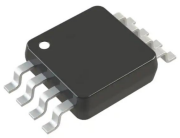
Zero-Drift, Single-Supply, Rail-to-Rail Input/Output Operational AmplifierDual Operational Amplifier

Features

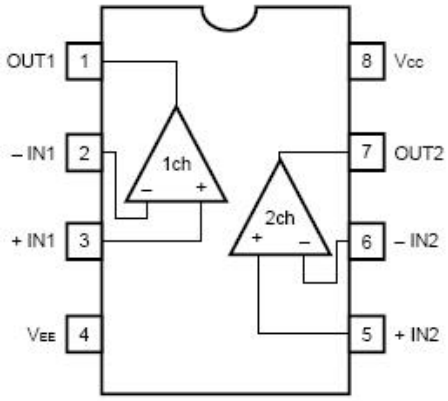
- Lowest auto-zero amplifier noise
- Low offset voltage: 1 µV
- Input offset drift: 0.002 µV/°C
- Rail-to-rail input and output swing
- 5 V single-supply operation
- High gain, CMRR, and PSRR: 120 dB
- Very low input bias current: 100 pA max
- Low supply current: 1.0 mA
- Overload recovery time: 10 µs
- No external components required

SOP8



MSOP8

Functional Block Diagram



AD8629(SOP8/MSOP8)

Pin Description

Pin No.	Pin Name	Function
1	Output 1	Ch1 Output
2	Inverting Input1	Ch1 Inverting Input
3	Non-Inverting Input 1	Ch1 Non-Inverting Input
4	V_{EE}	Negative Power Supply
5	Non-Inverting Input 2	Ch2 Non-Inverting Input
6	Inverting Input2	Ch2 Inverting Input
7	Output 2	Ch2 Output
8	Vcc	Positive Power Supply

Absolute Maximum Ratings

Characteristic	Symbol	Value	Unit
Supply Voltage		6	V
Differential Voltage*		±5.0	V
Input Voltage		GND-0.3 ~ V_{EE}+0.3	V
Output Short-Circuit Duration to GND		Indefinite	
Operating Temperature Range		-40 to +125	°C
Storage Temperature Range		-65 to 150	°C°C
Junction Temperature Range		-65 to 150	°C
Lead Temperature Range (Soldering,60s)		300	°C

*Differential input voltage is limited to ±5 V or the supply voltage, whichever is less.

Electrical Characteristics (Vcc=5.0V,VCM=2.5V,TA=25°C,unless otherwise noted)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	VOS	 −40°C≤TA≤+125°C		1	5 10	µV µV
Input Bias Current	IB	 −40°C≤TA≤+125°C		30.	100 1.5	pA nA
Input Offset current	IOS	 −40°C≤TA≤+125°C		50	200 250	pA pA
Input Voltage Range			0		5	V
Common-Mode Rejection Ratio	CMRR	VCM=0V to 5V −40°C≤TA≤+125°C	120 115	140 130		dB dB
Large signal Voltage Gain	AVO	RL=10kΩ, VO=0.3V to 4.7V −40°C≤TA≤+125°C	125 120	145 135		dB dB
Offset Voltage Drift	ΔVOS/ΔT	−40°C≤TA≤+125°C		0.002	0.02	µV/°C
OUTPUT CHARACTERISTICS						
Output voltage High	VOH	RL=100kΩ to ground −40°C≤TA≤+125°C RL=10kΩ to ground −40°C≤TA≤+125°C	4.99 4.99 4.95 4.95	4.996 4.995 4.98 4.97		V V V V
Output voltage Low	VOL	RL=100kΩ to ground −40°C≤TA≤+125°C RL=10kΩ to ground −40°C≤TA≤+125°C		1 2 10 15	5 5 20 20	mV mV mV mV
Short-Circuit Limit	Isc	−40°C≤TA≤+125°C	±25	±50 ±40		mA mA
Output Current	IO	−40°C≤TA≤+125°C		±30 ±15		mA mA
POWER SUPPLY						
Power supply rejection Ratio	PSRR	VS=2.7V to 5.5V −40°C≤TA≤+125°C	115	130		dB
Supply Current/Amplifier	ISY	VO=0V −40°C≤TA≤+125°C		0.85 1.0	1.1 1.2	mA mA
INPUT CAPACITANCE						
Differential Common-Mode	CIN			1.5 1.0		pF pF
DYNAMIC PERFORMANCE						
Slew Rate	SR	RL=10kΩ		1.0		V/µs

Overload Recovery Time				0.05		ms
Gain Bandwidth Product	GBP			2.5		MHz
NOISE PERFORMANCE						
Voltage Noise	en p-p	0.1Hz to 10Hz		0.5		µV p-p
	en p-p	0.1Hz to 1.0Hz		0.16		mV p-p
Voltage Noise Density	e_n	f=1kHz		22		nV/√Hz
Current Noise Density	i_n	f=10Hz		5		fV/√Hz

