élantec
HIGH PERFORMANCE ANALOG INTEGRATED CIRCUITS

EL2126C - Preliminary

Ultra-low Noise, Low Power, Wideband Amplifier

Features

- Voltage noise of only 1.3nV/√Hz
- Current noise of only 1.2pA/√Hz
- Low offset voltage ≤200µV
- 90MHz -3dB BW for A_V=10
- Very low supply current -4.7mA
- SOT23 package
- ±5V to ±15V operation

Applications

- Ultrasound input amplifiers
- Wideband instrumentation
- Communication equipment
- AGC & PLL active filters
- Wideband sensors

Ordering Information

Part No	Package	Tape & Reel	Outline #
EL2126CW	5-Pin SOT23		MDP0038
EL2126CS	8-Pin SO		MDP0027
EL2126CN	8-Pin PDIP		MDP0031

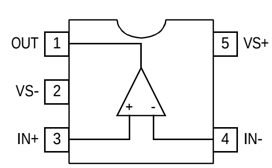
General Description

The EL2126C is an ultra-low noise, wideband amplifier that runs on half the supply current of competitive parts. It is intended for use in systems such as ultrasound imaging where a very small signal needs to be amplified by a large amount without adding significant noise. Its low power dissipation enables it to be packaged in the tiny SOT23 package, which further helps systems where many input channels create both space and power dissipation problems.

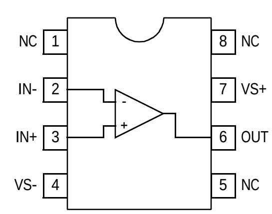
The EL2126C is stable for gains of 10 and greater and uses traditional voltage feedback. This allows the use of reactive elements in the feedback loop, a common requirement for many filter topologies. It operates from ±5V to ±15V supplies and is available in a 5-pin SOT23 package and 8-pin SO and 8-pin PDIP packages.

The EL2126C is fabricated in Elantec's proprietary complementary bipolar process, and is specified for operation over the full -40°C to +85°C temperature range.

Connection Diagrams



EL2126C
(5-Pin SOT23)



EL2126C
(8-Pin SO and 8-Pin PDIP)

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Ultra-low Noise, Low Power, Wideband Amplifier

Absolute Maximum Ratings (T_A = 25°C)

V_S+ to V_S-	33V	Power Dissipation	See Curves
Continuous Output Current	40mA	Operating Temperature	-40°C to +85°C
Any Input	V_S+ - 0.3V to V_S- + 0.3V	Storage Temperature	-60°C to +150°C

Important Note:

All parameters having Min/Max specifications are guaranteed. Typ values are for information purposes only. Unless otherwise noted, all tests are at the specified temperature and are pulsed tests, therefore: $T_J = T_C = T_A$

Electrical Characteristics

V_S+ = +5V, V_S- = -5V, T_A = 25°C, R_F = 180Ω, R_G = 20Ω, R_L = 500Ω unless otherwise specified.

Parameter	Description	Conditions	Min	Typ	Max	Unit
DC Performance						
V_{OS}	Input Offset Voltage (SO8 & PDIP8)			0.5	3	mV
	Input Offset Voltage (SOT23-5)				3	mV
T_{CVOS}	Offset Voltage Temperature Coefficient			TBD		µV/°C
I_B	Input Bias Current		-15	-6		µA
I_{OS}	Input Bias Current Offset			0.13	0.8	µA
T_{CIB}	Input Bias Current Temperature Coefficient			TBD		nA/°C
C_{IN}	Input Capacitance			2.2		pF
A_{VOL}	Open Loop Gain	V_O = ±2.5V	75	86		dB
PSRR	Power Supply Rejection Ratio [1]		70	100		dB
CMRR	Common Mode Rejection Ratio [2]		70	85		dB
CMIR	Common Mode Input Range		±3.5			V
V_{OUT}+	Positive Output Voltage Swing	R_F = 1kΩ, R_L = ∞	+3.7	+3.8		V
V_{OUT}-	Negative Output Voltage Swing		-3.7	-4		V
V_{OUTL}	Output Voltage Swing into 100Ω		±3	±3.4		V
I_{OUT}	Output Short Circuit Current [3]		70	100		mA
I_{SY}	Supply Current			4.7	5.5	mA
AC Performance - V_{CC} = -5V, R_G = 20Ω, C_L = 3pF						
BW	-3dB Bandwidth, R_L = 500Ω			98		MHz
BW ±0.1dB	±0.1dB Bandwidth, R_L = 500Ω			17		MHz
BW ±1dB	±1dB Bandwidth, R_L = 500Ω			80		MHz
Peaking	Peaking, R_L = 500Ω			0.6		dB
SR	Slew Rate (±2.5V Square Wave, Measured 20%-80%)		TBD	120		V/µs
OS+	Negative Overshoot, 4Vpk-pk Output Square Wave			+2.8		%
OS-	Positive Overshoot, 4Vpk-pk Output Square Wave			-7		%
T_S	Settling Time to 0.1% of ±1V Pulse			51		ns
V_N	Voltage Noise Spectral Density			1.3		nV/√Hz
I_N	Current Noise Spectral Density			1.2		pA/√Hz
HD2	2nd Harmonic Distortion [4]			TBD		dBc
HD3	3rd Harmonic Distortion [4]			TBD		dBc
THD	Total Harmonic Distortion [5]			TBD		dBc
IMD	Intermodulation Distortion [6]			TBD		%

