

AD8417-2 WLCSP Data Sheet Revision



AHEAD OF WHAT'S POSSIBLE™

Data Sheet Comparison (AMR)

Old Datasheet

Table 3. Absolute Maximum Ratings

Parameter	Rating
Supply Voltage	6 V
Input Voltage Range	
Continuous	-2 V to +36 V
Differential Input Survival	5.5 V (magnitude)
Reverse Supply Voltage	0.3 V
Operating Temperature Range	-40°C to +125°C
Storage Temperature Range	-65°C to +150°C
Output Short-Circuit Duration	Indefinite

Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only; functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product reliability.

New Datasheet

Table 3. Absolute Maximum Ratings

Parameter	Rating
Supply Voltage	6 V
Input Voltage Range, Survival	
+IN to GND	-3 V to +46 V
-IN to GND	-3 V to +46 V
Differential Input Survival	5.5 V (magnitude)
Reverse Supply Voltage	0.3 V
Operating Temperature Range	-40°C to +125°C
Storage Temperature Range	-65°C to +150°C
Output Short-Circuit Duration	Indefinite

Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only; functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product reliability.

- **Note:** Improvement on Input Voltage Range rating.

Data Sheet Comparison

$T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$ (operating temperature range), $V_S = 5\text{ V}$, unless otherwise noted.

Table 2. Electrical Characteristics

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
GAIN					
Initial			60		V/V
Error Over Temperature	Specified temperature range			± 0.3	%
Gain vs. Temperature		-10		+10	ppm/ $^\circ\text{C}$
VOLTAGE OFFSET					
Offset Voltage, Referred to the Input (RTI)	25 $^\circ\text{C}$		± 200		μV
Over Temperature, RTI	Specified temperature range			± 400	μV
Offset Drift		-0.4	+0.1	+0.4	$\mu\text{V}/^\circ\text{C}$
INPUT					
Input Bias Current			160		μA
Input Voltage Range	Common mode, continuous	-2		+36	V
Common-Mode Rejection Ratio (CMRR)	Specified temperature range, f = dc f = dc to 10 kHz	90	100		dB
			86		dB
OUTPUT					
Output Voltage Range	$R_L = 25\text{ k}\Omega$	0.045		$V_S - 0.035$	V
Output Resistance			2		Ω
DYNAMIC RESPONSE					
Small Signal -3 dB Bandwidth			250		kHz
Slew Rate			1		V/ μs
NOISE					
0.1 Hz to 10 Hz, RTI			2.3		$\mu\text{V p-p}$
Spectral Density, 1 kHz, RTI			110		nV/ $\sqrt{\text{Hz}}$
OFFSET ADJUSTMENT					
Ratiometric Accuracy ¹	Divider to supplies	0.499	0.501		V/V
Accuracy, Referred to the Output (RTO)	Voltage applied to $V_{\text{REF}1}$ and $V_{\text{REF}2}$ in parallel		± 1		mV/V
Output Offset Adjustment Range	$V_S = 5\text{ V}$	0.045		$V_S - 0.035$	V
POWER SUPPLY					
Operating Range		2.7	5.5		V
Quiescent Current Over Temperature	$V_{\text{OUT}} = 0.1\text{ V dc}$		8.2		mA
Power-Supply Rejection Ratio		80			dB
TEMPERATURE RANGE					
For Specified Performance					
Operating Temperature Range		-40		+125	$^\circ\text{C}$

OLD DATASHEET

SPECIFICATIONS

$T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$ (operating temperature range), $V_S = 5\text{ V}$, unless otherwise noted.

