

AD8676* PRODUCT PAGE QUICK LINKS

Last Content Update: 06/09/2017

COMPARABLE PARTS

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EVALUATION KITS

- EVAL-OPAMP-2 Evaluation Board

DOCUMENTATION

Data Sheet

- AD8676: Ultraprecision, 36 V, 2.8 nV/√Hz Dual Rail-to-Rail Output Op Amp Data Sheet

TOOLS AND SIMULATIONS

- Analog Filter Wizard
- Analog Photodiode Wizard
- AD8676 SPICE Macro Model

REFERENCE DESIGNS

- CN0177
- CN0191
- CN0200
- CN0209
- CN0257
- CN0318

DESIGN RESOURCES

- AD8676 Material Declaration
- PCN-PDN Information
- Quality And Reliability
- Symbols and Footprints

DISCUSSIONS

View all AD8676 EngineerZone Discussions.

SAMPLE AND BUY

Visit the product page to see pricing options.

TECHNICAL SUPPORT

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REVISION HISTORY

8/11—Rev. B to Rev. C

Change to Y-Axis Label, Figure 9	7
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11/09—Rev. A to Rev. B

Changes to General Description Section	1
Added Table 1; Renumbered Sequentially	1
Updated Outline Dimensions	11
Changes to Ordering Guide	11

4/08—Rev. 0 to Rev. A

Changes to Table 1	3
Changes to Table 2.....	4
Changes to Figure 6, Figure 7, Figure 8	6
Changes to Figure 9 through Figure 12	7
Changes to Figure 21, Figure 22, and Figure 25	9
Added Figure 26, Renumbered Sequentially	9
Changes to Figure 27.....	10
Added Figure 28, Renumbered Sequentially	10

10/06—Revision 0: Initial Version

SPECIFICATIONS

ELECTRICAL SPECIFICATIONS

$V_S = \pm 5.0\text{ V}$, $V_{CM} = 0\text{ V}$, $V_O = 0\text{ V}$, $T_A = +25^\circ\text{C}$, unless otherwise specified.

Table 2.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}			12	50	μV
B Grade (SOIC)					60	μV
B Grade (MSOP)					100	μV
A Grade (SOIC, MSOP)						
Offset Voltage	V_{OS}	$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$		15	160	μV
B Grade (SOIC, MSOP)					250	μV
A Grade (SOIC, MSOP)						
Input Bias Current	I_B		-2		+2	nA
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	-5.5		+5.5	nA
Input Offset Current	I_{OS}		-1		+1	nA
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	-2.8		+2.8	nA
Input Voltage Range			-3.0		+3.0	V
Common-Mode Rejection Ratio	CMRR	$V_{CM} = -3.0\text{ V to }+3.0\text{ V}$	105	130		dB
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	105			dB
Open-Loop Gain	A_{VO}	$R_L = 2\text{ k}\Omega$ to ground, $V_O = -3.5\text{ V to }+3.5\text{ V}$	120	126		dB
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	117			dB
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$		0.2	0.6	$\mu\text{V}/^\circ\text{C}$
OUTPUT CHARACTERISTICS						
Output Voltage High	V_{OH}	$R_L = 10\text{ k}\Omega$ to ground	+4.90	+4.95		V
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	+4.85			V
		$R_L = 2\text{ k}\Omega$ to ground	+4.80	+4.89		V
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	+4.75			V
Output Voltage Low	V_{OL}	$R_L = 10\text{ k}\Omega$ to ground		-4.98	-4.90	V
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$			-4.85	V
		$R_L = 2\text{ k}\Omega$ to ground		-4.91	-4.86	V
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$			-4.82	V
Short-Circuit Limit	I_{SC}			+40		mA
Output Current	I_O			± 20		mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	$V_S = \pm 5.0\text{ V to } \pm 15.0\text{ V}$	106	120		dB
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	106	120		dB
Supply Current/Amplifier	I_{SY}	$V_O = 0\text{ V}$		2.5	3.2	mA
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$			3.8	mA
DYNAMIC PERFORMANCE						
Slew Rate	SR	$R_L = 2\text{ k}\Omega$		2.5		V/ μs
Gain Bandwidth Product	GBP			10		MHz
NOISE PERFORMANCE						
Voltage Noise	e_n p-p	0.1 Hz to 10 Hz		0.1		$\mu\text{V p-p}$
Voltage Noise Density	e_n	$f = 1\text{ kHz}$		2.8		nV/ $\sqrt{\text{Hz}}$
Current Noise Density	i_n	$f = 10\text{ Hz}$		0.3		pA/ $\sqrt{\text{Hz}}$

$V_S = \pm 15\text{ V}$, $V_{CM} = 0\text{ V}$, $V_O = 0\text{ V}$, $T_A = +25^\circ\text{C}$, unless otherwise specified.

