élantec
HIGH PERFORMANCE ANALOG INTEGRATED CIRCUITS

EL5396C

Triple 400MHz Fixed Gain Amplifier

Features

- Gain selectable (+1, -1, +2)
- 400MHz -3dB Bandwidth (A_V = 1, 2)
- 9mA supply current (per amplifier)
- Single and dual supply operation, from 5V to 10V
- Power-down
- Available in 16-pin QSOP package
- Single (EL5196C) available
- 200MHz, 3mA product available (EL5197C, EL5397C)

Applications

- Video Amplifiers
- Cable Drivers
- RGB Amplifiers
- Test Equipment
- Instrumentation
- Current to Voltage Converters

Ordering Information

Part No	Package	Tape & Reel	Outline #
EL5396CS	16-Pin SO	-	MDP0027
EL5396CS-T7	16-Pin SO	7"	MDP0027
EL5396CS-T13	16-Pin SO	13"	MDP0027
EL5396CU	16-Pin QSOP	-	MDP0040
EL5396CU-T13	16-Pin QSOP	13"	MDP0040

General Description

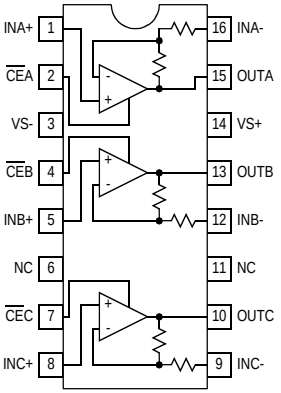
The EL5396C is a triple channel, fixed gain amplifier with a bandwidth of 400MHz, making these amplifiers ideal for today's high speed video and monitor applications. The EL5396C features internal gain setting resistors and can be configured in a gain of +1, -1 or +2. The same bandwidth is seen in both gain-of-1 and gain-of-2 applications.

The EL5396C can be run from a single or dual supply voltage of 5V to 10V and consumes just 9mA of supply current per channel. Each channel of the EL5396C has a disable. Upon being disabled, the outputs are tri-stated and the power supply current reduces to less than 150µA per amplifier. Allowing the $\overline{CE}$ pin to float, or applying a low logic level will enable the amplifier.

For applications where board space is critical, the EL5396C is offered in the 16-pin QSOP package, as well as a 16-pin SO. The EL5396C is specified for operation over the full industrial temperature range of -40°C to +85°C.

Pin Configurations

16-Pin SO & QSOP



EL5396CS, EL5396CU

EL5396C

Triple 400MHz Fixed Gain Amplifier

Absolute Maximum Ratings (T_A = 25°C)

Values beyond absolute maximum ratings can cause the device to be prematurely damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

Supply Voltage between V_S+ and V_S-	11V
Maximum Continuous Output Current	50mA
Operating Junction Temperature	125°C
Power Dissipation	See Curves
Pin Voltages	V_S- - 0.5V to V_S+ +0.5V
Storage Temperature	-65°C to +150°C
Operating Temperature	-40°C to +85°C
Lead Temperature	260°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, R_L = 150Ω, T_A = 25°C unless otherwise specified.

Parameter	Description	Conditions	Min	Typ	Max	Unit
AC Performance						
BW	-3dB Bandwidth	A_V = +1		400		MHz
		A_V = +2		400		MHz
BW1	0.1dB Bandwidth			35		MHz
SR	Slew Rate	V_O = -2.5V to +2.5V, A_V = +2	TBD	-2600		V/µs
ts	0.1% Settling Time	V_{OUT} = -2.5V to +2.5V, AV = -1		9		ns
C_S	Channel Separation	f = 5MHz		68		dB
e_n	Input Voltage Noise			3.8		nV/√Hz
i_n-	IN- input current noise			25		pA/√Hz
i_n+	IN+ input current noise			55		pA/√Hz
dG	Differential Gain Error [1]	A_V = +2		0.035		%
dP	Differential Phase Error [1]	A_V = +2		0.04		°
DC Performance						
V_{OS}	Offset Voltage		-15	1	15	mV
T_CV_{OS}	Input Offset Voltage Temperature Coefficient	Measured from T_{MIN} to T_{MAX}		5		µV/°C
A_E	Gain Error	V_O = -3V to +3V	-2	1.3	2	%
R_F, R_G	Internal R_F and R_G		320	400	480	Ω
Input Characteristics						
CMIR	Common Mode Input Range		±3V	±3.3V		V
$+I_{IN}$	+ Input Current		-120	40	120	µA
$-I_{IN}$	- Input Current		-40	4	40	µA
R_{IN}	Input Resistance			27		kΩ
C_{IN}	Input Capacitance			0.5		pF
Output Characteristics						
V_O	Output Voltage Swing	R_L = 150Ω to GND	±3.4V	±3.7V		V
		R_L = 1KΩ to GND	±3.8V	±4.0V		V
I_{OUT}	Output Current	R_L = 10Ω to GND	95	120		mA
Enable (selected packages only)						
t_{EN}	Enable Time			40		ns
t_{DIS}	Disable Time			TBD		ns
I_{IHCE}	CE pin Input High Current	$\overline{CE}$ = V_S+		0.8	6	µA
I_{ILCE}	CE pin Input Low Current	$\overline{CE}$ = V_S-		0	-0.1	µA
V_{IHCE}	CE pin Input High Voltage for Power Down		V_S+ -0.5			V
V_{ILCE}	CE pin Input Low Voltage for Power Up				V_S+ -3	V