1. Measured by moving the supplies from ±4V to ±6V
2. Measured with the input moving -4.4V to +3.5V

3. Pulse test only and using a 10Ω load
4. Frequency = 10MHz, V_{OUT} = 1Vpk-pk, into 100Ω and 5pF load
5. Frequency = 20MHz, V_{OUT} = -20dBm (0.0274V_{RMS}) into 500Ω and 15pF load
6. Two-tone IMD, frequencies = 5MHz and 6MHz at -20dBm output level, R_{LOAD} = 500Ω and 15pF

Electrical Characteristics

V_S+ = +15V, V_{S-} = -15V, T_A = 25°C, R_F = 180Ω, R_G = 20Ω, R_L = 500Ω unless otherwise specified.

Parameter	Description	Conditions	Min	Typ	Max	Unit
DC Performance						
V_{OS}	Input Offset Voltage (SO8 & PDIP8)			-0.5	3	mV
	Input Offset Voltage (SOT23-5)				3	mV
T_{CVOS}	Offset Voltage Temperature Coefficient			TBD		µV/°C
I_B	Input Bias Current		-15	-5		µA
I_{OS}	Input Bias Current Offset			0.16	0.7	µA
T_{CIB}	Input Bias Current Temperature Coefficient			TBD		nA/°C
C_{IN}	Input Capacitance			2.2		pF
A_{VOL}	Open Loop Gain		75	88		dB
PSRR	Power Supply Rejection Ratio [1]		65	80		dB
CMRR	Common Mode Rejection Ratio [2]		70	85		dB
CMIR	Common Mode Input Range		±13.5	TBD		V
V_{OUT}	Output Voltage Swing		±13.5	±13.7		V
V_{OUTL}+	Positive Output Voltage Swing into 100Ω	R_F = 1kΩ, R_L = ∞	10.7	11.7		V
V_{OUTL}-	Negative Output Voltage Swing into 100Ω		-9.5	-10.2		V
I_{OUT}	Output Short Circuit Current [3]		90	150		mA
I_{SY}	Supply Current			5	6	mA
AC Performance - V_{CC} = -5V, R_G = 20Ω, C_L = 3pF						
BW	-3dB Bandwidth, R_L = 500Ω			136		MHz
BW ±0.1dB	±0.1dB Bandwidth, R_L = 500Ω			26		MHz
BW ±1dB	±1dB Bandwidth, R_L = 500Ω			60		MHz
Peaking	Peaking, R_L = 500Ω			2.1		dB
SR	Slew Rate (±2.5V Square Wave, Measured 25%-75%)		TBD	150		V/µS
OS+	Positive Overshoot, 4Vpk-pk Output Square Wave			1.6		%
OS-	Negative Overshoot, 4Vpk-pk Output Square Wave			-4.4		%
T_S	Settling Time to 0.1% of ±1V Pulse			48		ns
V_N	Voltage Noise Spectral Density			1.4		nV/√Hz
I_N	Current Noise Spectral Density			1.1		pA/√Hz
HD2	2nd Harmonic Distortion [4]			TBD		dBc
HD3	3rd Harmonic Distortion [4]			TBD		dBc
THD	Total Harmonic Distortion [5]			TBD		dBc
IMD	Intermodulation Distortion [6]			TBD		%