Table 3.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}			12	50	μV
B Grade (SOIC)					60	μV
B Grade (MSOP)					100	μV
A Grade (SOIC, MSOP)						
Offset Voltage	V_{OS}	$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$		15	160	μV
B Grade (SOIC, MSOP)					250	μV
A Grade (SOIC, MSOP)						
Input Bias Current	I_B		-2		+2	nA
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	-4.5		+4.5	nA
Input Offset Current	I_{OS}		-1		+1	nA
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	-2.8		+2.8	nA
Input Voltage Range			-12.5		+12.5	V
Common-Mode Rejection Ratio	CMRR	$V_{CM} = -12.5\text{ V to } +12.5\text{ V}$	111	130		dB
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	107	130		dB
Open-Loop Gain	A_{VO}	$R_L = 2\text{ k}\Omega$ to ground, $V_O = -13.5\text{ V to } +13.5\text{ V}$	123	132		dB
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	117			dB
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$		0.2	0.6	$\mu\text{V}/^\circ\text{C}$
OUTPUT CHARACTERISTICS						
Output Voltage High	V_{OH}	$R_L = 10\text{ k}\Omega$ to ground $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	+14.85	+14.92		V
			+14.80			V
		$R_L = 2\text{ k}\Omega$ to ground $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	+14.60	+14.75		V
			+14.40			V
Output Voltage Low	V_{OL}	$R_L = 10\text{ k}\Omega$ to ground $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$		-14.96	-14.94	V
					-14.90	V
		$R_L = 2\text{ k}\Omega$ to ground $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$		-14.85	-14.75	V
					-14.60	V
Short-Circuit Limit	I_{SC}			+40		mA
Output Current	I_O			± 20		mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	$V_S = \pm 5.0\text{ V to } \pm 15.0\text{ V}$ $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	106	120		dB
			106			dB
Supply Current/Amplifier	I_{SY}	$V_O = 0\text{ V}$ $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$		2.7	3.4	mA
					4.2	mA
DYNAMIC PERFORMANCE						
Slew Rate	SR	$R_L = 10\text{ k}\Omega$		2.5		V/ μs
Gain Bandwidth Product	GBP			10		MHz
NOISE PERFORMANCE						
Voltage Noise	e_n p-p	0.1 Hz to 10 Hz		0.1		$\mu\text{V p-p}$
Voltage Noise Density	e_n	$f = 1\text{ kHz}$		2.8		nV/ $\sqrt{\text{Hz}}$
Current Noise Density	i_n	$f = 10\text{ Hz}$		0.3		pA/ $\sqrt{\text{Hz}}$

ABSOLUTE MAXIMUM RATINGS

Table 4.

Parameter	Rating
Supply Voltage	± 18 V
Input Voltage	$\pm V$ supply
Differential Input Voltage	± 0.7 V
Output Short-Circuit Duration to GND	Indefinite
Storage Temperature Range	
RM, R Packages	-65°C to $+150^{\circ}\text{C}$
Operating Temperature Range	-40°C to $+125^{\circ}\text{C}$
Junction Temperature Range	
RM, R Packages	-65°C to $+150^{\circ}\text{C}$
Lead Temperature Range (Soldering, 10 sec)	300°C

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

THERMAL RESISTANCE

Table 5. Thermal Resistance

Package Type	θ_{JA}	θ_{JC}	Unit
8-Lead MSOP (RM)	210	45	$^{\circ}\text{C}/\text{W}$
8-Lead SOIC_N (R)	158	43	$^{\circ}\text{C}/\text{W}$

POWER SEQUENCING

The op amp supplies must be established simultaneously with, or before, any input signals are applied. If this is not possible, the input current must be limited to 10 mA.

ESD CAUTION



ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

TYPICAL PERFORMANCE CHARACTERISTICS

$\pm 15\text{ V}$ and $\pm 5\text{ V}$, $T_A = 25^\circ\text{C}$, unless otherwise specified.