Electrical Characteristics

V_S+ = +5V, V_S- = -5V, R_L = 150Ω, T_A = 25°C unless otherwise specified.

Parameter	Description	Conditions	Min	Typ	Max	Unit
Supply						
Is_{ON}	Supply Current - Enabled (per amplifier)	No Load, V_{IN} = 0V, $\overline{CE}$ = -5V	8	9	10.5	mA
Is_{OFF}	Supply Current - Disabled (per amplifier)	No Load, V_{IN} = 0V, $\overline{CE}$ = +4.5V		95	130	µA
PSRR	Power Supply Rejection Ratio	DC, V_S = ±4.75V to ±5.25V	55	75		dB
-IPSR	- Input Current Power Supply Rejection	DC, V_S = ±4.75V to ±5.25V	-2		2	µA/V

1. Standard NTSC test, AC signal amplitude = 286mV_{P-P}, f = 3.58MHz

EL5396C

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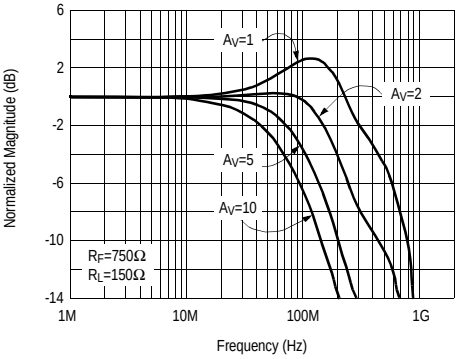
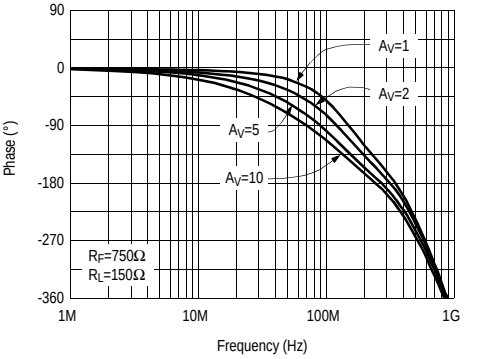
Typical Performance Curves

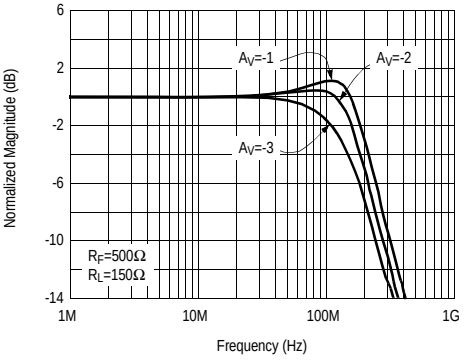
Non-Inverting Frequency Response (Gain)



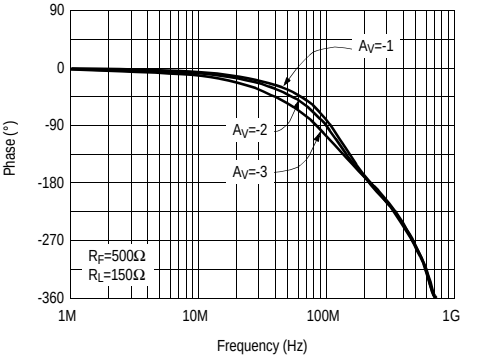
Non-Inverting Frequency Response (Phase)



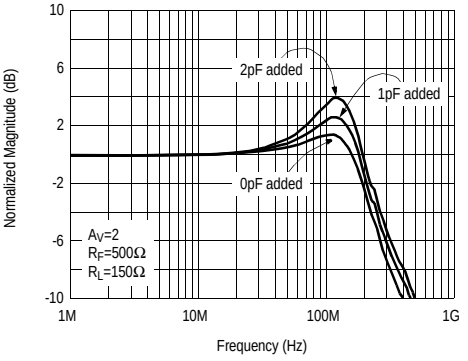
Inverting Frequency Response (Gain)



