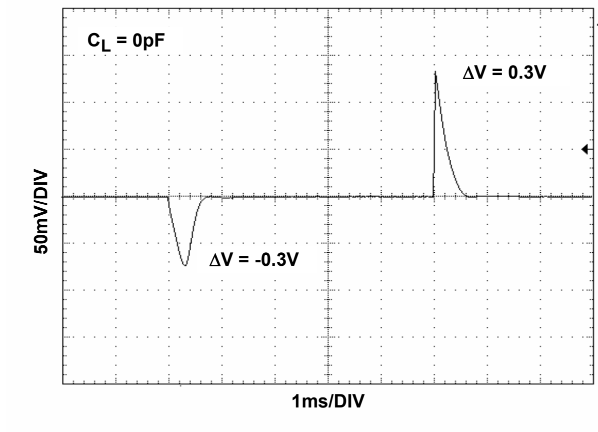


FIGURE 62. LINE TRANSIENT RESPONSE

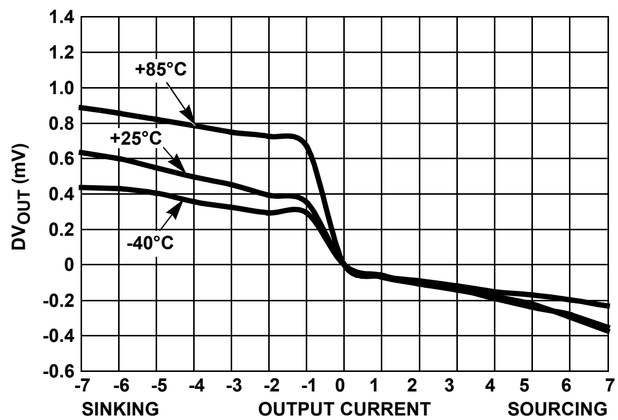


FIGURE 63. LOAD REGULATION OVER-TEMPERATURE

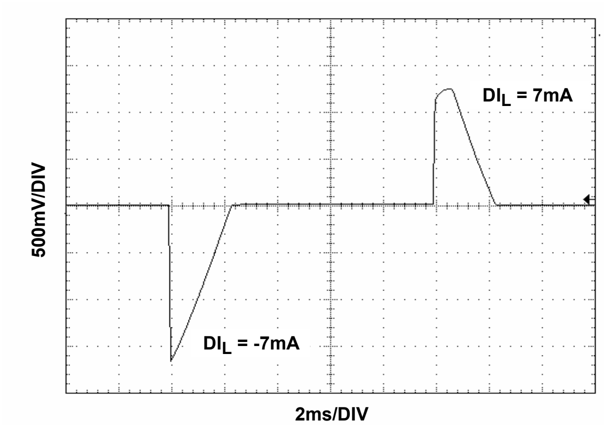


FIGURE 64. LOAD TRANSIENT RESPONSE

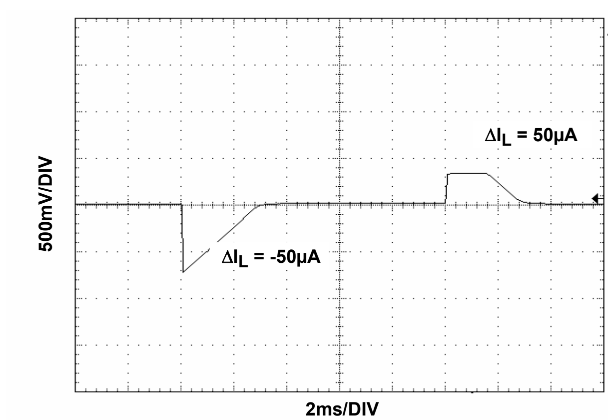


FIGURE 65. LOAD TRANSIENT RESPONSE

Typical Performance Curves, V_{OUT} = 2.048V V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified. (Continued)

