Linear Voltage Regulator – SiS5219A

Positive Adjustable 1A Low-Dropout Voltage Regulator in bare die form

Rev 1.1
30/03/22

Description

SiS5219A is optimised to deliver up to 1A peak output current for start-up conditions where high inrush current is demanded. Output voltage is set by x2 external resistors and enabled or shut down by CMOS or TTL signalling. The device exhibits low dropout voltage and ground current, when disabled current consumption drops to near zero. The part is optimised for ultra-low noise performance delivering 500nV/√Hz typical and lower with an optional bypass capacitor. Rugged with high stability, internal limiting + thermal shutdown features for overload immunity, the part suits use in high performance high reliability applications.

Features:

- Wide V_{IN} 2.4V - 16V
- Output current capability: 1A
- Low dropout voltage:
  - < 330 mV (I_{OUT} = 500mA)
  - < 550 mV (I_{OUT} = 1000mA)
- 0.003% Line, 0.2% Load regulation (Typ)
- Low ground current: < 13mA (I_{OUT} = 500mA)
- Ultra-Low output noise: 300 nV/√Hz with C_{BYPASS}
- CMOS/TTL-Compatible Enable/Shutdown Control
- Near-Zero Shutdown Current
- Current + thermal limiting + rev. polarity protection
- Low temperature coefficient.

Ordering Information

The following part suffixes apply:

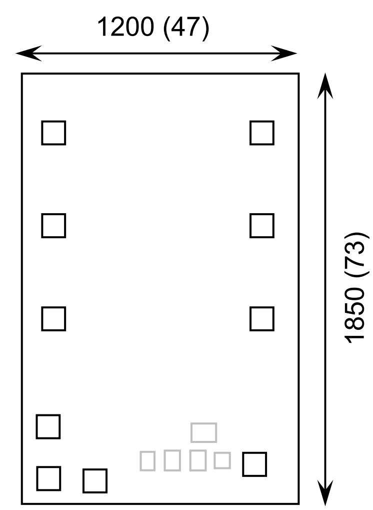
- No suffix - MIL-STD-883 /2010B Visual Inspection
- "**H**" - MIL-STD-883 /2010B Visual Inspection
  + MIL-PRF-38534 Class H LAT
- "**K**" - MIL-STD-883 /2010A Visual Inspection (Space)
  + MIL-PRF-38534 Class K LAT

LAT = Lot Acceptance Test.

For further information on LAT process flows see below.

www.siliconsupplies.com\quality\bare-die-lot-qualification

Die Dimensions in µm (mils)



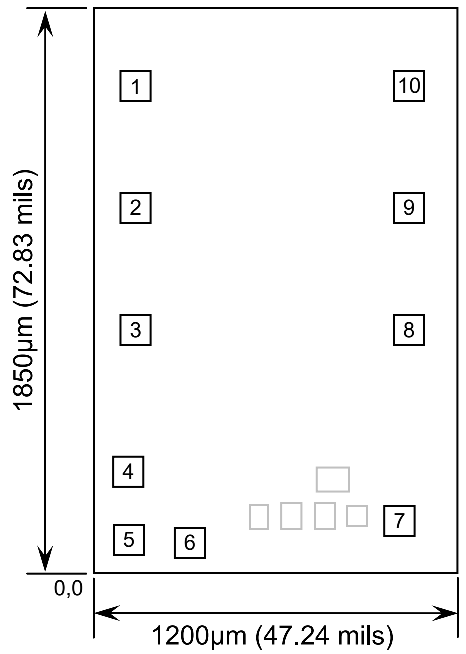
Supply Formats:

- Default – Die in Waffle Pack (288 per tray capacity)
- Sawn Wafer on Tape – On request
- Unsawn Wafer – On request
- Tape & Reel – On request
- In Metal or Ceramic package – On request