Table 2. Electrical Characteristics

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
GAIN					
Initial			60		V/V
Error Over Temperature	Specified temperature range			± 0.3	%
Gain vs. Temperature		-10		+10	ppm/ $^\circ\text{C}$
VOLTAGE OFFSET					
Offset Voltage, Referred to the Input (RTI)	25 $^\circ\text{C}$		± 200		μV
Over Temperature, RTI	Specified temperature range			± 400	μV
Offset Drift		-0.4	+0.1	+0.4	$\mu\text{V}/^\circ\text{C}$
INPUT					
Input Bias Current			160		μA
Input Voltage Range	Common mode, continuous	-2		+42	V
Common-Mode Rejection Ratio (CMRR)	Specified temperature range, f = dc f = dc to 10 kHz	90	100		dB
			86		dB
OUTPUT					
Output Voltage Range	$R_L = 25\text{ k}\Omega$	0.045		$V_S - 0.035$	V
Output Resistance			2		Ω
DYNAMIC RESPONSE					
Small Signal -3 dB Bandwidth			250		kHz
Slew Rate			1		V/ μs
NOISE					
0.1 Hz to 10 Hz, RTI			2.3		$\mu\text{V p-p}$
Spectral Density, 1 kHz, RTI			110		nV/ $\sqrt{\text{Hz}}$
OFFSET ADJUSTMENT					
Ratiometric Accuracy ¹	Divider to supplies	0.499	0.501		V/V
Accuracy, Referred to the Output (RTO)	Voltage applied to $V_{\text{REF}1}$ and $V_{\text{REF}2}$ in parallel		± 1		mV/V
Output Offset Adjustment Range	$V_S = 5\text{ V}$	0.045		$V_S - 0.035$	V
POWER SUPPLY					

NEW DATASHEET

Data Sheet Comparison (Plots)

Old Datasheet

TYPICAL PERFORMANCE CHARACTERISTICS

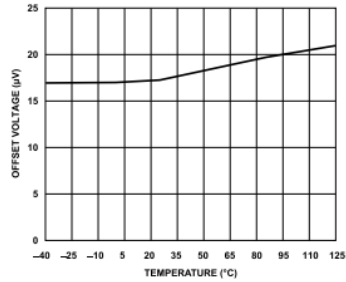


Figure 4. Typical Offset Voltage Drift vs. Temperature

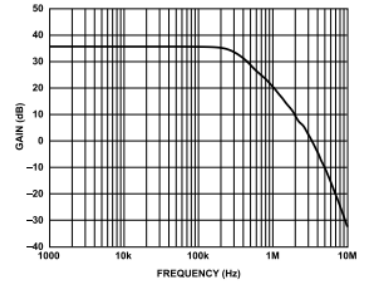


Figure 7. Typical Small Signal Bandwidth ($V_{OUT} = 200 \text{ mV p-p}$)

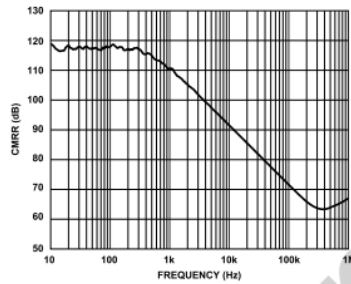


Figure 5. Typical CMRR vs. Frequency

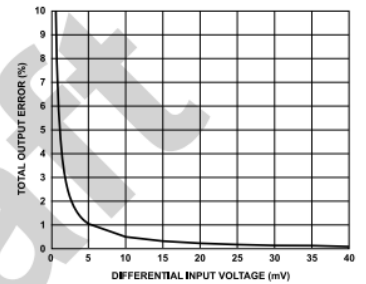


Figure 8. Total Output Error vs. Differential Input Voltage

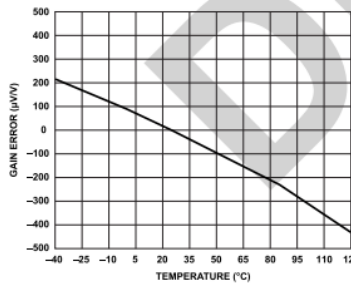


Figure 6. Typical Gain Error vs. Temperature

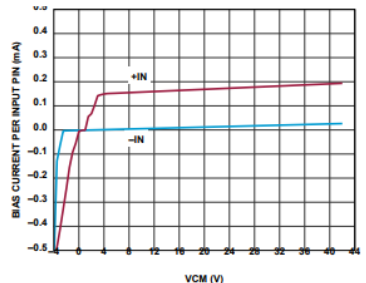


Figure 9. Bias Current per Input Pin vs. V_{CM}

New Datasheet

TYPICAL PERFORMANCE CHARACTERISTICS

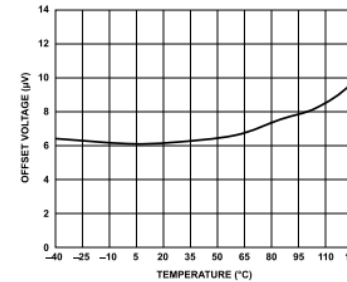


Figure 4. Typical Offset Voltage Drift vs. Temperature

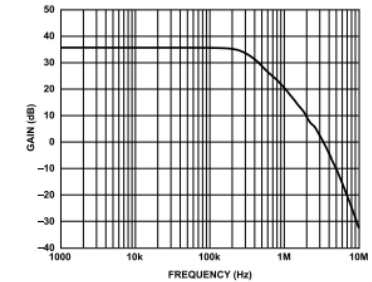


Figure 7. Typical Small Signal Bandwidth ($V_{OUT} = 200 \text{ mV p-p}$)