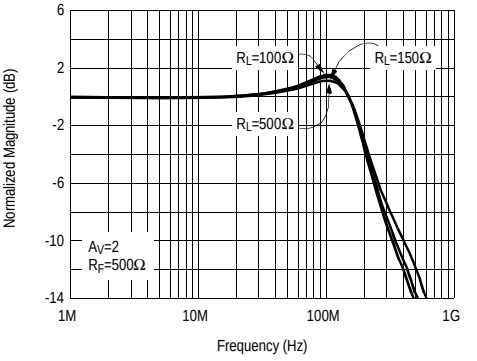
Inverting Frequency Response (Phase)



Frequency Response for Various C_{IN-}

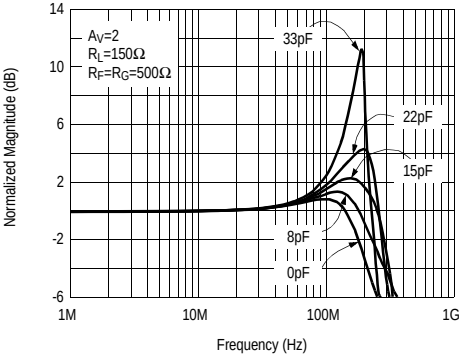


Frequency Response for Various R_L

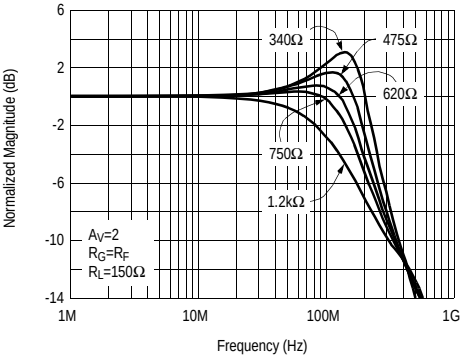


Typical Performance Curves

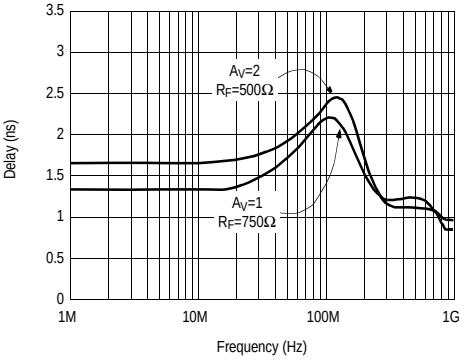
Frequency Response for Various C_L



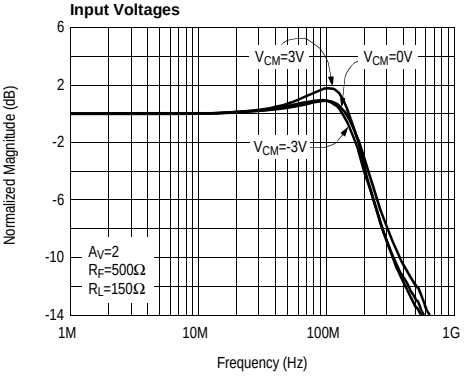
Frequency Response for Various R_F



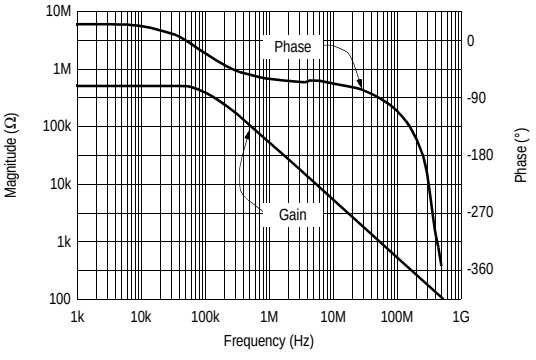
Group Delay vs Frequency



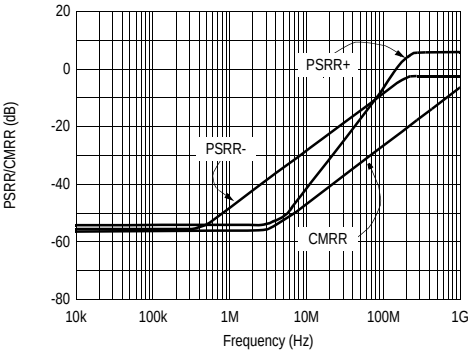
Frequency Response for Various Common-mode Input Voltages