(V_S=2.7V, V_{CM}=1.35V, V_O=1.4V, T_A=25°C, unless otherwise noted)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}	 −40°C≤T_A≤+125°C		1	5 10	µV µV
Input Bias Current	I_B	 −40°C≤T_A≤+125°C		30.	100 1.5	pA nA
Input Offset current	I_{OS}	 −40°C≤T_A≤+125°C		50	200 250	pA pA
Input Voltage Range			0		5	V
Common-Mode Rejection Ratio	CMRR	V_{CM}=0V to 5V −40°C≤T_A≤+125°C	115 110	130 120		dB dB
Large signal Voltage Gain	A_{VO}	R_L=10kΩ, V_O=0.3V to 4.7V −40°C≤T_A≤+125°C	110 105	140 130		dB dB
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	−40°C≤T_A≤+125°C		0.002	0.02	µV/°C
OUTPUT CHARACTERISTICS						
Output voltage High	V_{OH}	R_L=100kΩ to ground −40°C≤T_A≤+125°C R_L=10kΩ to ground −40°C≤T_A≤+125°C	2.68 2.68 2.67 2.67	2.695 2.695 2.68 2.675		V V V V
Output voltage Low	V_{OL}	R_L=100kΩ to ground −40°C≤T_A≤+125°C R_L=10kΩ to ground −40°C≤T_A≤+125°C		1 2 10 15	5 5 20 20	mV mV mV mV
Short-Circuit Limit	Isc	−40°C≤T_A≤+125°C	±10	±15 ±10		mA mA
Output Current	I_O	−40°C≤T_A≤+125°C		±10 ±5		mA mA
POWER SUPPLY						
Power supply rejection Ratio	PSRR	V_S=2.7V to 5.5V −40°C≤T_A≤+125°C	115	130		dB
Supply Current/Amplifier	I_{SY}	V_O=0V −40°C≤T_A≤+125°C		0.75 0.9	1.0 1.2	mA mA
INPUT CAPACITANCE						
Differential Common-Mode	C_{IN}			1.5 1.0		pF pF
DYNAMIC PERFORMANCE						
Slew Rate	SR	R_L=10kΩ		1.0		V/µs
Overload Recovery Time				0.05		ms
Gain Bandwidth Product	GBP			2.0		MHz
NOISE PERFORMANCE						
Voltage Noise	en p-p	0.1Hz to 10Hz		0.5		µV p-p
Voltage Noise Density	e_n	f=1kHz		22		nV/√Hz
Current Noise Density	i_n	f=10Hz		5		fV/√Hz