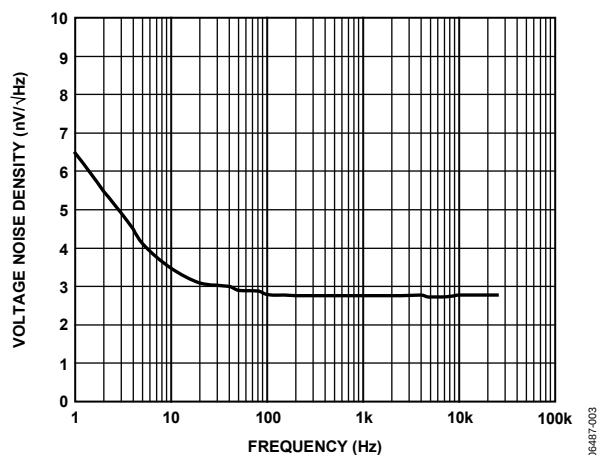


Figure 3. Voltage Noise Density vs. Frequency

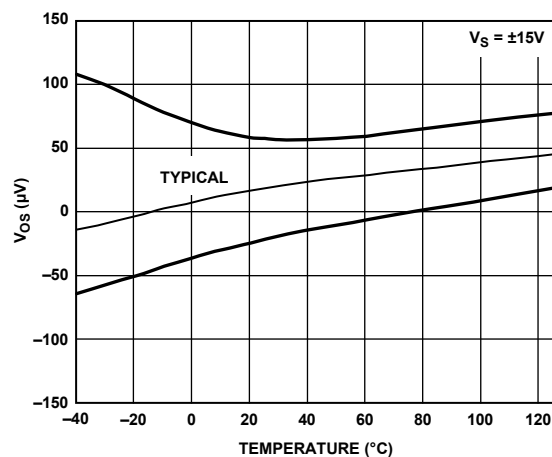


Figure 6. Offset Voltage vs. Temperature

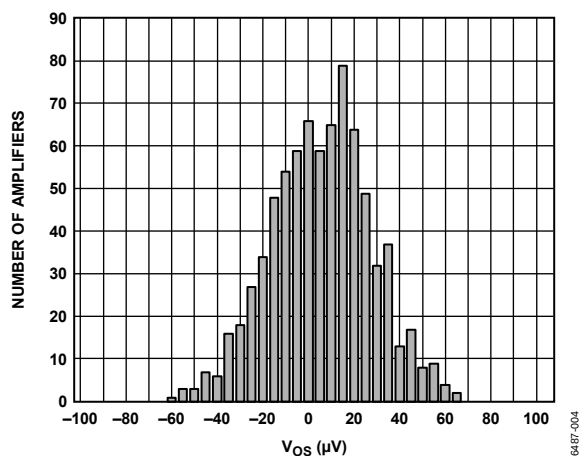


Figure 4. Input Offset Voltage Distribution

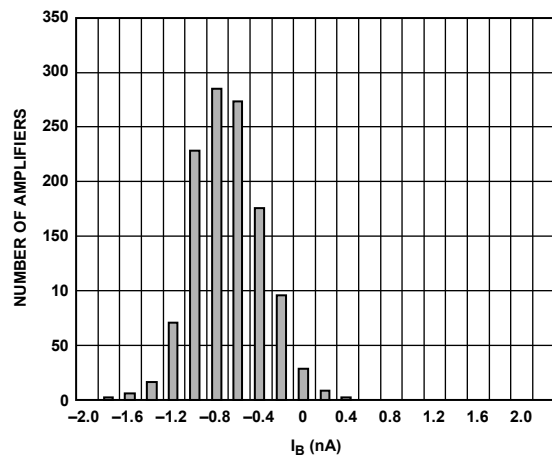


Figure 7. Input Bias Current, $V_{SY} = \pm 15\text{ V}$

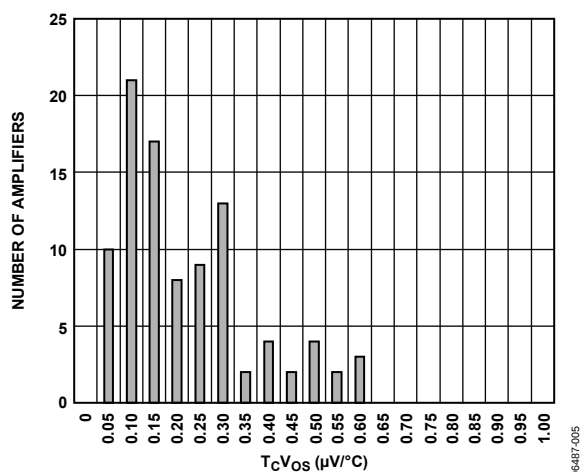


Figure 5. TCV_{OS} Distribution

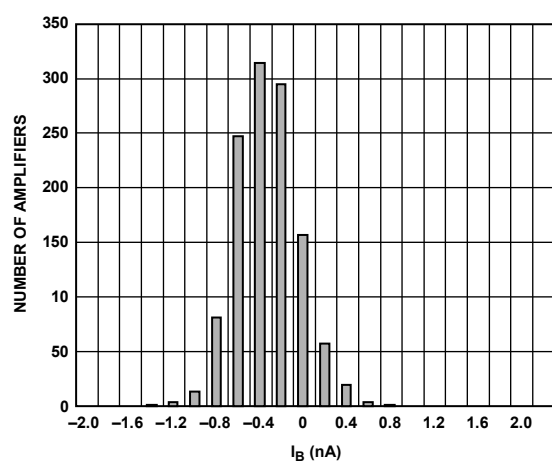


Figure 8. Input Bias Current, $V_{SY} = \pm 5\text{ V}$

$\pm 15\text{ V}$ and $\pm 5\text{ V}$, $T_A = 25^\circ\text{C}$, unless otherwise specified.