Transimpedance (ROL) vs Frequency

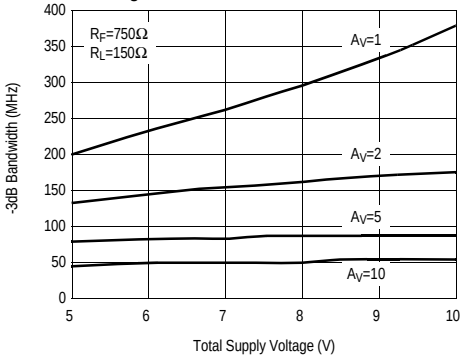


PSRR and CMRR vs Frequency

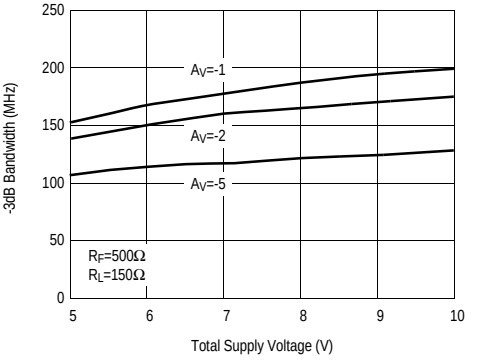


Typical Performance Curves

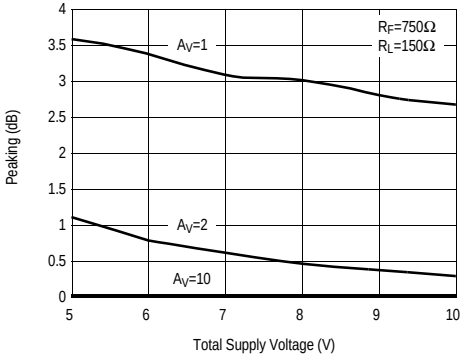
-3dB Bandwidth vs Supply Voltage for Non-inverting Gains



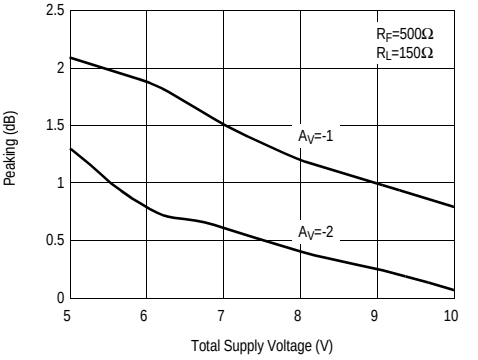
-3dB Bandwidth vs Supply Voltage for Inverting Gains



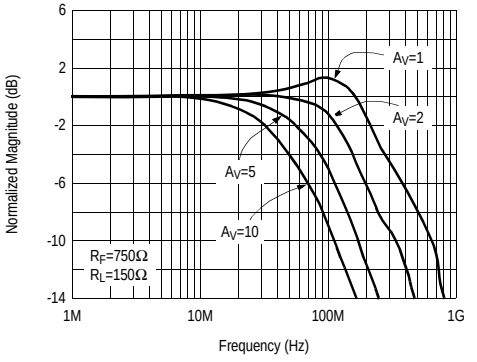
Peaking vs Supply Voltage for Non-inverting Gains



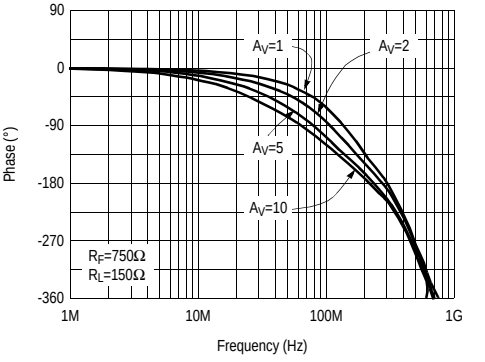
Peaking vs Supply Voltage for Inverting Gains



Non-inverting Frequency Response (Gain)

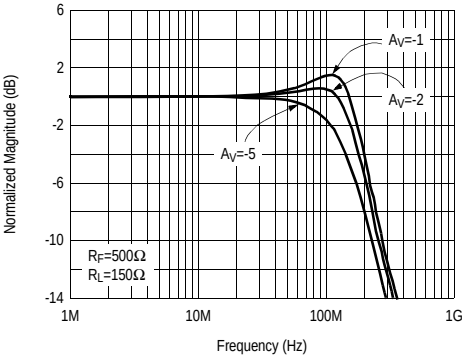


Non-inverting Frequency Response (Phase)