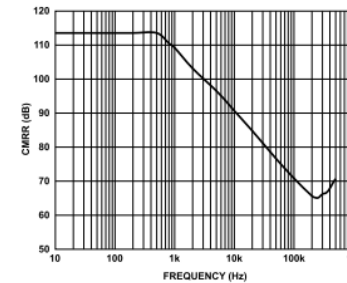


Figure 5. Typical CMRR vs. Frequency

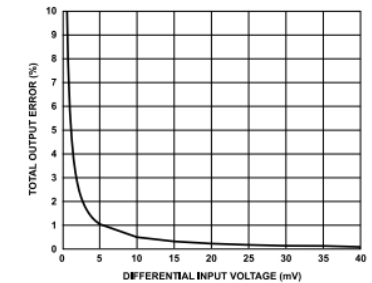


Figure 8. Total Output Error vs. Differential Input Voltage

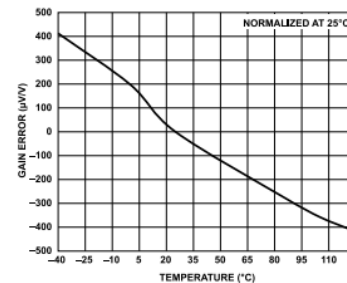


Figure 6. Typical Gain Error vs. Temperature

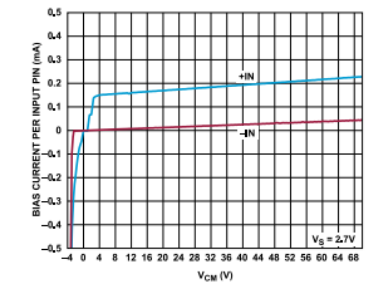


Figure 9. Bias Current per Input Pin vs. V_{CM}

► **Note:** Update on newly gathered TPC plots.

Data Sheet Comparison (Plots)

Old Datasheet

TYPICAL PERFORMANCE CHARACTERISTICS

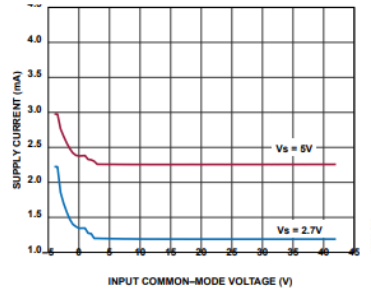


Figure 10. Supply Current vs. Input Common-Mode Voltage

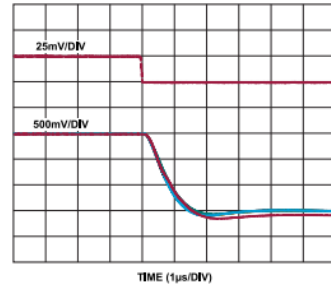


Figure 13. Fall Time ($V_S = 2.7\text{ V}$)

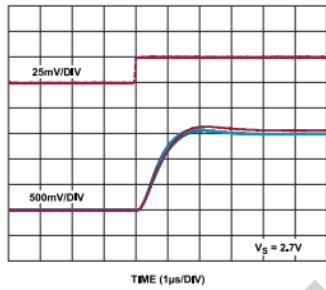


Figure 11. Rise Time ($V_S = 2.7\text{ V}$)

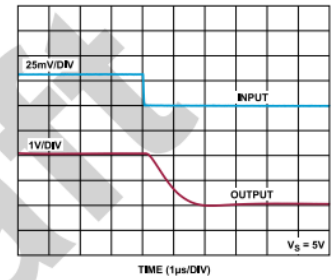


Figure 14. Fall Time ($V_S = 5\text{ V}$)

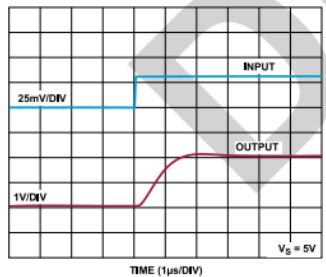


Figure 12. Rise Time ($V_S = 5\text{ V}$)