Characteristics Curves

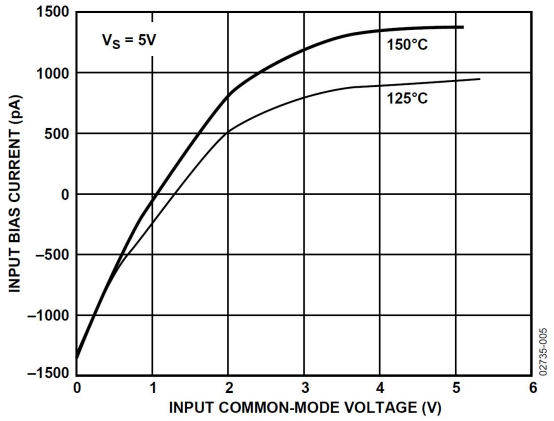


Figure 7. Input Bias Current vs. Input Common-Mode Voltage at 5 V

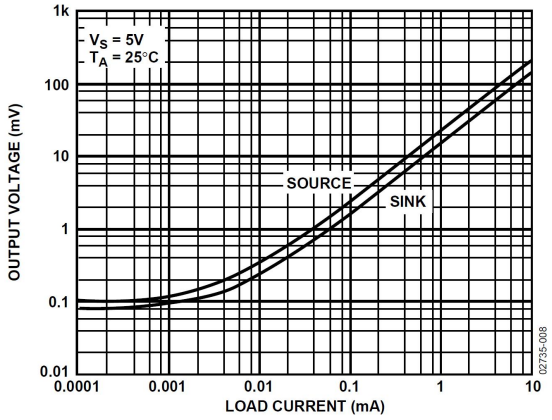


Figure 10. Output Voltage to Supply Rail vs. Load Current at 5 V

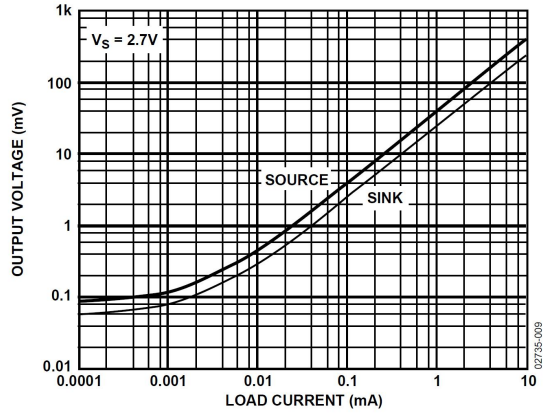


Figure 11. Output Voltage to Supply Rail vs. Load Current at 2.7 V

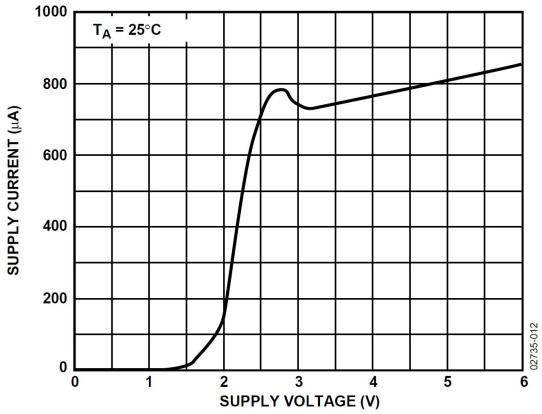


Figure 14. Supply Current vs. Supply Voltage

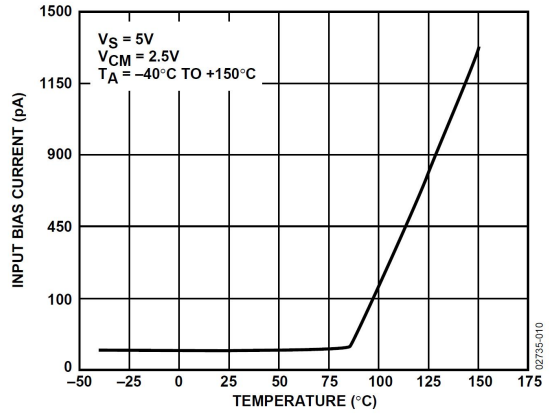


Figure 12. Input Bias Current vs. Temperature

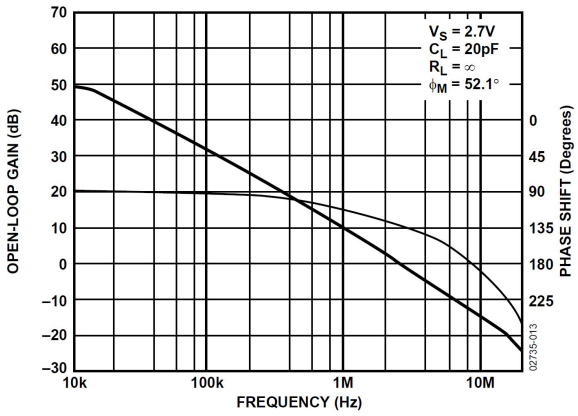


Figure 15. Open-Loop Gain and Phase vs. Frequency

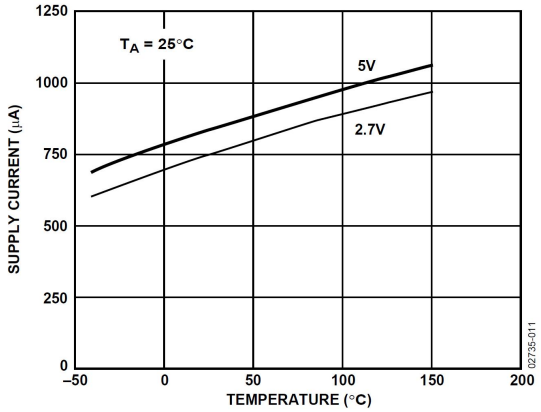


Figure 13. Supply Current vs. Temperature