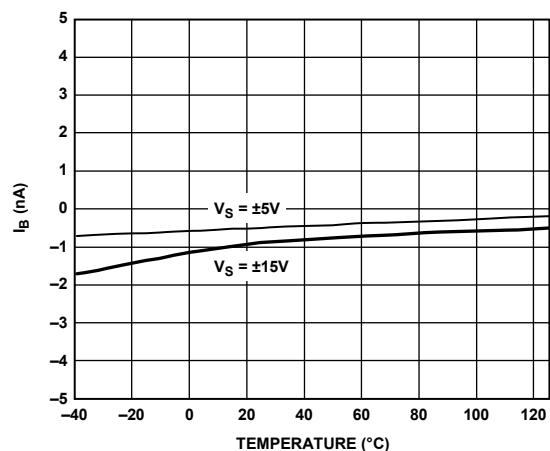


Figure 9. Input Bias Current vs. Temperature

06487-109

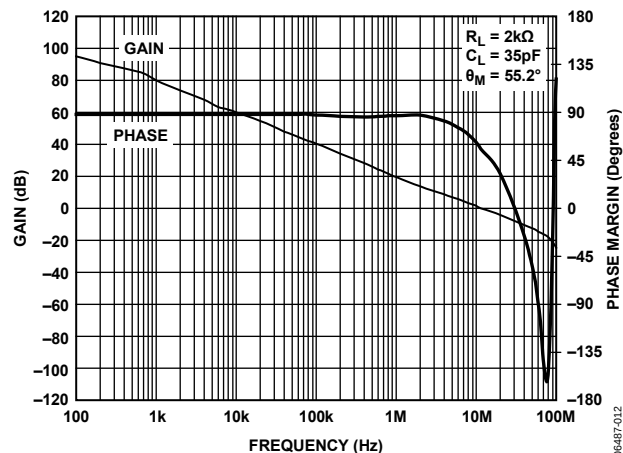


Figure 12. Gain and Phase vs. Frequency

06487-012

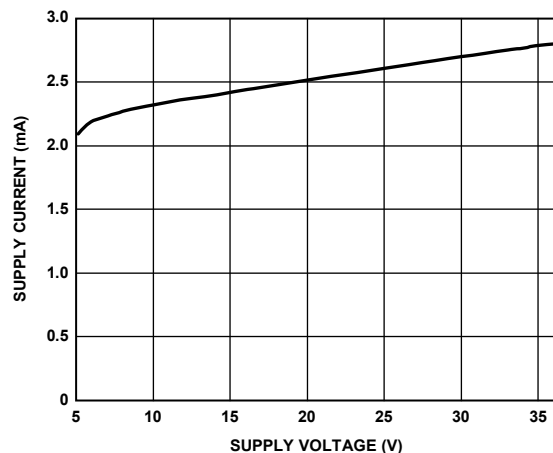


Figure 10. Supply Current vs. Total Supply Voltage

06487-110

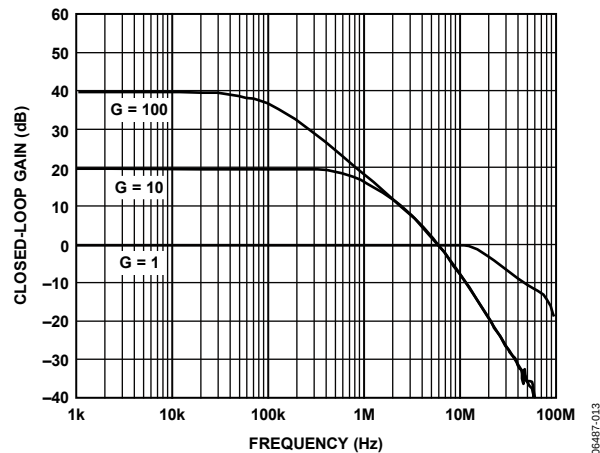


Figure 13. Closed-Loop Gain vs. Frequency

06487-013

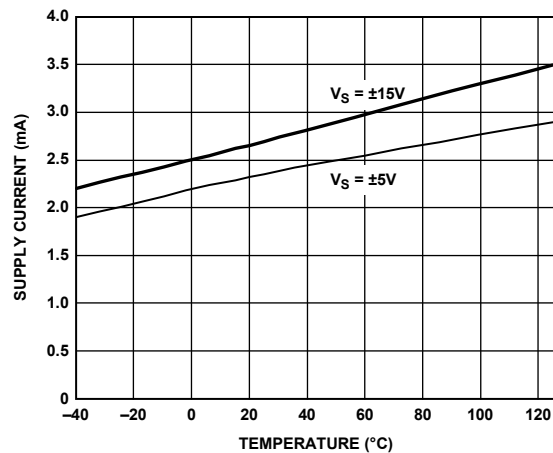


Figure 11. Supply Current vs. Temperature

06487-111

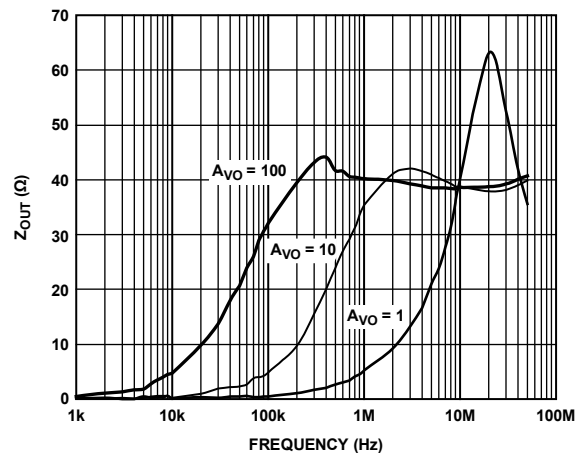


Figure 14. Z_{OUT} vs. Frequency

06487-014

$\pm 15\text{ V}$ and $\pm 5\text{ V}$, $T_A = 25^\circ\text{C}$, unless otherwise specified.