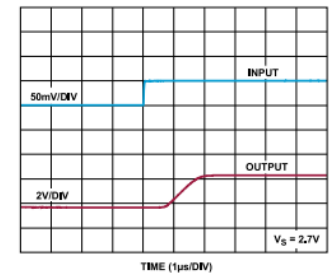


Figure 15. Differential Overload Recovery, Rising ($V_S = 2.7\text{ V}$)

New Datasheet

TYPICAL PERFORMANCE CHARACTERISTICS

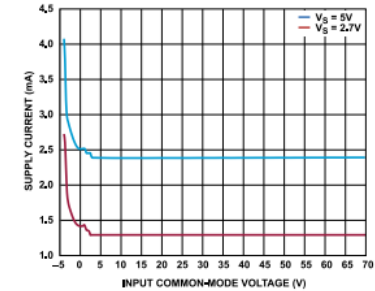


Figure 10. Supply Current vs. Input Common-Mode Voltage

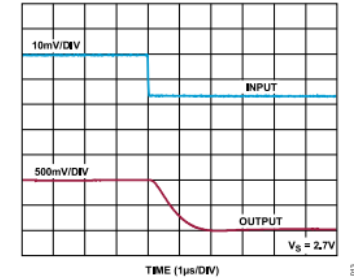


Figure 13. Fall Time ($V_S = 2.7\text{ V}$)

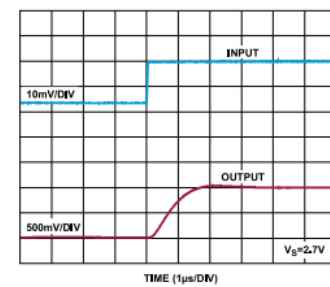


Figure 11. Rise Time ($V_S = 2.7\text{ V}$)

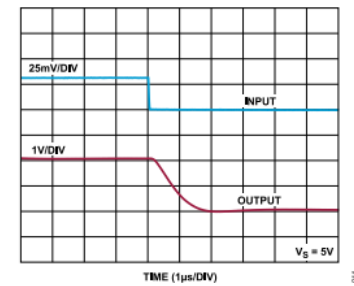


Figure 14. Fall Time ($V_S = 5\text{ V}$)

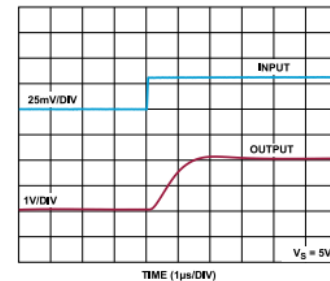


Figure 12. Rise Time ($V_S = 5\text{ V}$)

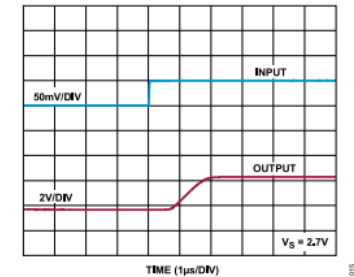


Figure 15. Differential Overload Recovery, Rising ($V_S = 2.7\text{ V}$)

► **Note:** Update on newly gathered TPC plots.

Data Sheet Comparison (Plots)

Old Datasheet

TYPICAL PERFORMANCE CHARACTERISTICS

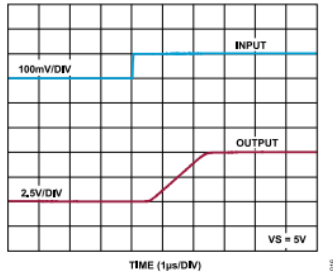


Figure 16. Differential Overload Recovery, Rising ($V_S = 5\text{ V}$)

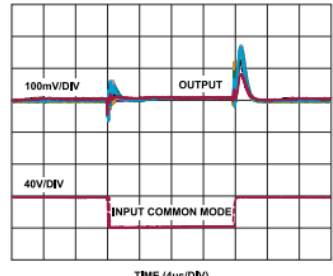


Figure 19. Input Common-Mode Step Response ($V_S = 5\text{ V}$, Inputs Shorted)

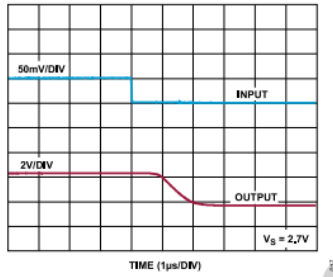


Figure 17. Differential Overload Recovery, Falling ($V_S = 2.7\text{ V}$)