1. Measured by moving the supplies from ±13.5V to ±16.5V
2. Measured with the input moving -14.4V to +13.8V
3. Pulse test only and using a 10Ω load
4. Frequency = 10MHz, V_{OUT} = 1Vpk-pk, into 100Ω and 5pF load
5. Frequency = 20MHz, V_{OUT} = -20dBm (0.0274V_{RMS}) into 500Ω and 15pF load

6. Two-tone IMD, frequencies = 5MHz and 6MHz at -20dBm output level, R_{LOAD} = 500Ω and 15pF

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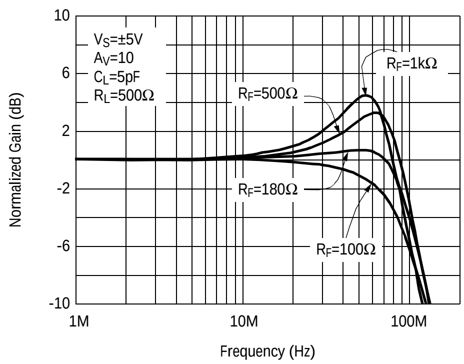
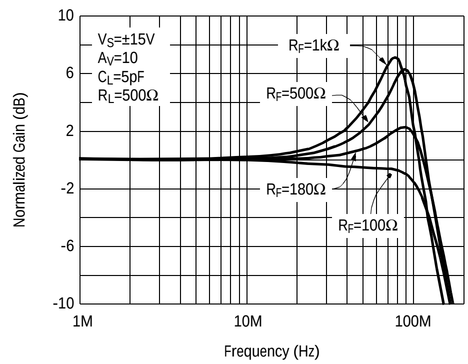
Typical Performance Curves

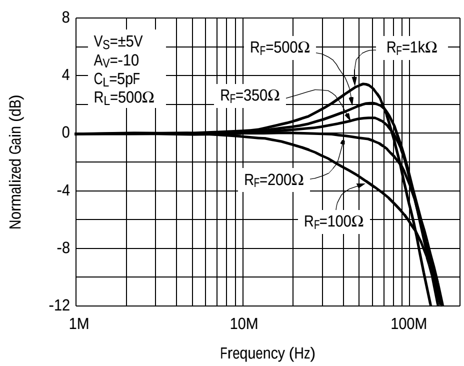
Non-Inverting Frequency Response for Various R_F



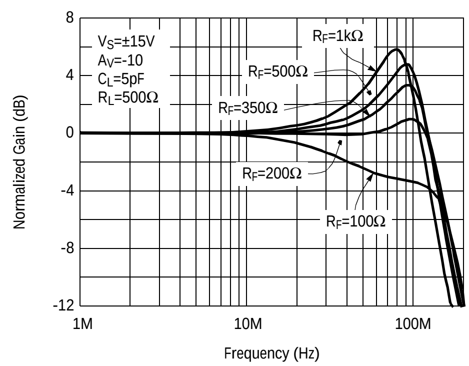
Non-Inverting Frequency Response for Various R_F



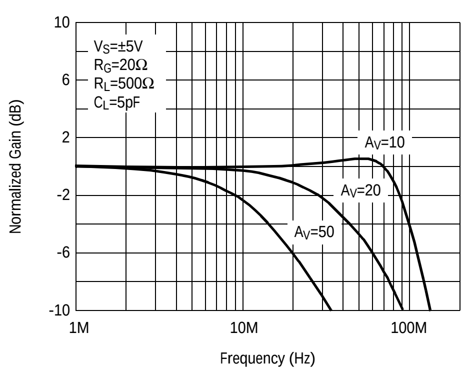
Inverting Frequency Response for Various R_F



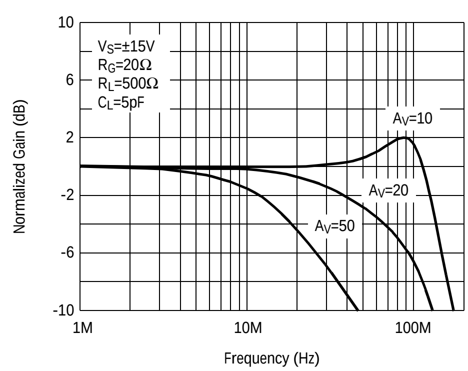
Inverting Frequency Response for Various R_F