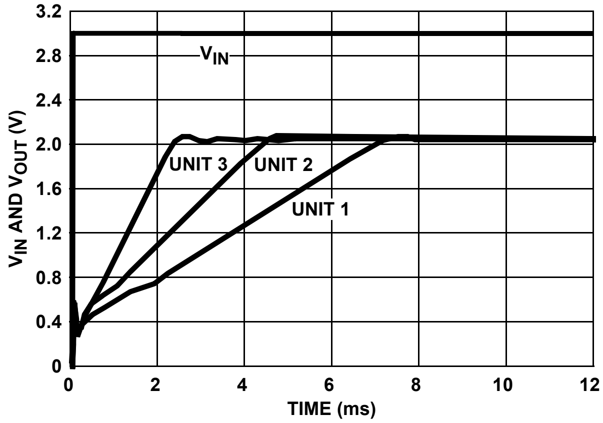


FIGURE 66. TURN-ON TIME (+25°C)

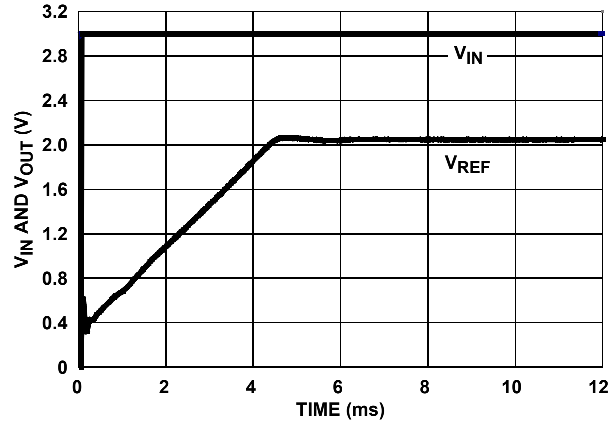


FIGURE 67. TURN-ON TIME (+25°C)

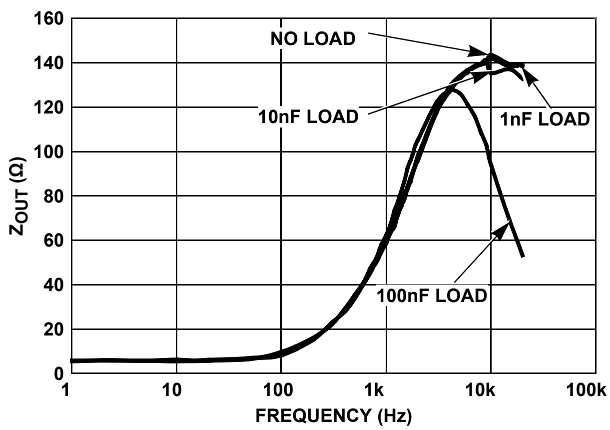


FIGURE 68. Z_{OUT} vs FREQUENCY

Typical Performance Characteristic Curves, V_{OUT} = 2.50V V_{IN} = 3.0V, I_{OUT} = 0mA, T_A = +25°C unless otherwise specified.