Mechanical Specification

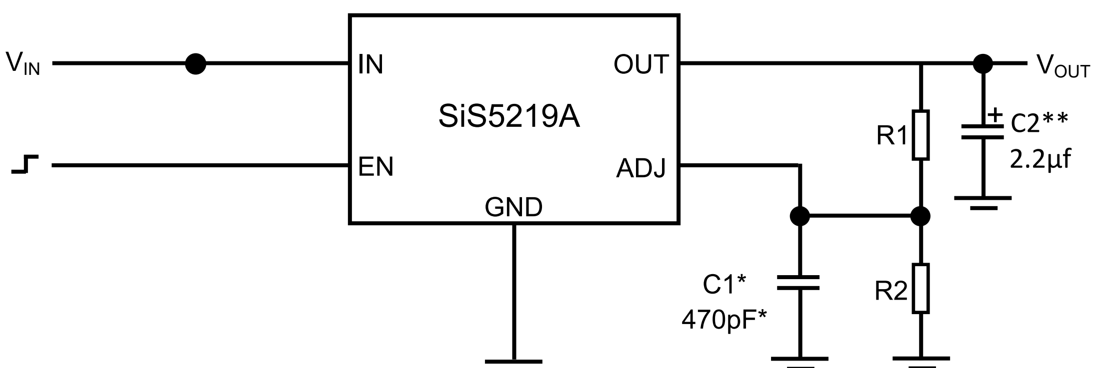
Die Size (Unsawn)	1200 x 1850 47 x 73	µm mils
Minimum Bond Pad Size	100 x 100 3.94 x 3.94	µm mils
Die Thickness	280 (±20) 11.02 (±0.79)	µm mils
Top Metal Composition	Al	
Back Metal Composition	Ti/Ni/Ag	

Pad Layout and Functions



PAD	FUNCTION	COORDINATES (mm)	
		X	Y
1	V_{OUT}	0.120	1.514
2	V_{OUT}	0.120	1.134
3	V_{OUT}	0.120	0.754
4	V_{OUT}	0.095	0.315
5	ADJ	0.095	0.100
6	GND	0.290	0.095
7	EN	0.945	0.160
8	V_{IN}	0.975	0.754
9	V_{IN}	0.975	1.134
10	V_{IN}	0.975	1.514
CONNECT CHIP BACK TO GND			

Typical Application



1.24V - 16V Adjustable Regulator

$V_{OUT} = 1.242V \times \left(\frac{R2}{R1} + 1\right)$

* Include the optional bypass capacitor from ADJ to GND for ultra-low output noise.
** C2 is not required for stability; however it does improve transient response.
For optimum stability and transient response locate C1 C2 as close as possible to the regulator.
Although ADJ is a high-impedance input, for best performance, R2 should not exceed 470 kΩ

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Absolute Maximum Ratings[1]

PARAMETER	SYMBOL	VALUE	UNIT
Input–Output Voltage differential	V_{IN} - V_{OUT}	20	V
Power Dissipation	P_D	Internally Limited	
Operating Junction Temperature	T_J	-40 to 125	°C
Storage Temperature	T_{STG}	-65 to 150	°C

Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNIT
Input Voltage	V_{IN}	2.4	16	V
Enable Voltage	V_{EN}	0	V_{IN}	V
Output Current	I_{OUT}	0.1	1000	mA
Operating Junction Temperature Range	T_J	-40 to 125		°C