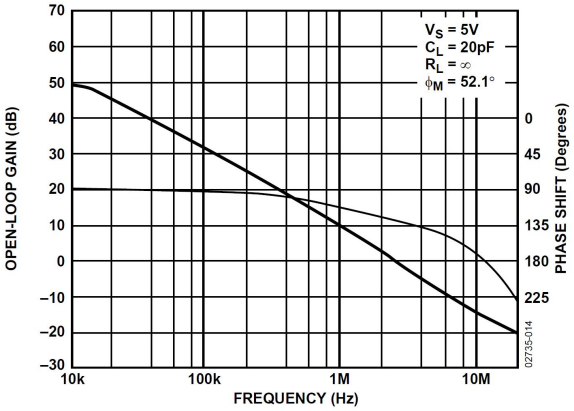


Figure 16. Open-Loop Gain and Phase vs. Frequency

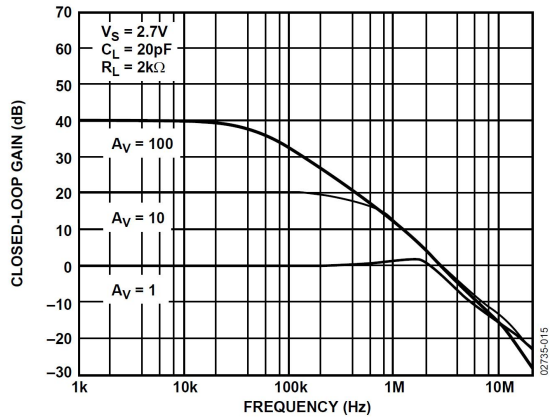


Figure 17. Closed-Loop Gain vs. Frequency at 2.7 V

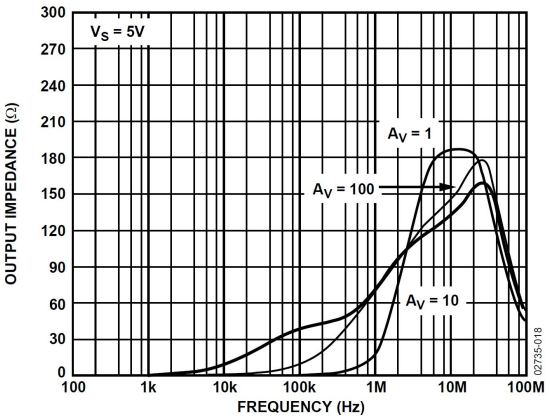


Figure 20. Output Impedance vs. Frequency at 5 V

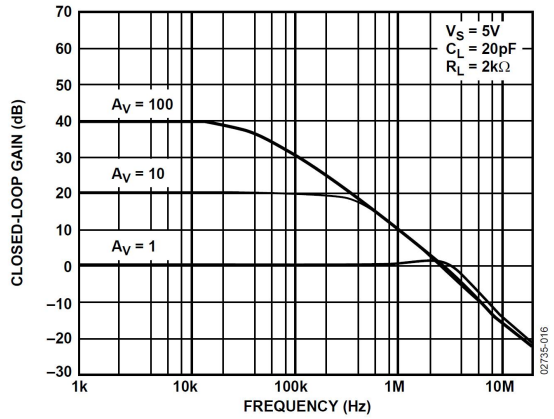


Figure 18. Closed-Loop Gain vs. Frequency at 5 V

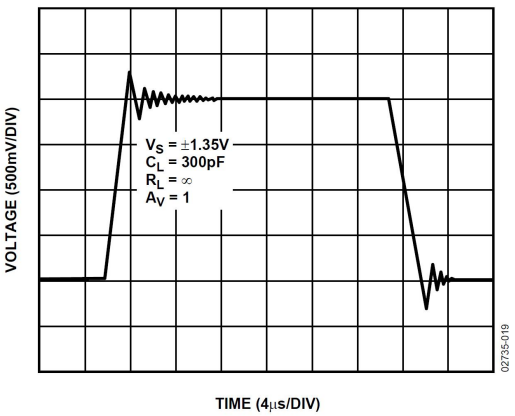


Figure 21. Large Signal Transient Response at 2.7 V

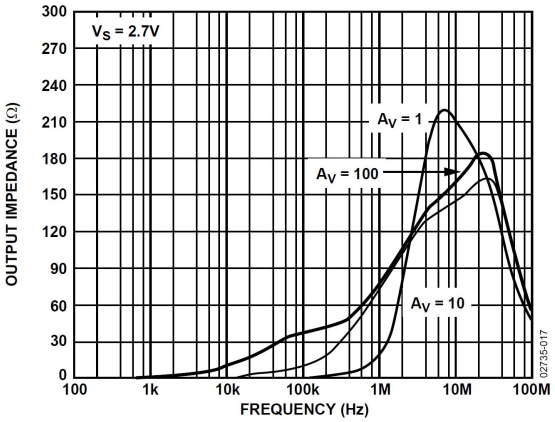


Figure 19. Output Impedance vs. Frequency at 2.7 V

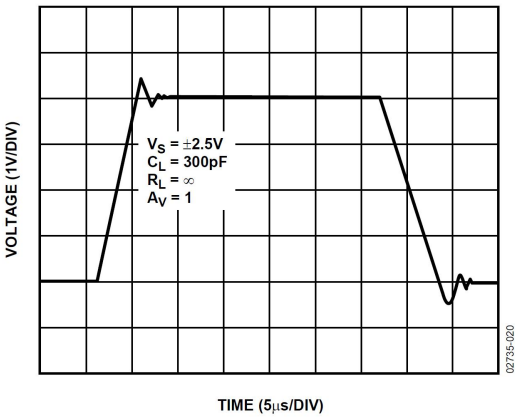


Figure 22. Large Signal Transient Response at 5 V

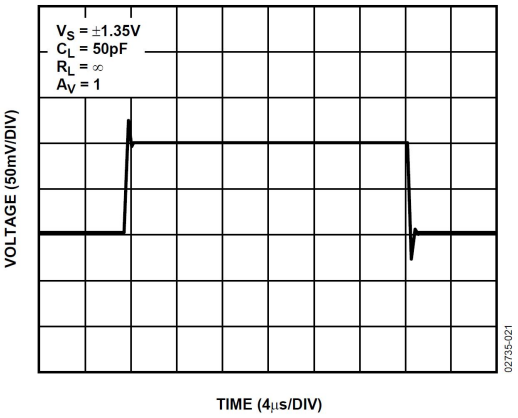