Non-Inverting Frequency Response for Various Gain

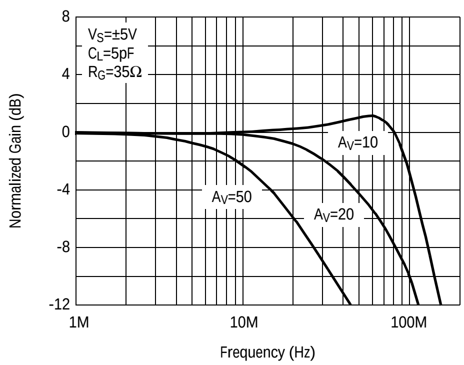


Non-Inverting Frequency Response for Various Gain

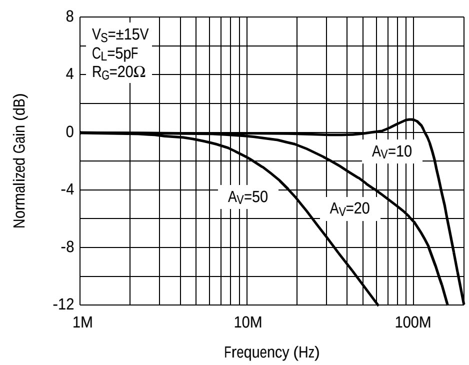


Typical Performance Curves

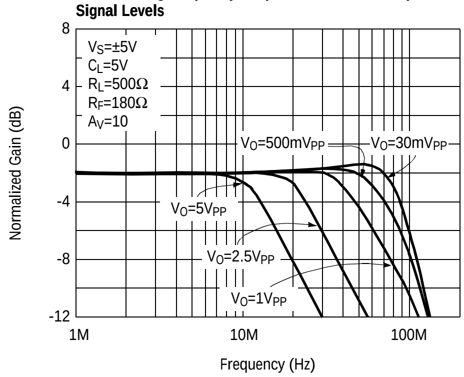
Inverting Frequency Response for Various Gain



Inverting Frequency Response for Various R_F



Non-Inverting Frequency Response for Various Output Signal Levels



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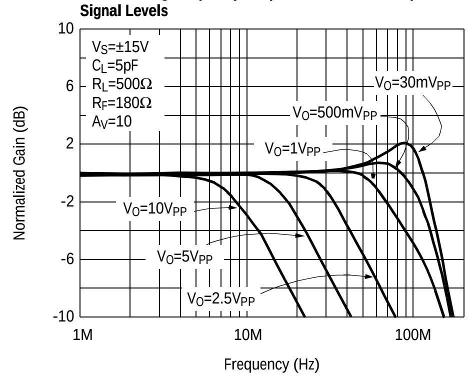
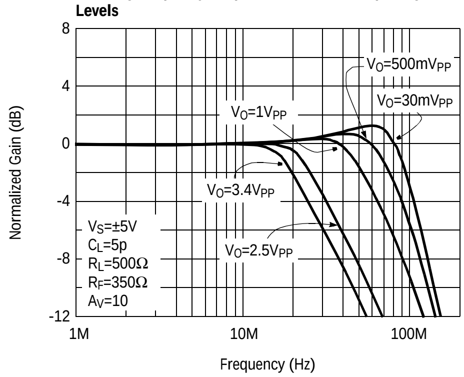
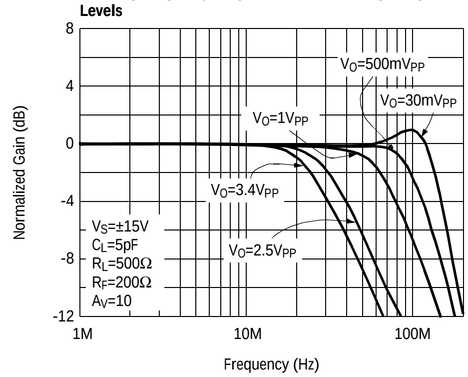