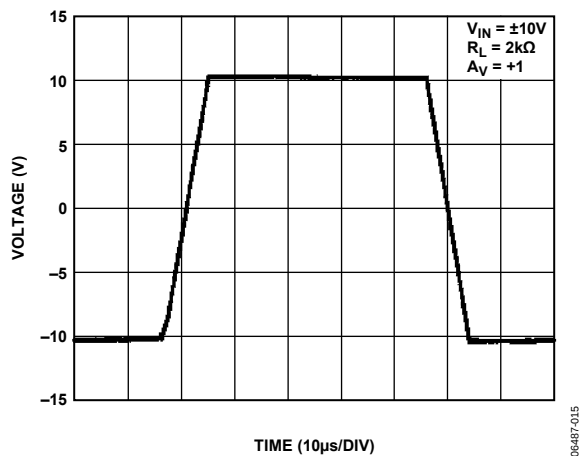


Figure 15. Large Signal Transient Response, $V_{SV} = \pm 15\text{ V}$

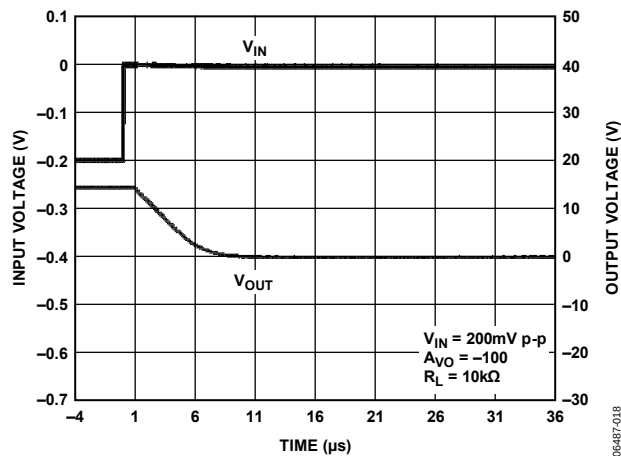


Figure 18. Positive Overvoltage Recovery

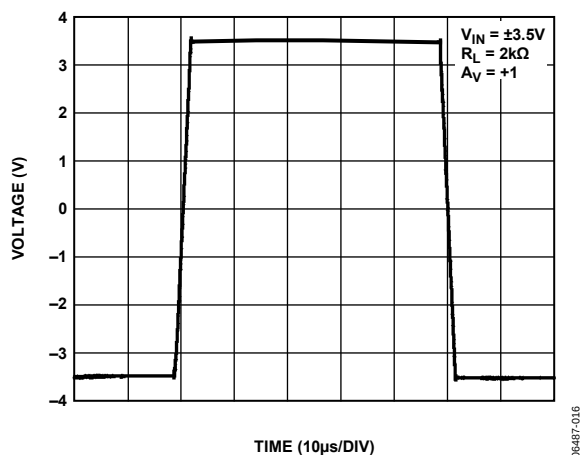


Figure 16. Large Signal Transient Response, $V_{SV} = \pm 5\text{ V}$

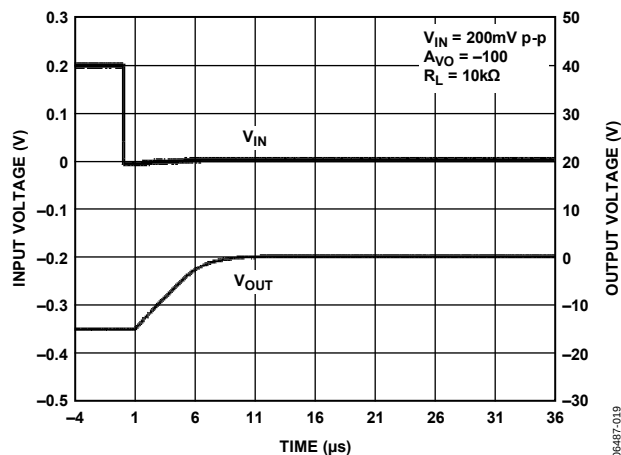


Figure 19. Negative Overvoltage Recovery

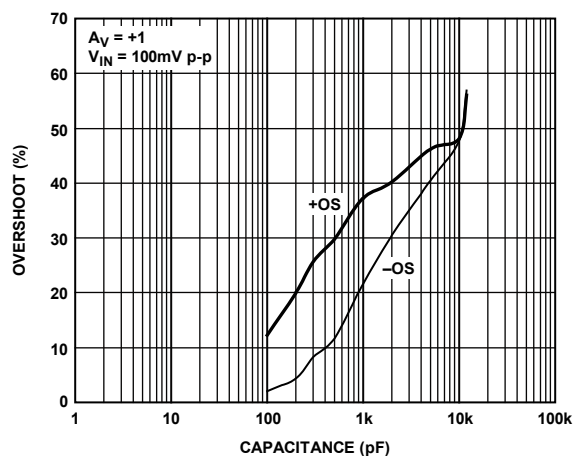


Figure 17. Small Signal Overshoot vs. Load Capacitance