Figure 23. Small Signal Transient Response at 2.7 V

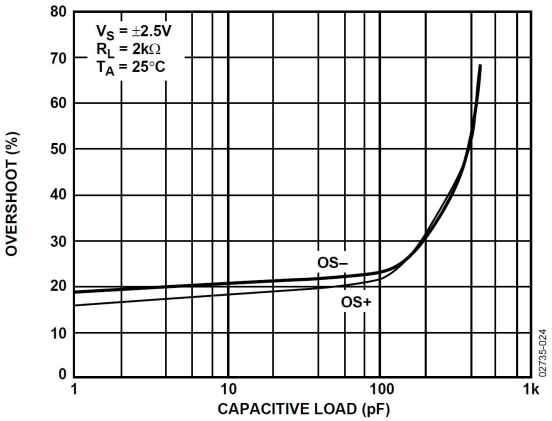


Figure 26. Small Signal Overshoot vs. Load Capacitance at 5 V

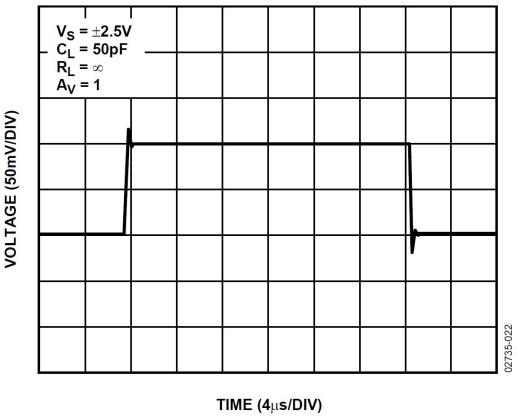


Figure 24. Small Signal Transient Response at 5 V

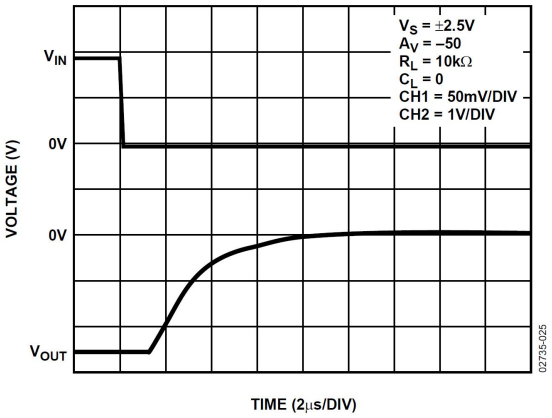


Figure 27. Positive Overvoltage Recovery

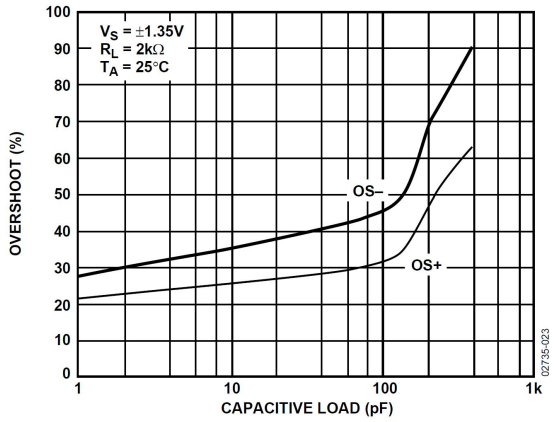


Figure 25. Small Signal Overshoot vs. Load Capacitance at 2.7 V

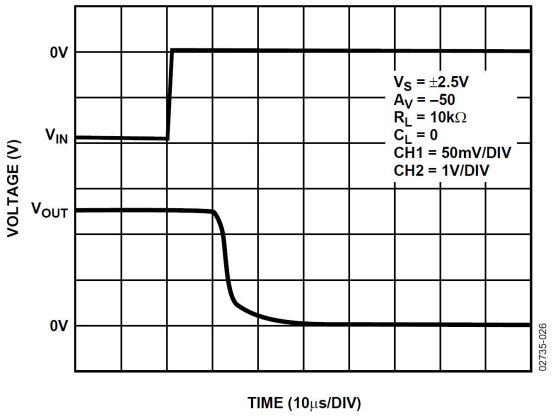


Figure 28. Negative Overvoltage Recovery

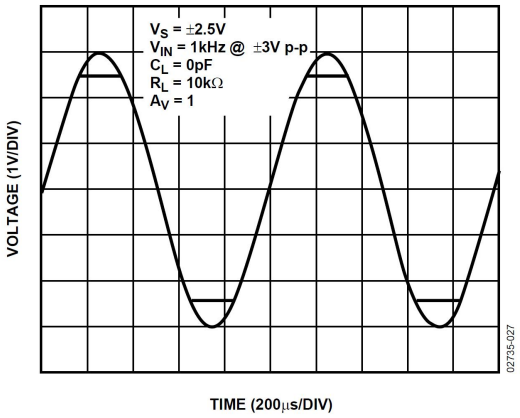


Figure 29. No Phase Reversal

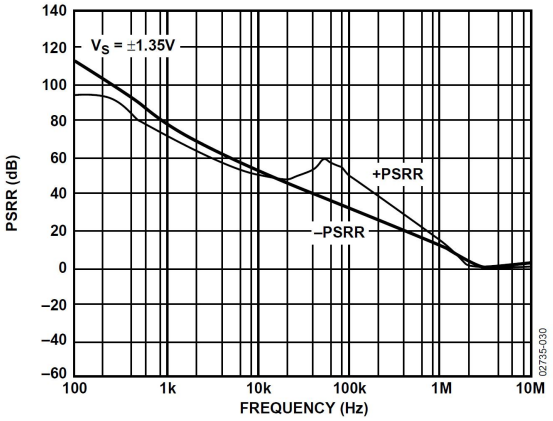


Figure 32. PSRR vs. Frequency

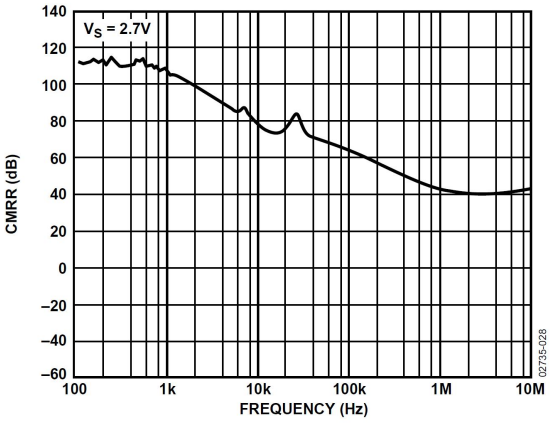