Inverting Frequency Response for Various Output Signal Levels

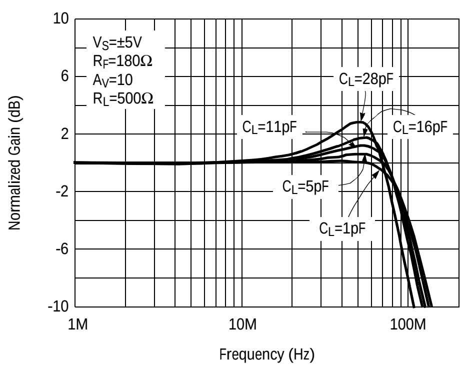


Inverting Frequency Response for Various Output Signal Levels

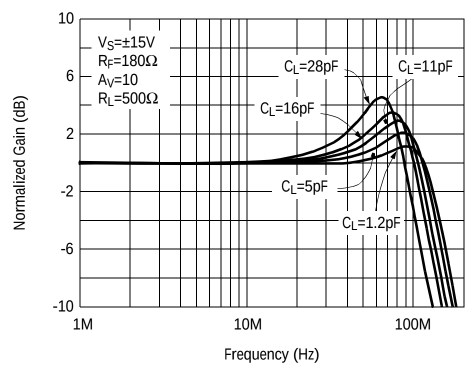


Typical Performance Curves

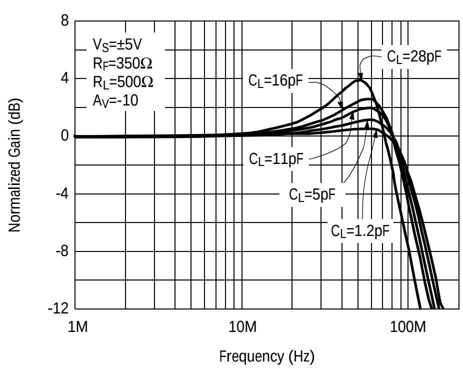
Non-Inverting Frequency Response for Various C_L



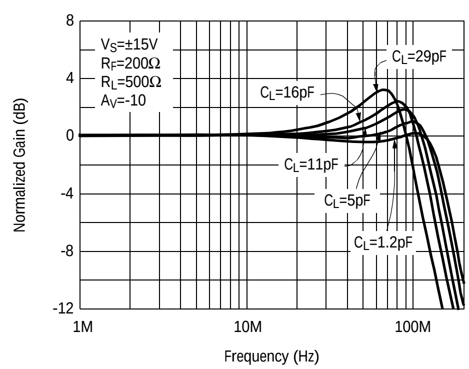
Non-Inverting Frequency Response for Various C_L



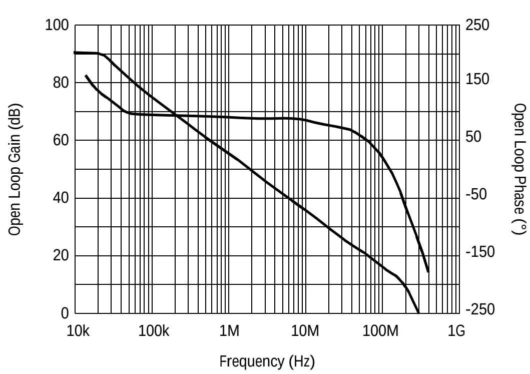
Inverting Frequency Response for Various C_L



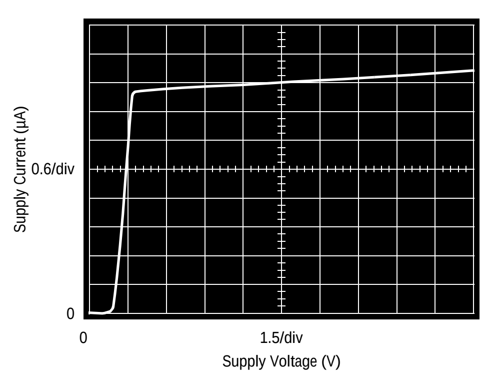
Inverting Frequency Response for Various C_L