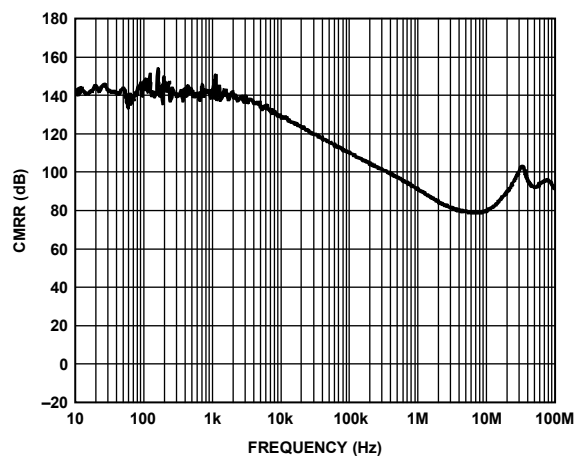


Figure 20. CMRR vs. Frequency

$\pm 15\text{ V}$ and $\pm 5\text{ V}$, $T_A = 25^\circ\text{C}$, unless otherwise specified.

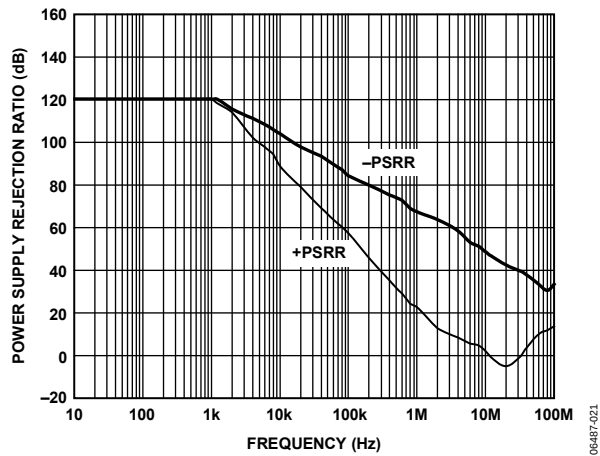


Figure 21. Power Supply Rejection Ratio vs. Frequency

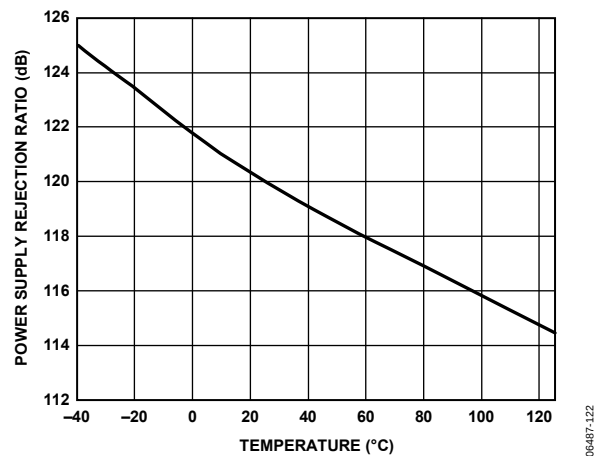


Figure 22. Power Supply Rejection Ratio vs. Temperature

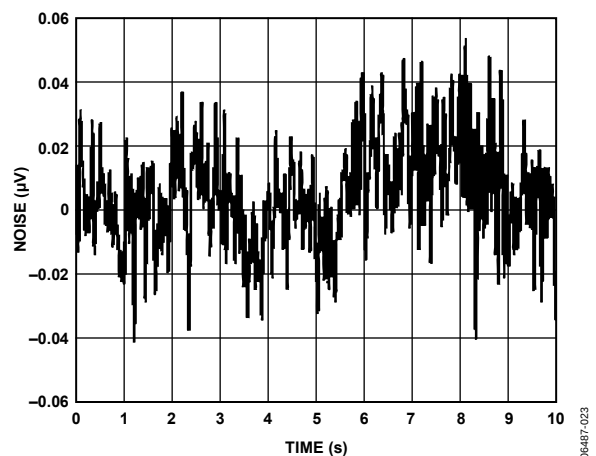


Figure 23. Voltage Noise (0.1 Hz to 10 Hz)