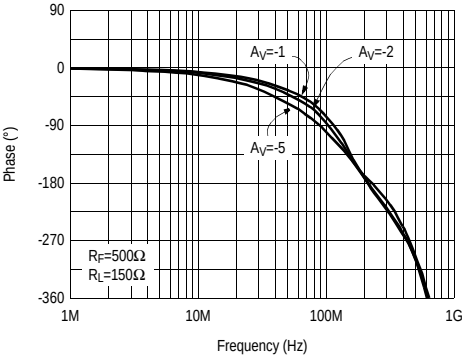


Typical Performance Curves

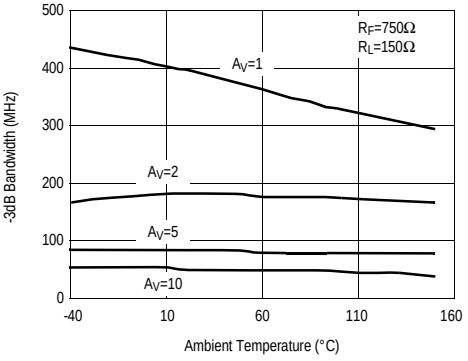
Inverting Frequency Response (Gain)



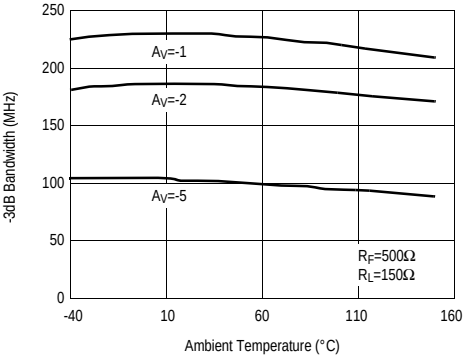
Inverting Frequency Response (Phase)



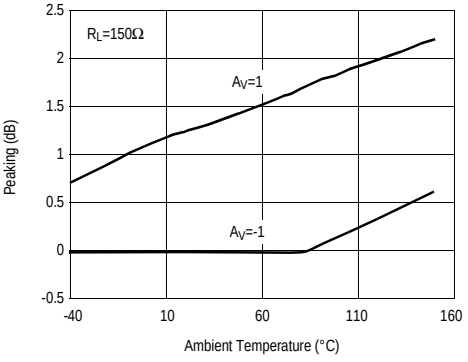
-3dB Bandwidth vs Temperature for Non-inverting Gains



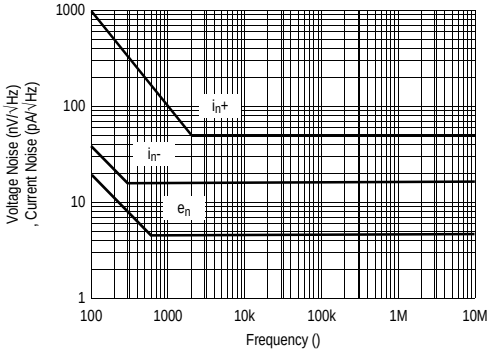
-3dB Bandwidth vs Temperature for Inverting Gains



Peaking vs Temperature



Voltage and Current Noise vs Frequency

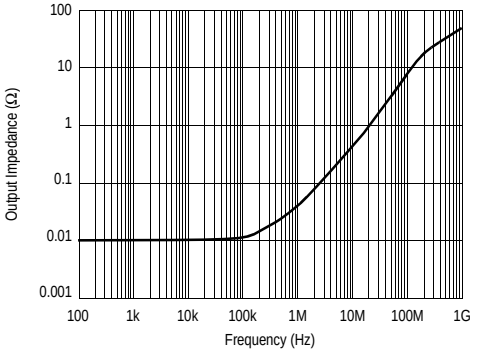


EL5396C

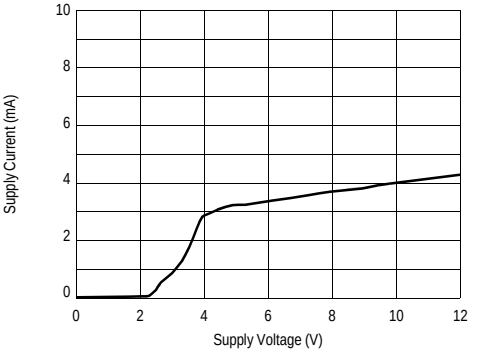
Triple 400MHz Fixed Gain Amplifier

Typical Performance Curves

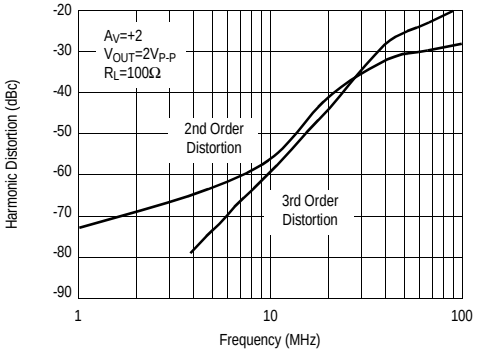
Closed Loop Output Impedance vs Frequency