Open Loop Gain/Phase



Supply Current vs Supply Voltage



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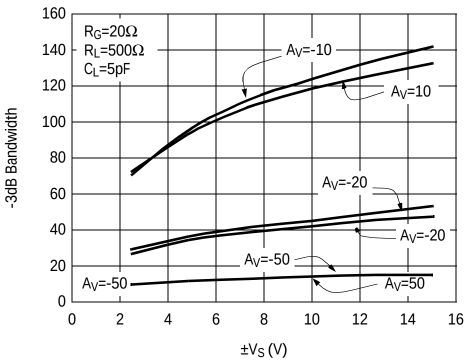
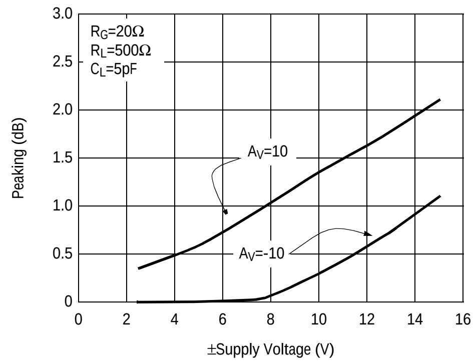
Typical Performance Curves

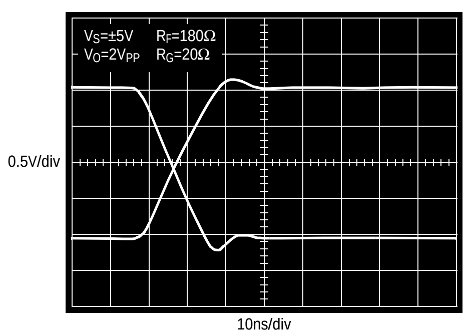
Bandwidth vs V_S



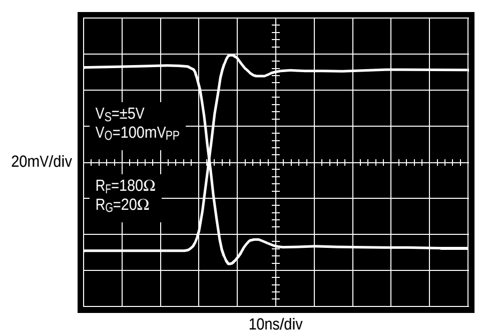
Peaking vs V_S



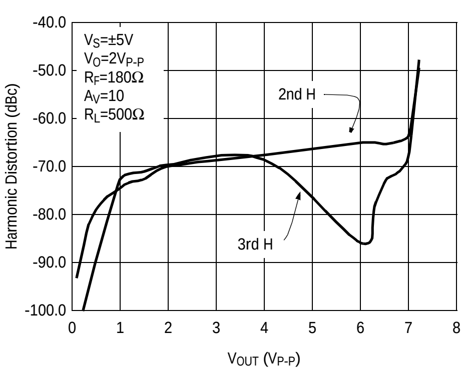
Large Signal Step Response



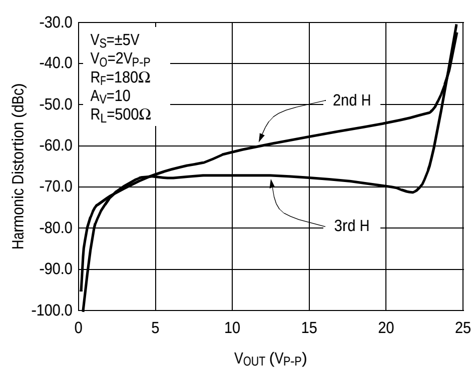
Small Signal Step Response



1MHz Harmonic Distortion vs Output Swing



1MHz Harmonic Distortion vs Output Swing



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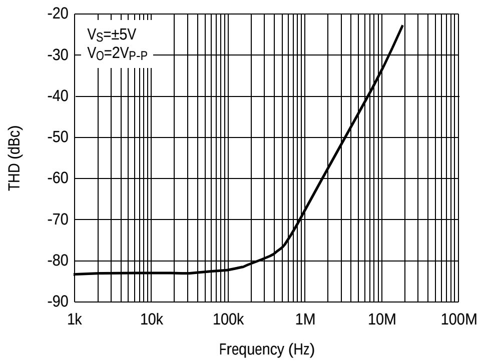
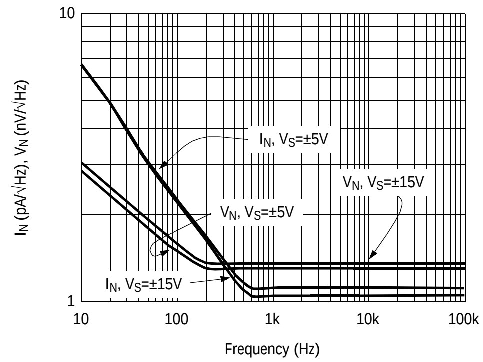
Typical Performance Curves