DC Electrical Characteristics

V_{IN} =V_{OUT} +1V, C_{OUT} = 2.2µF, I_{OUT}=10mA, V_{EN} = 2.25V, -40°C< T_J<+125°C (unless noted otherwise)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Reference Voltage	V_{REF}	2.4V ≤ V_{IN} ≤ 16V, 100µA ≤ I_L ≤ 1A, T_J=25°C	1.228	1.24	1.252	V
		2.4V ≤ V_{IN} ≤16V,100µA ≤ I_L ≤1A	1.215	-	1.265	
		1.8V≤V_{OUT}≤(V_{IN}-1V),100µA≤I_L≤1A	1.203	1.24	1.277	V
Reference Voltage Temperature Coefficient	$\Delta V_{REF}/\Delta T$		-	20	-	ppm/°C
Line Regulation	ΔV_{OUT}	V_{IN} = V_{OUT}+1V to 16V, I_{OUT} =10mA, T_J=25°C	-	0.003	0.05	% / V_{OUT}
		V_{IN} = V_{OUT}+1V to 16V, I_{OUT} =10mA	-	-	0.1	
Load Regulation[2]		I_{OUT} = 100µA to 1A, T_J=25°C	-	0.2	1.0	% / A
		I_{OUT} = 100µA to 1A	-	-	1.4	
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$		-	40	100	ppm/°C
Dropout Voltage[3]	V_{IN} - V_{OUT}	I_{OUT} = 100µA, T_J=25°C	-	30	60	mV
		I_{OUT} = 100µA	-	-	80	
		I_{OUT} = 100mA, T_J=25°C	-	100	200	
		I_{OUT} = 100mA	-	-	250	
		I_{OUT} = 500mA, T_J=25°C	-	250	330	
		I_{OUT} = 500mA	-	-	410	
		I_{OUT} = 750mA, T_J=25°C	-	310	440	
		I_{OUT} = 750mA	-	-	500	
		I_{OUT} = 1A, T_J=25°C	-	400	550	
		I_{OUT} = 1A	-	-	630	

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DC Electrical Characteristics

V_{IN} = V_{OUT} +1V, C_{OUT} = 2.2µF, I_{OUT}=10mA, V_{EN} = 2.25V, -40°C< T_J<+125°C (unless noted otherwise)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Enable Input Voltage	V_{EN}	Logic Low (off). T_J = 25°C	-	-	0.40	V
		Logic Low (off)	-	-	0.18	
		Logic High (on)	2.0	-	-	
Enable Input Current	I_{EN}	V_{EN} = 0.4V. T_J = 25°C	-	-	1	µA
		V_{EN} = 0.18V	-	-	2	
		V_{EN} = 0.20V. T_J = 25°C	-	12	20	
		V_{EN} = 0.20V	-	-	30	
Ground Pin Current[4]	I_{GND}	I_{OUT} = 100µA, V_{IN} = V_{OUT} +1.0V, T_J = 25°C	-	0.08	0.13	mA
		I_{OUT} = 100µA, V_{IN} = V_{OUT} +1.0V	-	-	0.17	
		I_{OUT} = 100mA, V_{IN} = V_{OUT}+1.0V, T_J = 25°C	-	0.95	2	
		I_{OUT} = 100mA, V_{IN} = V_{OUT}+1.0V	-	-	3	
		I_{OUT} = 500mA, V_{IN} = V_{OUT}+1.0V, T_J = 25°C	-	9	13	
		I_{OUT} = 500mA, V_{IN} = V_{OUT}+1.0V	-	-	15	
		I_{OUT} = 750mA, V_{IN} = V_{OUT}+1.0V, T_J = 25°C	-	18	25	
		I_{OUT} = 750mA, V_{IN} = V_{OUT}+1.0V	-	-	30	
		I_{OUT} = 1A, V_{IN} = V_{OUT}+1.0V, T_J = 25°C	-	31	50	
		I_{OUT} = 1A, V_{IN} = V_{OUT}+1.0V	-	-	60	
	$I_{GND(off)}$	V_{EN} = 0.4V. T_J = 25°C	-	-	3	µA
		V_{EN} = 0.18V	-	-	8	
Adjustment Pin Current	I_{ADJ}	T_J = 25°C	-	40	80	nA
			-	-	120	
Adjustment Pin Current Change	$\Delta I_{ADJ}/\Delta T$		-	0.1	-	nA/°C
Ripple Rejection	PSRR	f = 120Hz	60	-	-	dB
Current Limit	I_{LIMIT}	V_{OUT} = 0V. T_J = 25°C	-	3000	-	mA
		V_{OUT} = 0V	-	-	5000	
Output Noise	e_{no}	I_{OUT} = 50mA, C_{OUT} = 2.2µF, C_{bypass} = 0	-	500	-	nV/√Hz
		I_{OUT} = 50mA, C_{OUT} = 2.2µF, C_{bypass} = 470pF	-	300	-	

1. Operation above the absolute maximum rating may cause device failure. Operation at the absolute maximum ratings, for extended periods, may reduce device reliability. **2**. Regulation is measured at a constant junction temperature, using pulse testing with a low duty cycle. **3.** Dropout voltage is defined as the input to output differential at which the output voltage drops 2% below its nominal value measured at 1V differential. 4. I_{GND} is the quiescent current. I_{IN} = I_{GND} + I_{OUT}.