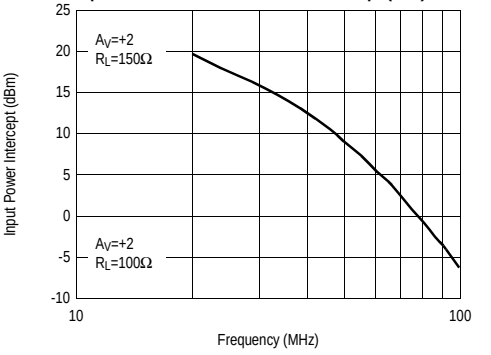
Supply Current vs Supply Voltage



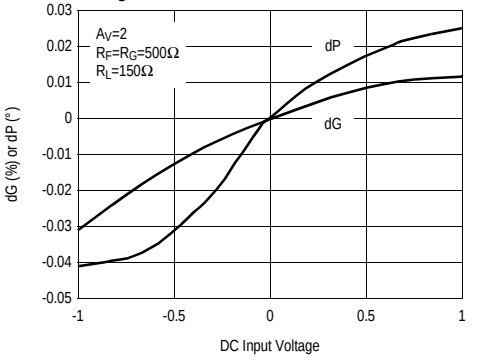
2nd and 3rd Harmonic Distortion vs Frequency



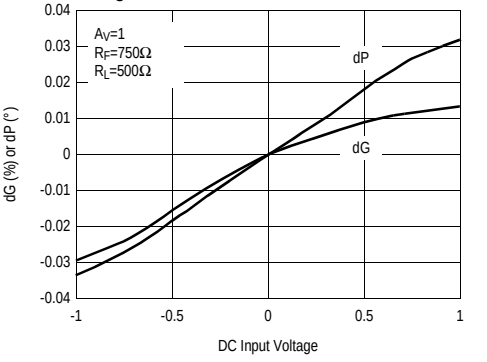
Two-tone 3rd Order Input Referred Intermodulation Intercept (IIP3)



Differential Gain/Phase vs DC Input Voltage at 3.58MHz

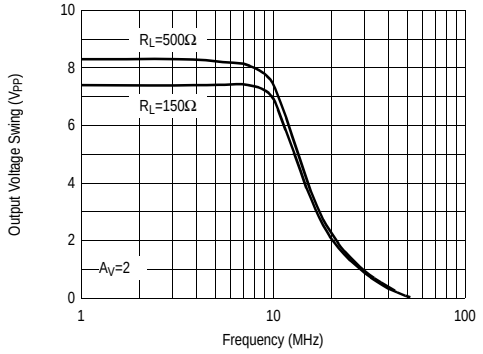


Differential Gain/Phase vs DC Input Voltage at 3.58MHz

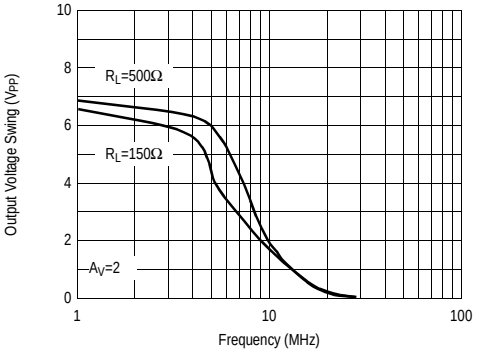


Typical Performance Curves

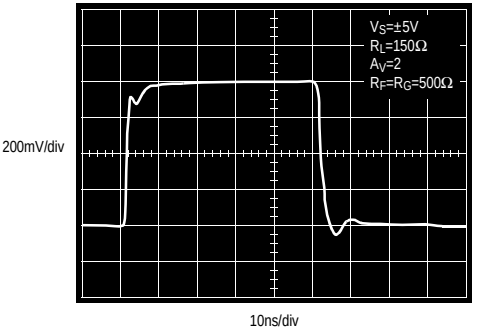
Output Voltage Swing vs Frequency THD<1%



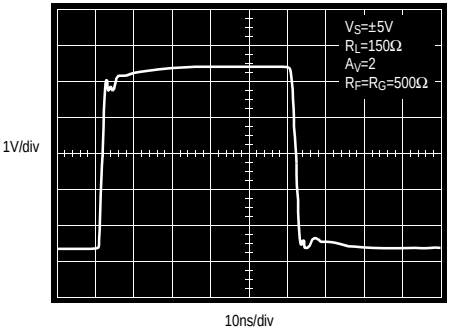
Output Voltage Swing vs Frequency THD<0.1%