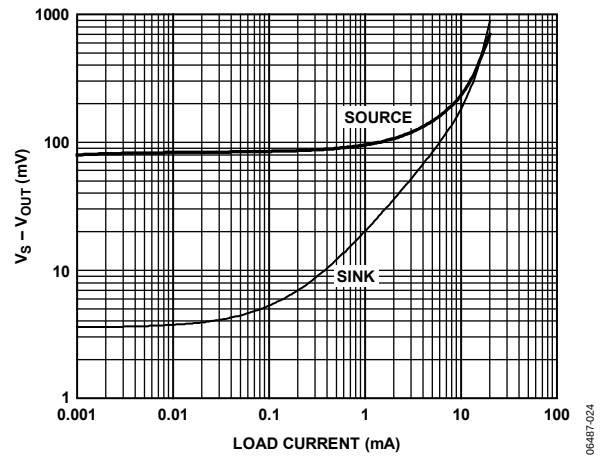


Figure 24. Output Saturation Voltage vs. Output Load Current

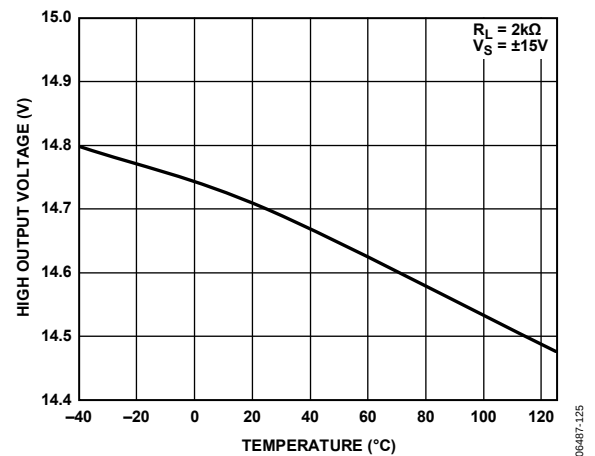


Figure 25. High Output Voltage, V_{OH} vs. Temperature, $V_S = \pm 15\text{ V}$

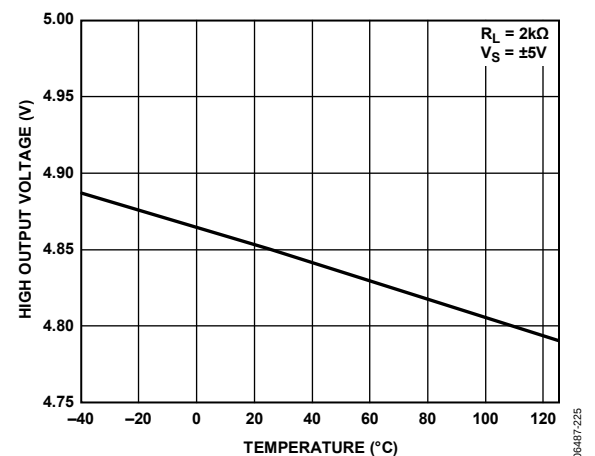


Figure 26. High Output Voltage, V_{OH} vs. Temperature, $V_S = \pm 5\text{ V}$

$\pm 15\text{ V}$ and $\pm 5\text{ V}$, $T_A = 25^\circ\text{C}$, unless otherwise specified.