Typical Electrical Characteristics, T_J = 25°C (unless noted otherwise)

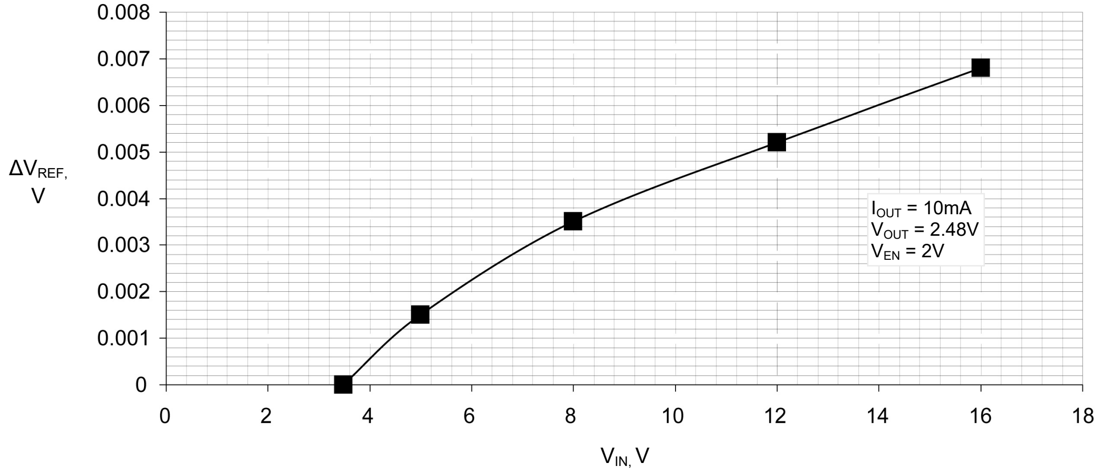

Figure 1 – Reference Voltage stability Versus Input Voltage

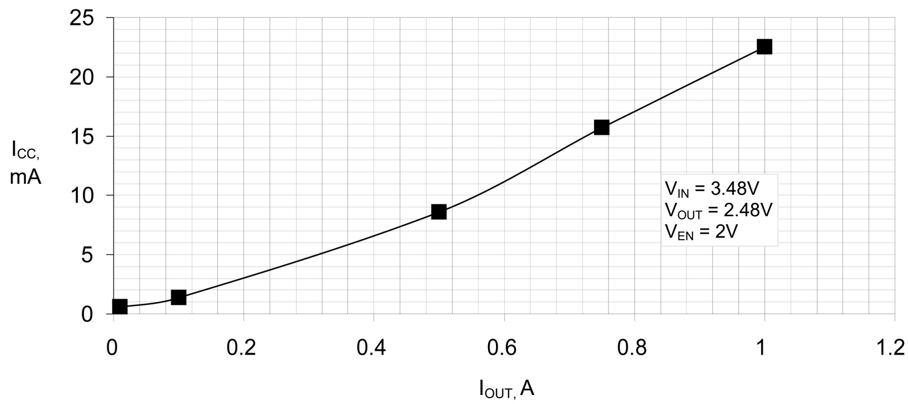

Figure 2 – Supply Current Versus Output Current

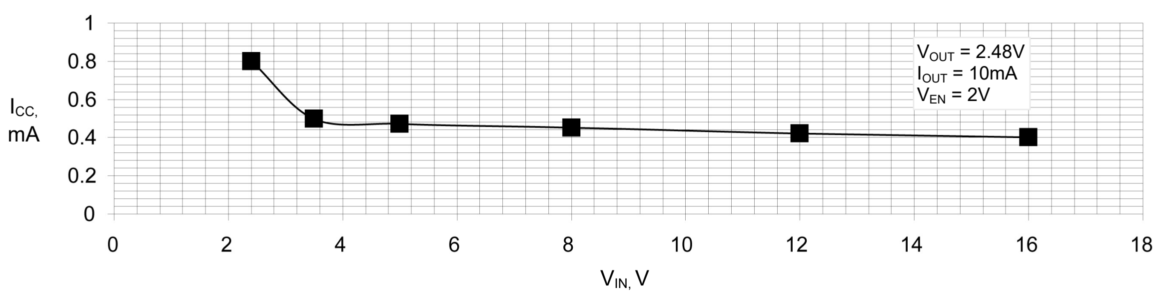

Figure 3 – Supply Current Versus Input Voltage

Typical Electrical Characteristics, T_J = 25°C (unless noted otherwise)