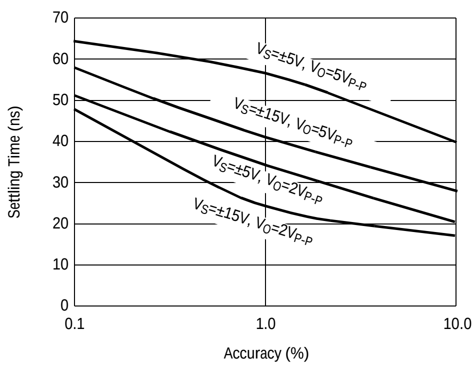
Total Harmonic Distortion vs Frequency



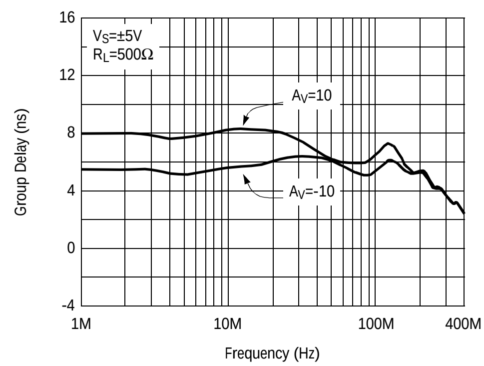
Noise vs Frequency



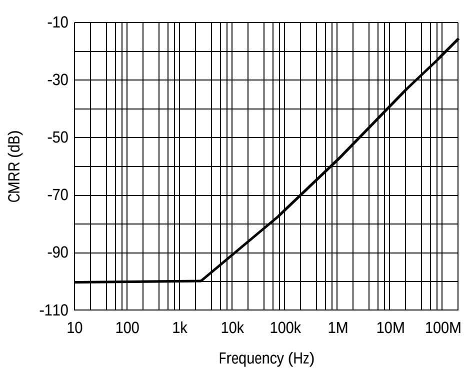
Settling Time vs Accuracy



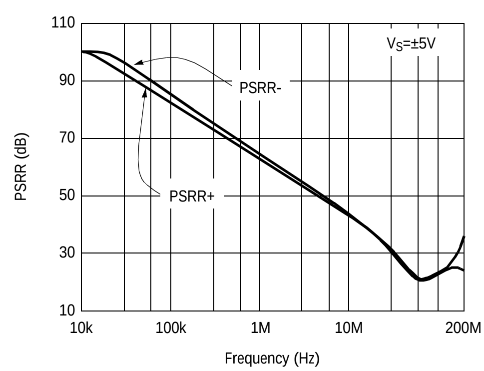
Group Delay vs Frequency



CMRR vs Frequency

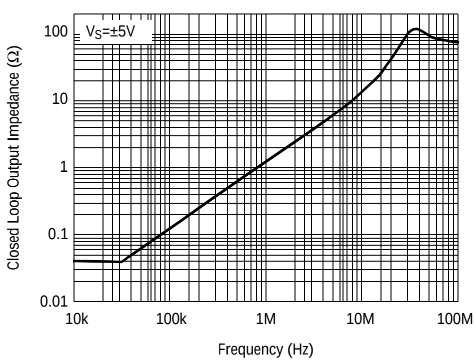


PSRR vs Frequency

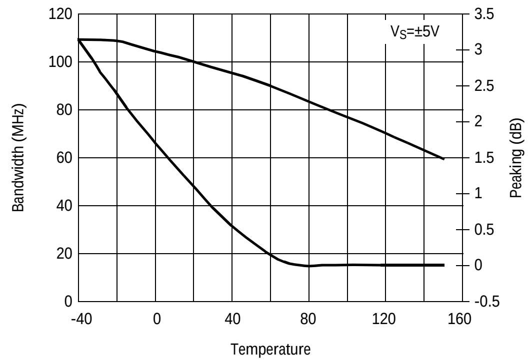


Typical Performance Curves

Closed Loop Output Impedance vs Frequency



Bandwidth and Peaking vs Temperature



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General Disclaimer

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HIGH PERFORMANCE ANALOG INTEGRATED CIRCUITS

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