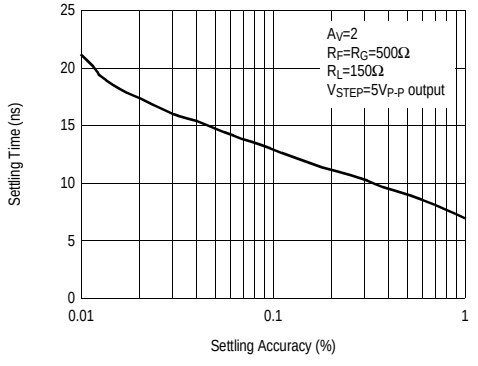
Small Signal Step Response



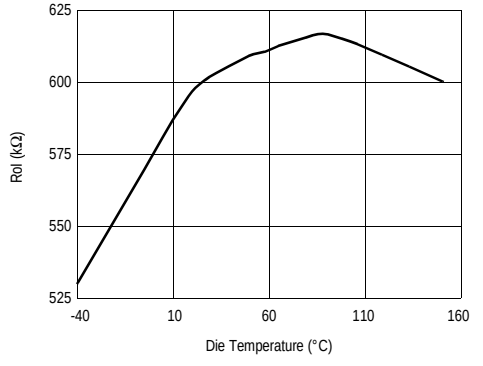
Large Signal Step Response



Settling Time vs Settling Accuracy



Transimpedance (RoI) vs Temperature



EL5396C

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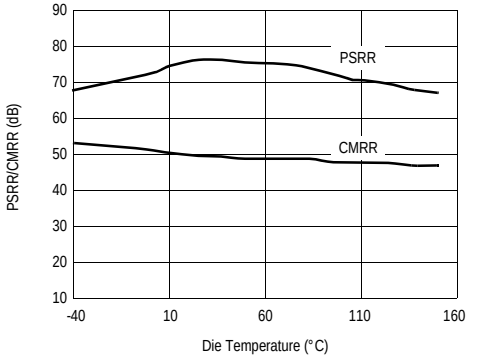
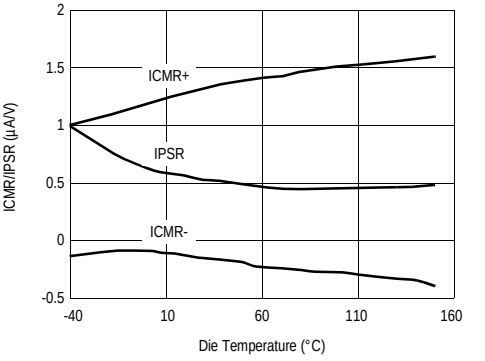
Typical Performance Curves