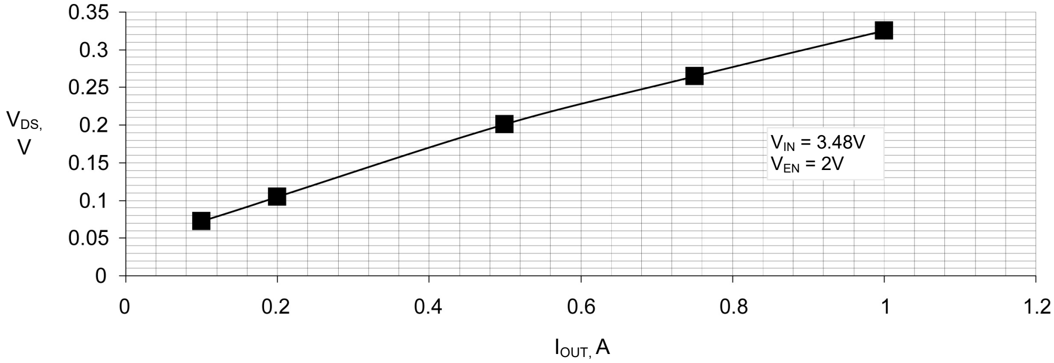

Figure 4 – V_{DS} Versus Output Current

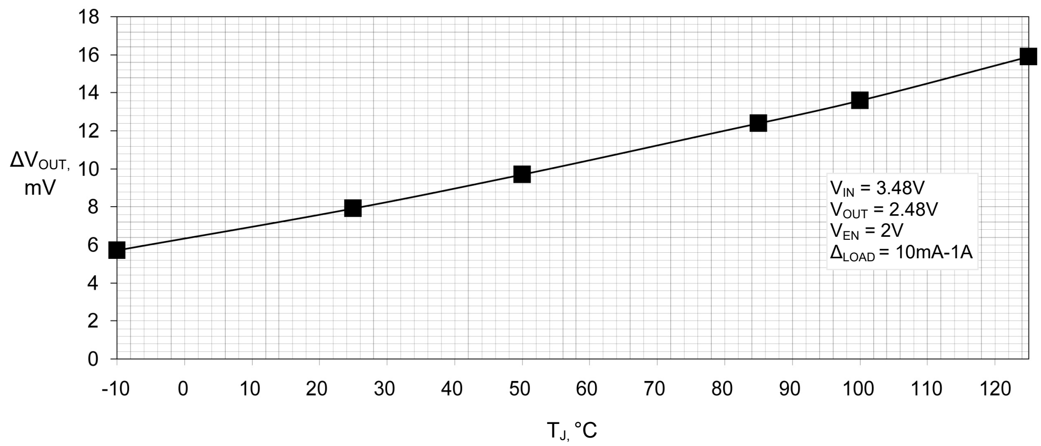

Figure 5 – ΔV_{OUT} at ΔI_{LOAD} Versus Junction Temperature

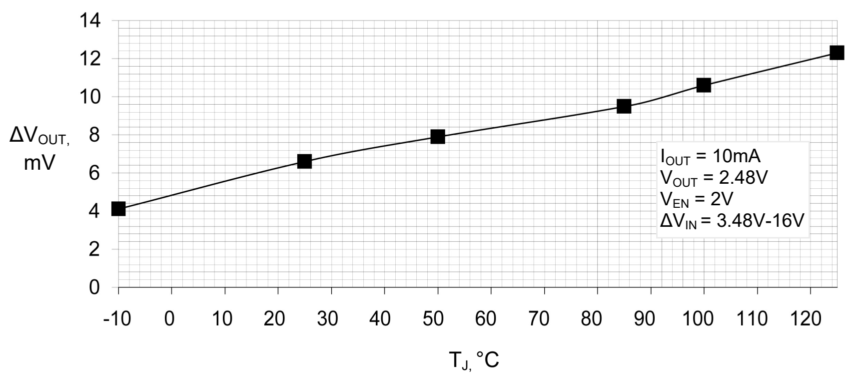

Figure 6 – ΔV_{OUT} at ΔV_{IN} Versus Junction Temperature