Figure 30. CMRR vs. Frequency at 2.7 V

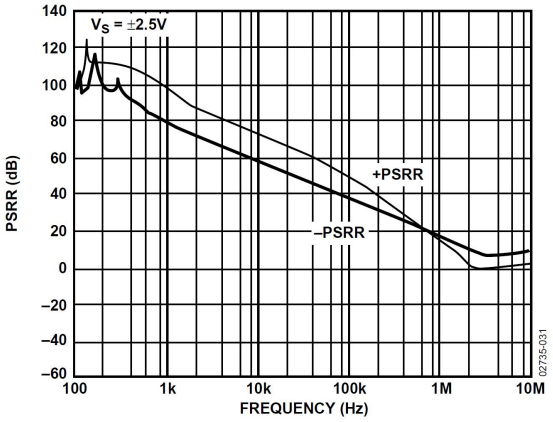


Figure 33. PSRR vs. Frequency

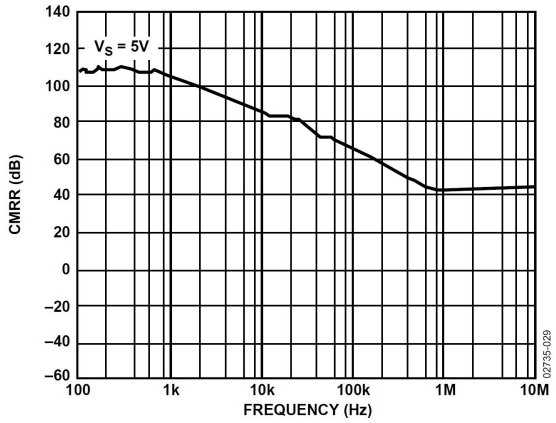


Figure 31. CMRR vs. Frequency at 5 V

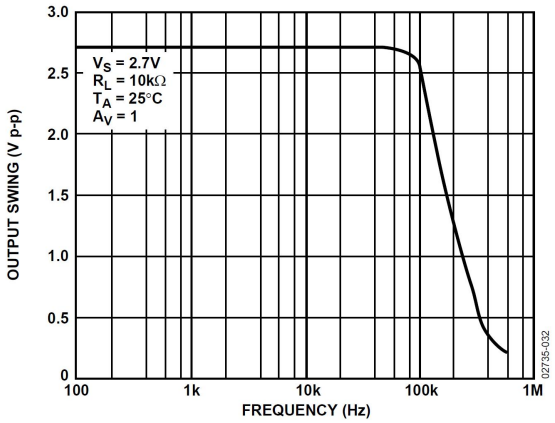


Figure 34. Maximum Output Swing vs. Frequency

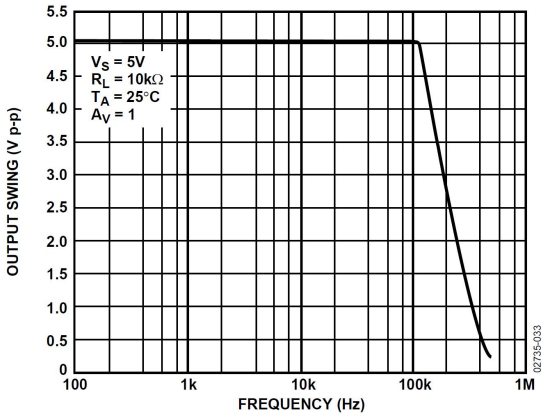


Figure 35. Maximum Output Swing vs. Frequency at 5 V

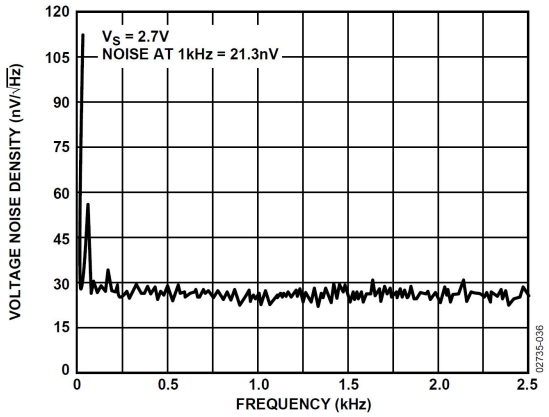


Figure 38. Voltage Noise Density at 2.7 V from 0 Hz to 2.5 kHz

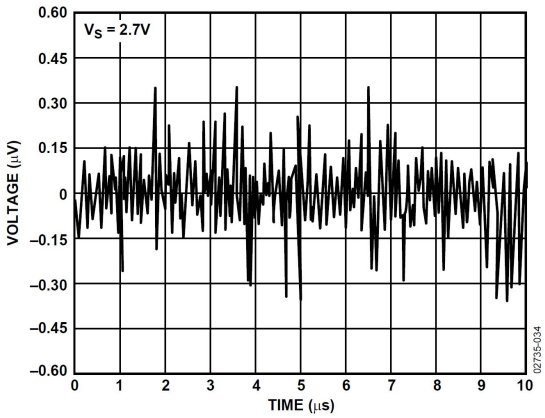


Figure 36. 0.1 Hz to 10 Hz Noise at 2.7 V

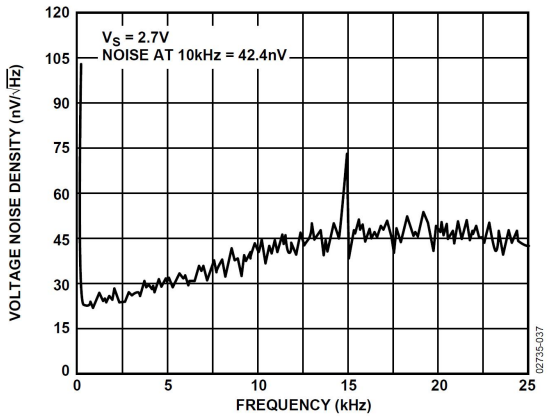


Figure 39. Voltage Noise Density at 2.7 V from 0 Hz to 25 kHz