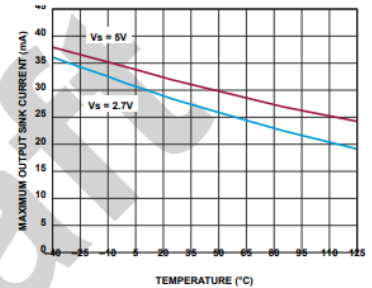


Figure 20. Maximum Output Sink Current vs. Temperature

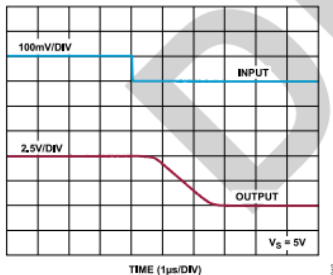


Figure 18. Differential Overload Recovery, Falling ($V_S = 5\text{ V}$)

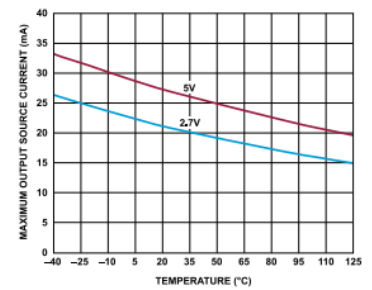


Figure 21. Maximum Output Source Current vs. Temperature

New Datasheet

TYPICAL PERFORMANCE CHARACTERISTICS

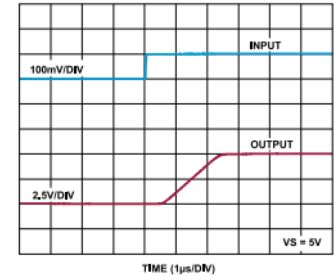


Figure 16. Differential Overload Recovery, Rising ($V_S = 5\text{ V}$)

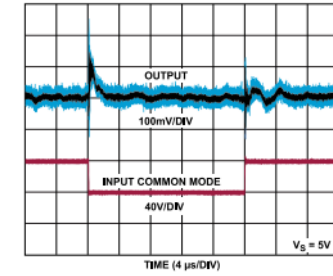


Figure 19. Input Common-Mode Step Response ($V_S = 5\text{ V}$, Inputs Shorted)

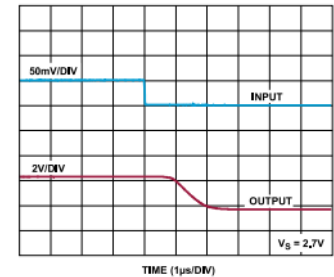


Figure 17. Differential Overload Recovery, Falling ($V_S = 2.7\text{ V}$)

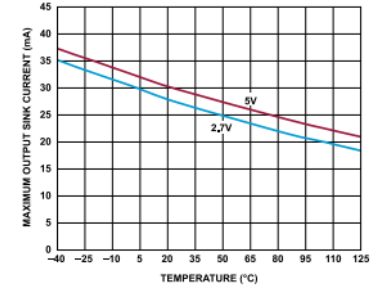


Figure 20. Maximum Output Sink Current vs. Temperature

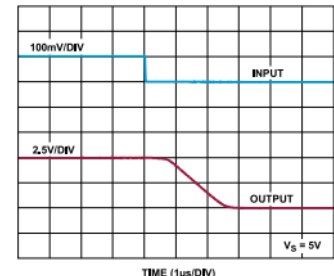


Figure 18. Differential Overload Recovery, Falling ($V_S = 5\text{ V}$)

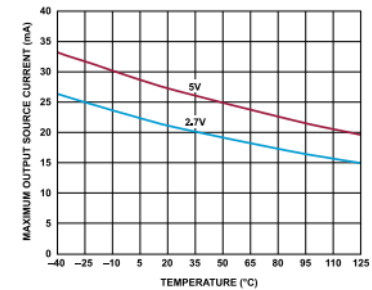


Figure 21. Maximum Output Source Current vs. Temperature

► **Note:** Update on newly gathered TPC plots.