Typical Electrical Characteristics, T_J = 25°C (unless noted otherwise)

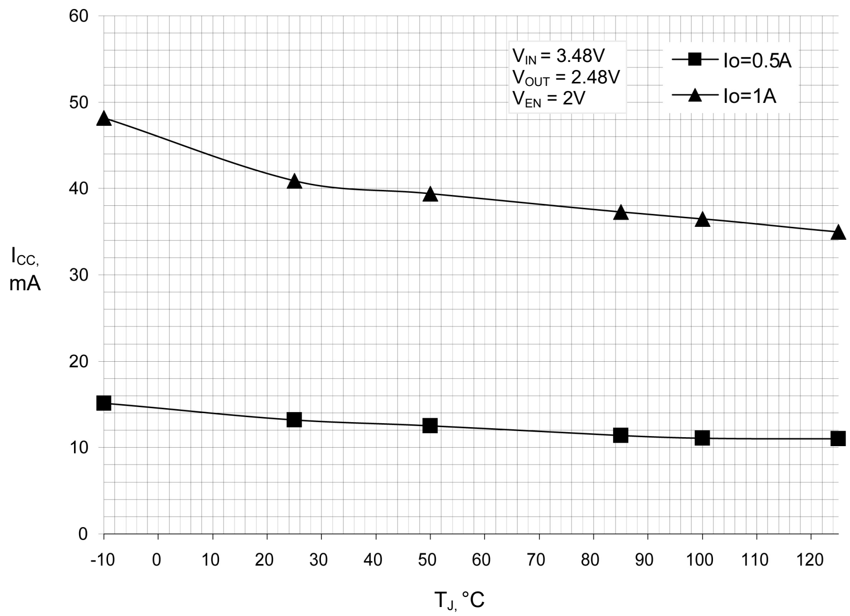

Figure 7 – Supply Current Versus Junction Temperature

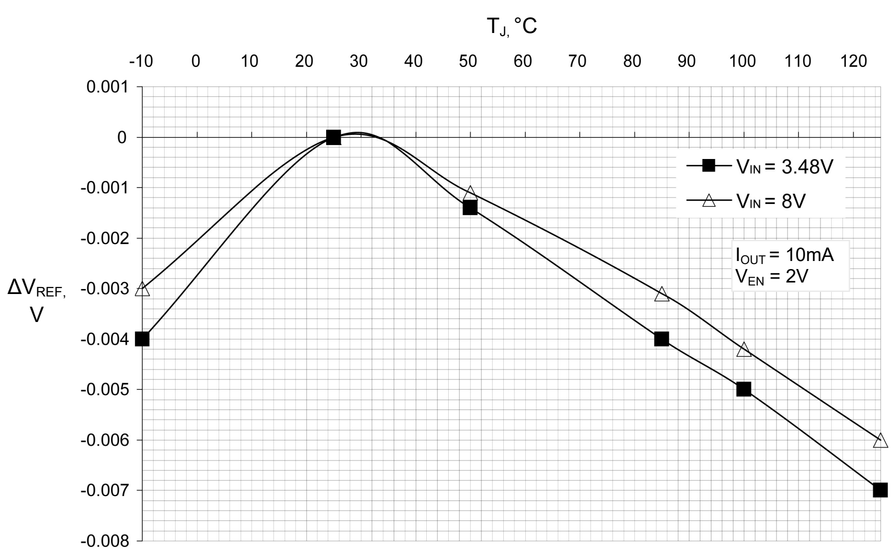

Figure 8 – ΔV_{REF} Versus Junction Temperature, I_{OUT} = 10mA

Typical Electrical Characteristics, T_J = 25°C (unless noted otherwise)