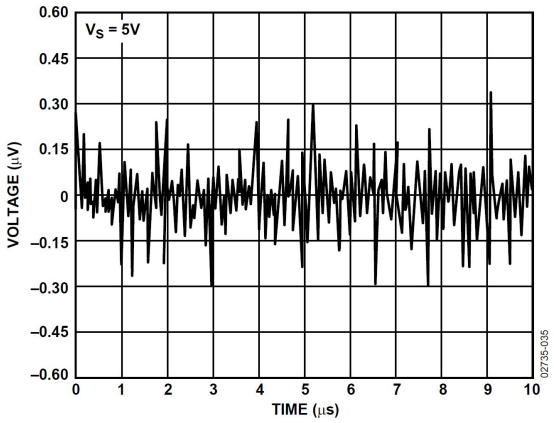


Figure 37. 0.1 Hz to 10 Hz Noise at 5 V

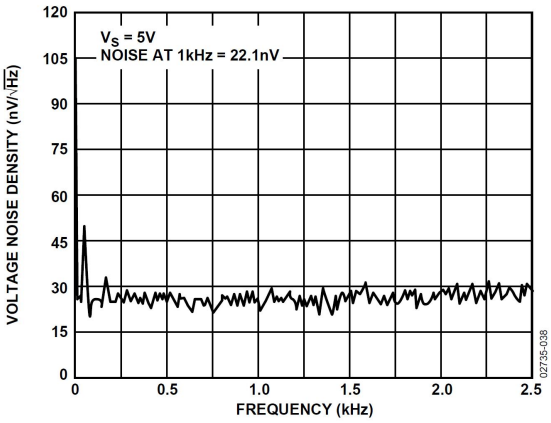


Figure 40. Voltage Noise Density at 5 V from 0 Hz to 2.5 kHz

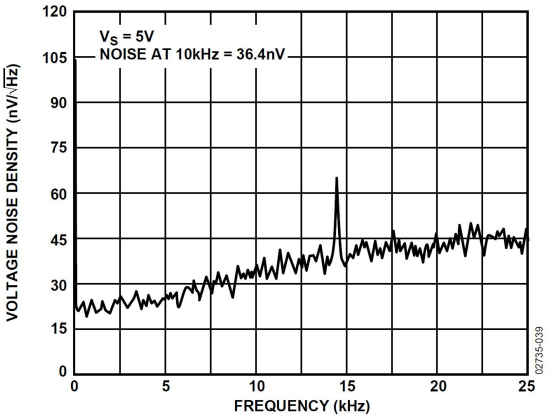


Figure 41. Voltage Noise Density at 5 V from 0 Hz to 25 kHz

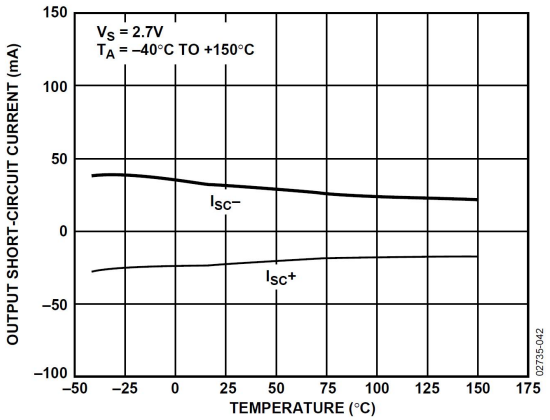


Figure 44. Output Short-Circuit Current vs. Temperature

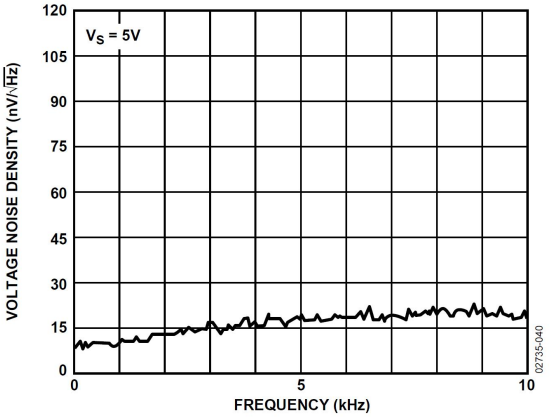


Figure 42. Voltage Noise

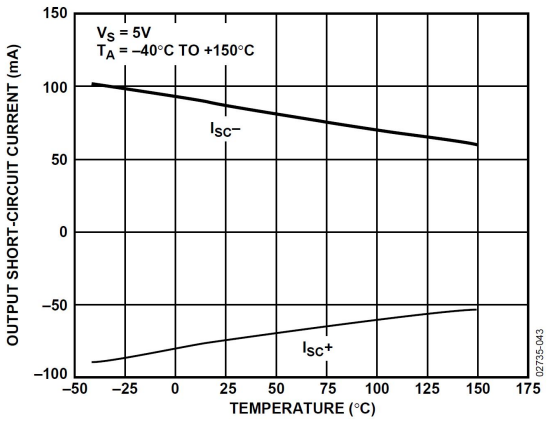


Figure 45. Output Short-Circuit Current vs. Temperature

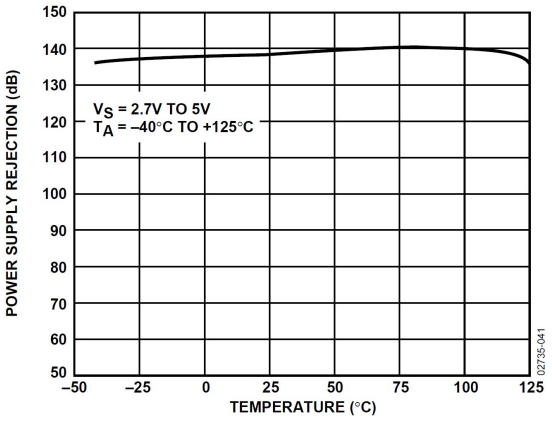


Figure 43. Power Supply Rejection vs. Temperature

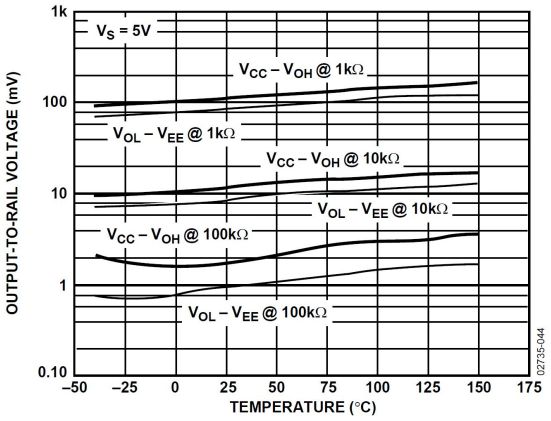


Figure 46. Output-to-Rail Voltage vs. Temperature