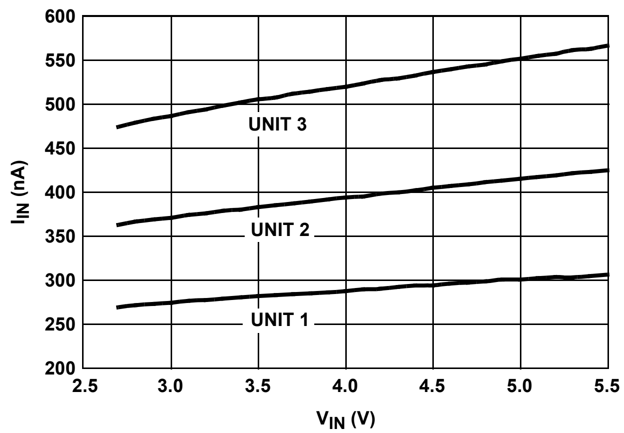


FIGURE 69. I_{IN} vs V_{IN}, 3 UNITS

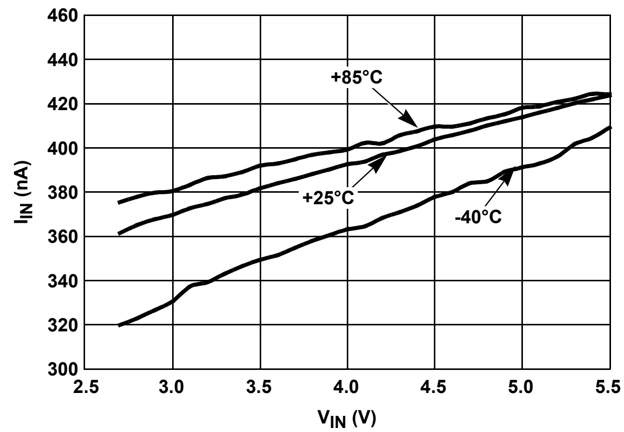


FIGURE 70. I_{IN} vs V_{IN} OVER-TEMPERATURE

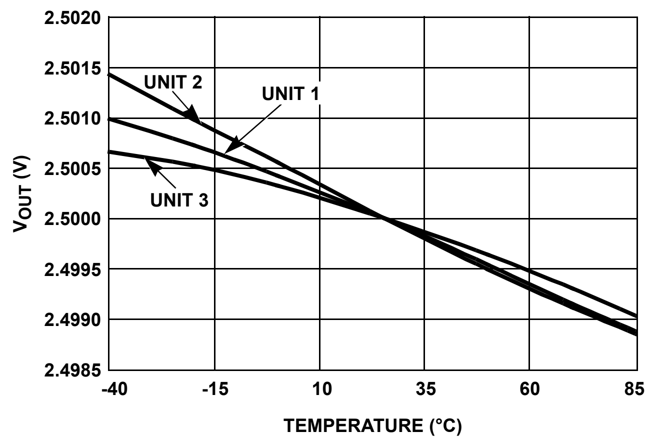


FIGURE 71. V_{OUT} vs TEMPERATURE NORMALIZED TO +25°C

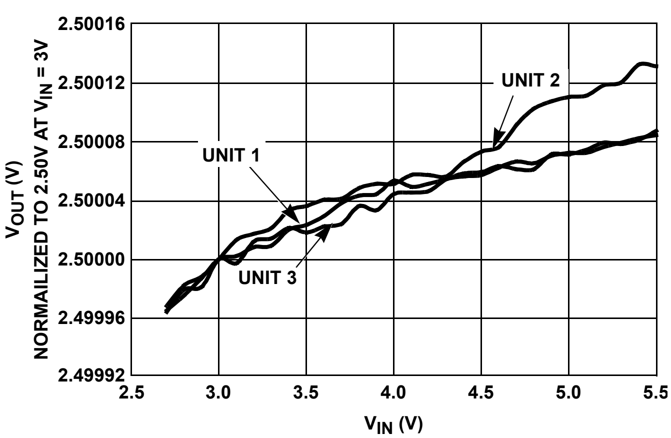


FIGURE 72. LINE REGULATION, 3 UNITS

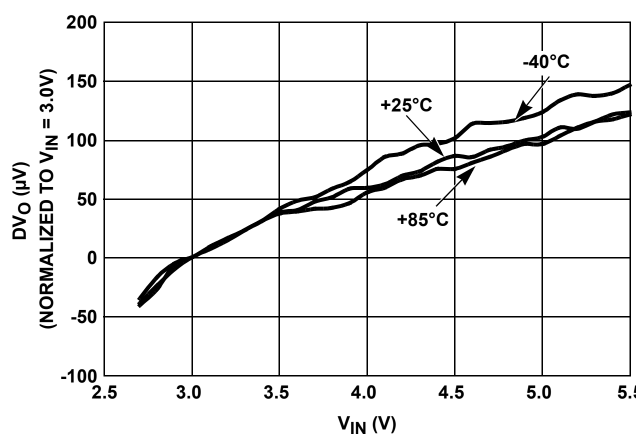


FIGURE 73. LINE REGULATION OVER-TEMPERATURE