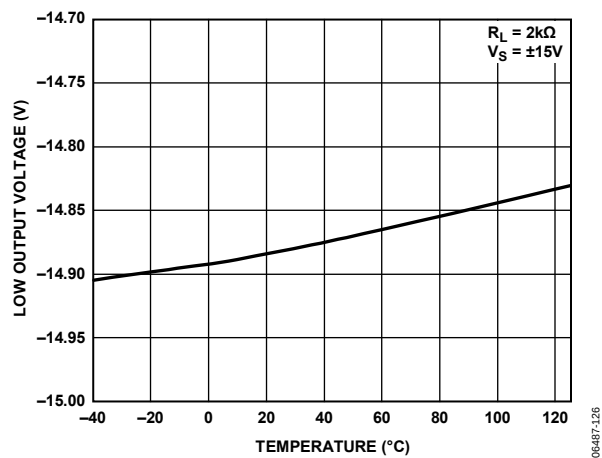


Figure 27. Low Output Voltage, V_{OL} vs. Temperature, $V_S = \pm 15\text{ V}$

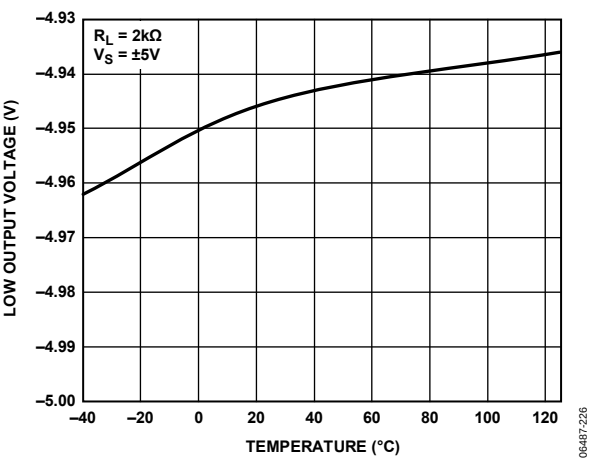
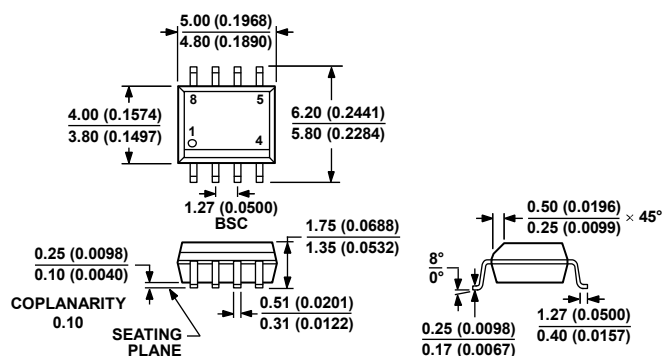


Figure 28. Low Output Voltage, V_{OL} vs. Temperature, $V_S = \pm 5\text{ V}$

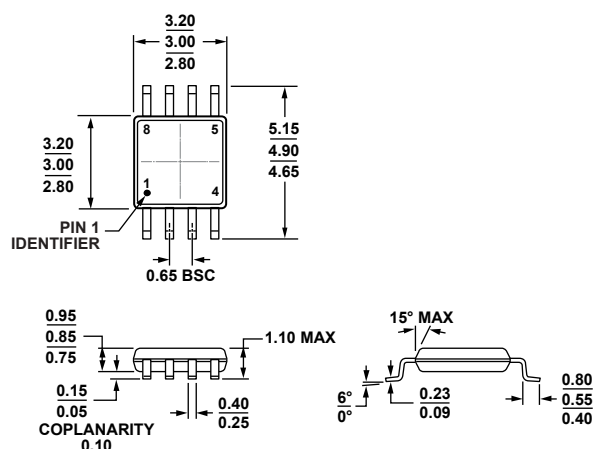
OUTLINE DIMENSIONS



COMPLIANT TO JEDEC STANDARDS MS-012-AA
CONTROLLING DIMENSIONS ARE IN MILLIMETERS; INCH DIMENSIONS
(IN PARENTHESES) ARE ROUNDED-OFF MILLIMETER EQUIVALENTS FOR
REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN.

Figure 29. 8-Lead Standard Small Outline Package [SOIC_N]
Narrow Body (R-8)

Dimensions shown in millimeters and (inches)



COMPLIANT TO JEDEC STANDARDS MO-187-AA

Figure 30. 8-Lead Mini Small Outline Package [MSOP]
(RM-8)

Dimensions shown in millimeters

ORDERING GUIDE

Model ¹	Temperature Range	Package Description	Package Option	Branding
AD8676ARMZ	−40°C to +125°C	8-Lead Mini Small Outline Package [MSOP]	RM-8	A13
AD8676ARMZ-REEL	−40°C to +125°C	8-Lead Mini Small Outline Package [MSOP]	RM-8	A13
AD8676ARZ	−40°C to +125°C	8-Lead Standard Small Outline Package [SOIC_N]	R-8	
AD8676ARZ-REEL	−40°C to +125°C	8-Lead Standard Small Outline Package [SOIC_N]	R-8	
AD8676ARZ-REEL7	−40°C to +125°C	8-Lead Standard Small Outline Package [SOIC_N]	R-8	
AD8676BRMZ	−40°C to +125°C	8-Lead Mini Small Outline Package [MSOP]	RM-8	A1L
AD8676BRMZ-REEL	−40°C to +125°C	8-Lead Mini Small Outline Package [MSOP]	RM-8	A1L
AD8676BRZ	−40°C to +125°C	8-Lead Standard Small Outline Package [SOIC_N]	R-8	
AD8676BRZ-REEL	−40°C to +125°C	8-Lead Standard Small Outline Package [SOIC_N]	R-8	
AD8676BRZ-REEL7	−40°C to +125°C	8-Lead Standard Small Outline Package [SOIC_N]	R-8	

¹ Z = RoHS Compliant Part.

NOTES