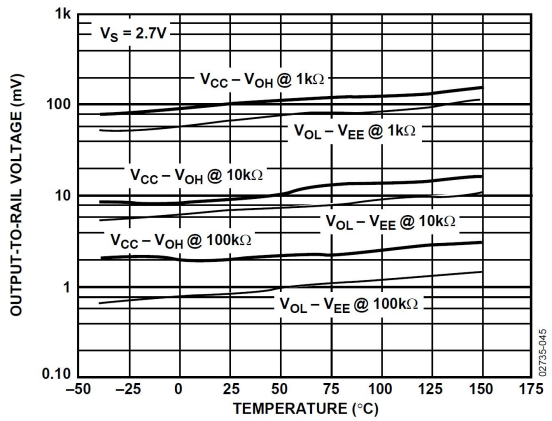


Figure 47. Output-to-Rail Voltage vs. Temperature

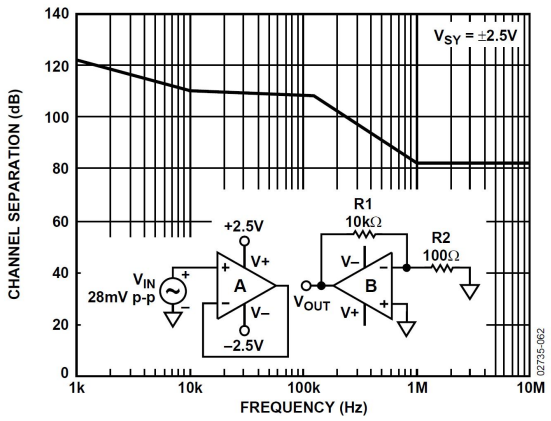
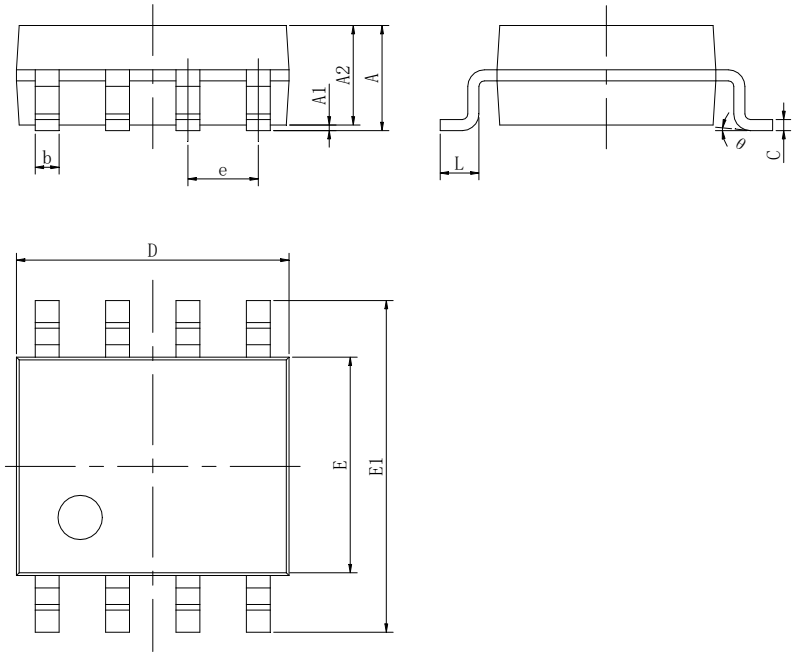


Figure 48. *PS8629* Channel Separation

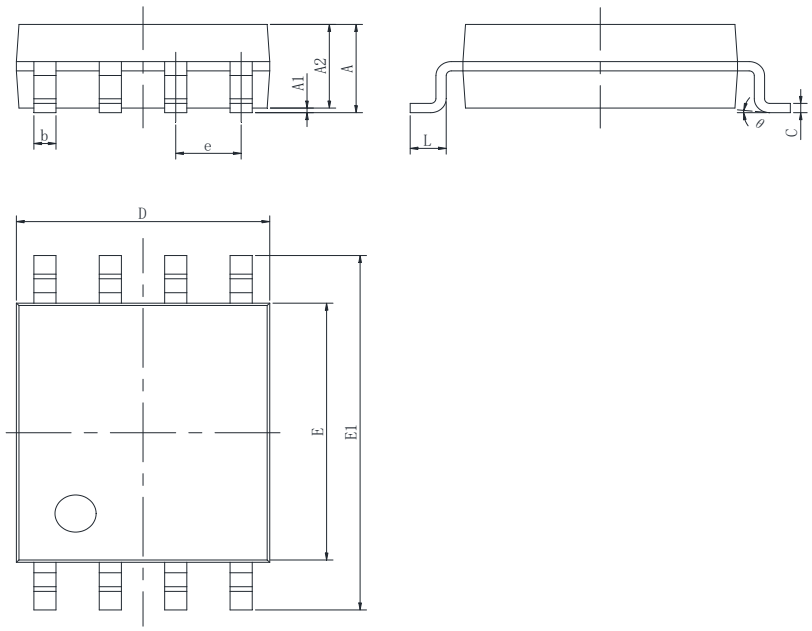
Outline Dimensions

SOP8 Unit:mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.800	0.053	0.071
A1	0.000	0.250	0.000	0.010
A2	1.250	1.550	0.053	0.061
b	0.300	0.510	0.011	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.201
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

MSOP8 Unit:mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.650(BSC)		0.026(BSC)	
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°