Data Sheet Comparison (Plots)

Old Datasheet

TYPICAL PERFORMANCE CHARACTERISTICS

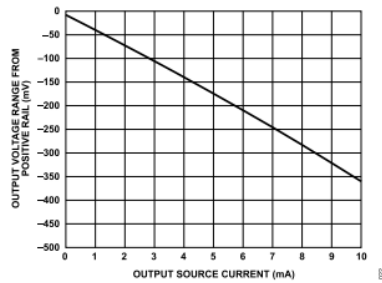


Figure 22. Output Voltage Range from Positive Rail vs. Output Source Current

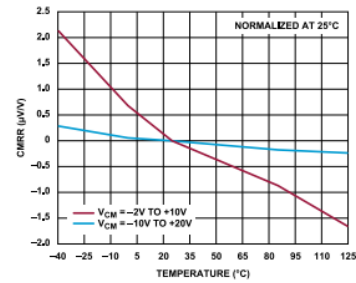


Figure 25. CMRR vs. Temperature

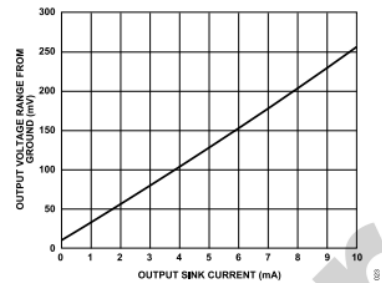


Figure 23. Output Voltage Range from Ground vs. Output Sink Current

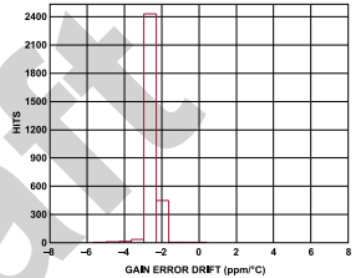


Figure 26. Gain Error Drift Distribution

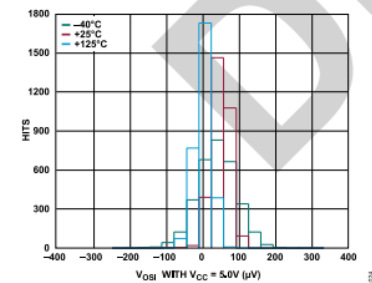


Figure 24. Offset Voltage Distribution

New Datasheet

TYPICAL PERFORMANCE CHARACTERISTICS

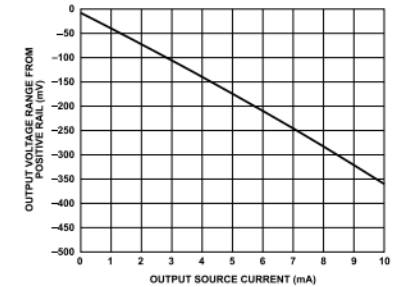


Figure 22. Output Voltage Range from Positive Rail vs. Output Source Current

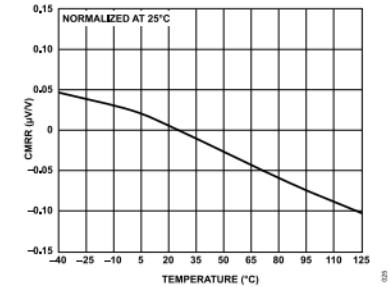


Figure 25. CMRR vs. Temperature

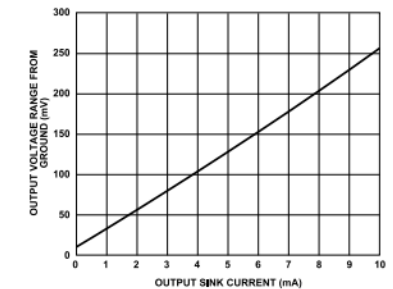


Figure 23. Output Voltage Range from Ground vs. Output Sink Current

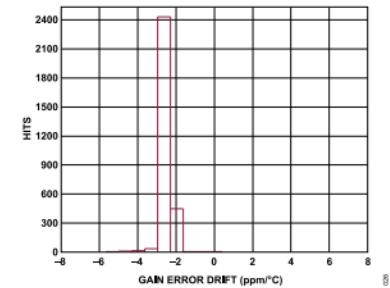
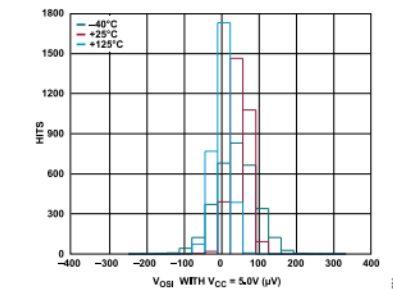


Figure 26. Gain Error Drift Distribution



► **Note:** Update on newly gathered TPC plots.