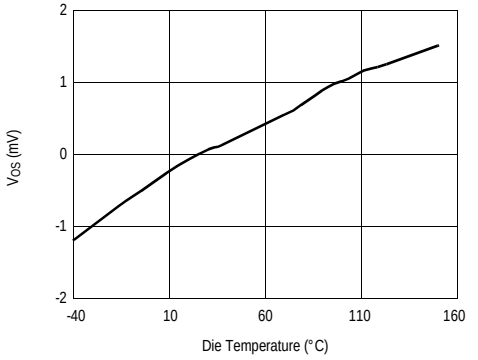
PSRR and CMRR vs Temperature



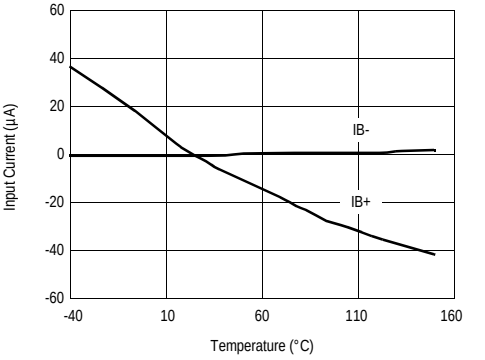
ICMR and IPSR vs Temperature



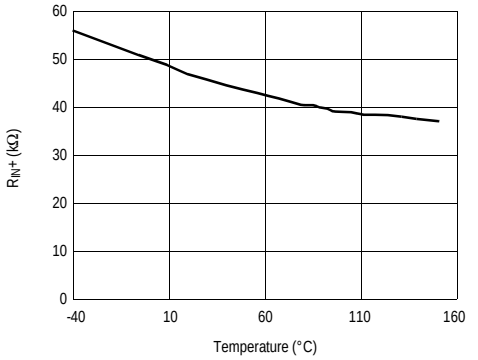
Offset Voltage vs Temperature



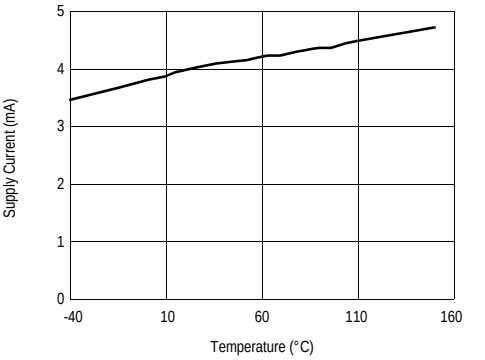
Input Current vs Temperature



Positive Input Resistance vs Temperature

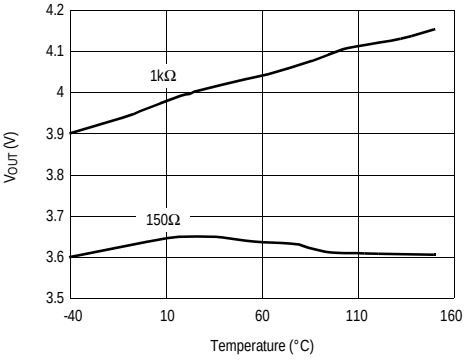


Supply Current vs Temperature

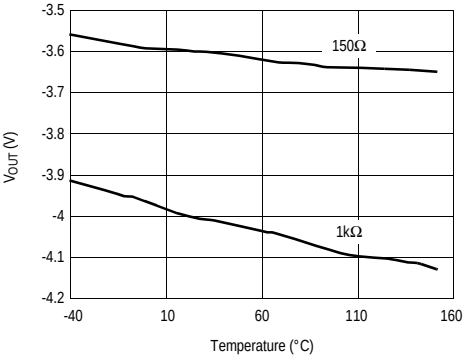


Typical Performance Curves

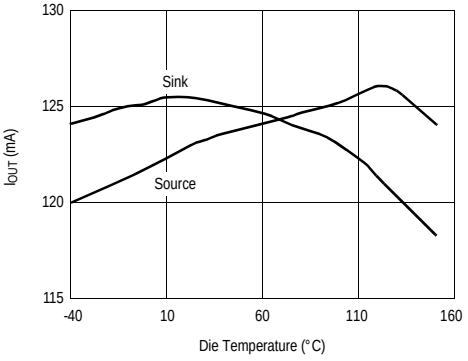
Positive Output Swing vs Temperature for Various Loads



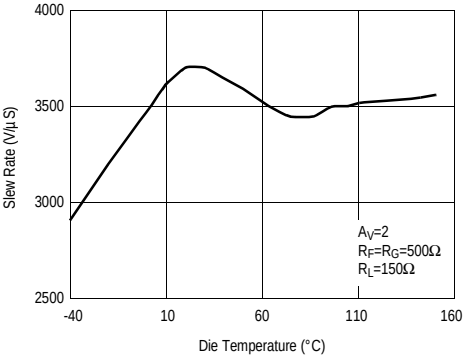
Negative Output Swing vs Temperature for Various Loads



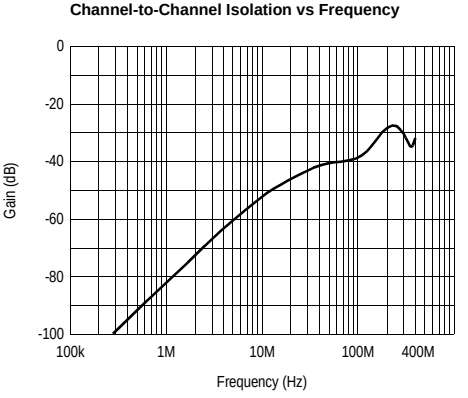
Output Current vs Temperature



Slew Rate vs Temperature

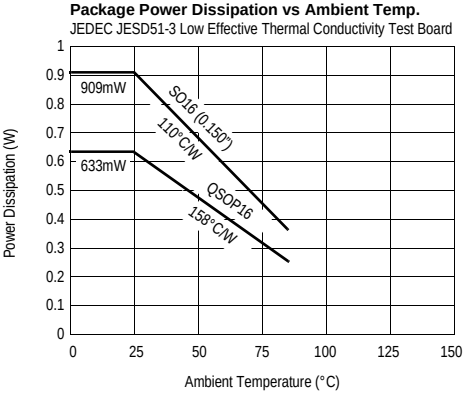


Channel-to-Channel Isolation vs Frequency



Package Power Dissipation vs Ambient Temp.

JEDEC JESD51-3 Low Effective Thermal Conductivity Test Board



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