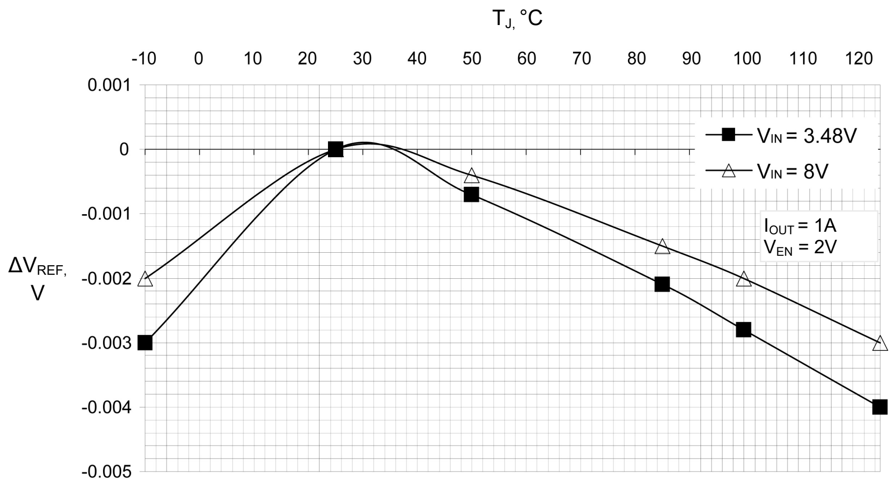

Figure 9 – ΔV_{REF} Versus Junction Temperature, I_{OUT} = 1A

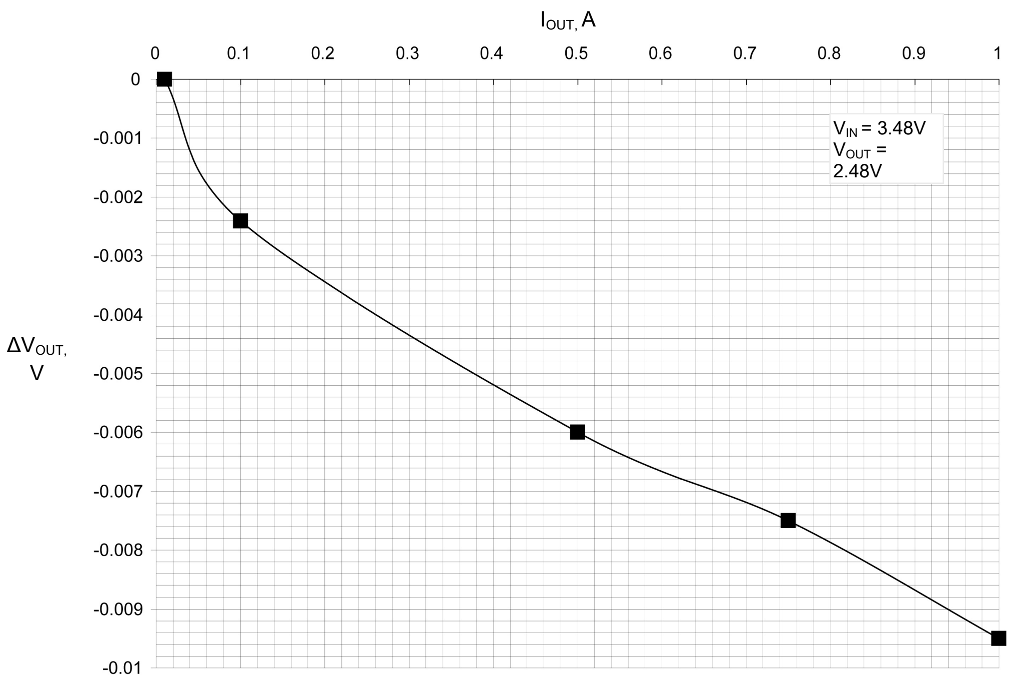

Figure 10 – ΔV_{OUT} Versus Output Current