

**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

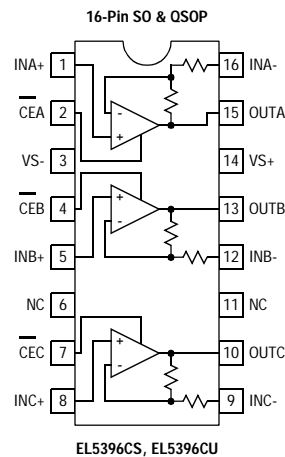
**General Description**

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 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**



Note: All information contained in this data sheet has been carefully checked and is believed to be accurate as of the date of publication; however, this data sheet cannot be a "controlled document". Current revisions, if any, to these specifications are maintained at the factory and are available upon your request. We recommend checking the revision level before finalization of your design documentation.

# EL5396C - Preliminary

## Triple 400MHz Fixed Gain Amplifier

### Absolute Maximum Ratings (T<sub>A</sub> = 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 <sub>S+</sub> and V <sub>S-</sub>	11V
Maximum Continuous Output Current	50mA
Operating Junction Temperature	125°C

Power Dissipation	See Curves
Pin Voltages	V <sub>S-</sub> - 0.5V to V <sub>S+</sub> + 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<sub>J</sub> = T<sub>C</sub> = T<sub>A</sub>.

### Electrical Characteristics

V<sub>S+</sub> = +5V, V<sub>S-</sub> = -5V, R<sub>L</sub> = 150Ω, T<sub>A</sub> = 25°C unless otherwise specified.

Parameter	Description	Conditions	Min	Typ	Max	Unit
<b>AC Performance</b>						
BW	-3dB Bandwidth	A <sub>V</sub> = +1		400		MHz
		A <sub>V</sub> = +2		400		MHz
BW1	0.1dB Bandwidth			35		MHz
SR	Slew Rate	V <sub>O</sub> = -2.5V to +2.5V, A <sub>V</sub> = +2	TBD	-2600		V/μs
t <sub>s</sub>	0.1% Settling Time	V <sub>OUT</sub> = -2.5V to +2.5V, A <sub>V</sub> = -1		9		ns
C <sub>S</sub>	Channel Separation	f = 5MHz		68		dB
e <sub>n</sub>	Input Voltage Noise			3.8		nV/√Hz
i <sub>n-</sub>	IN- input current noise			25		pA/√Hz
i <sub>n+</sub>	IN+ input current noise			55		pA/√Hz
dG	Differential Gain Error <sup>[1]</sup>	A <sub>V</sub> = +2		0.035		%
dP	Differential Phase Error <sup>[1]</sup>	A <sub>V</sub> = +2		0.04		°
<b>DC Performance</b>						
V <sub>OS</sub>	Offset Voltage		-15	1	15	mV
T <sub>C</sub> V <sub>OS</sub>	Input Offset Voltage Temperature Coefficient	Measured from T <sub>MIN</sub> to T <sub>MAX</sub>		5		μV/°C
A <sub>E</sub>	Gain Error	V <sub>O</sub> = -3V to +3V	-2	1.3	2	%
R <sub>F</sub> , R <sub>G</sub>	Internal R <sub>F</sub> and R <sub>G</sub>		320	400	480	Ω
<b>Input Characteristics</b>						
CMIR	Common Mode Input Range		±3V	±3.3V		V
+I <sub>IN</sub>	+ Input Current		-120	40	120	μA
-I <sub>IN</sub>	- Input Current		-40	4	40	μA
R <sub>IN</sub>	Input Resistance			27		kΩ
C <sub>IN</sub>	Input Capacitance			0.5		pF
<b>Output Characteristics</b>						
V <sub>O</sub>	Output Voltage Swing	R <sub>L</sub> = 150Ω to GND	±3.4V	±3.7V		V
		R <sub>L</sub> = 1KΩ to GND	±3.8V	±4.0V		V
I <sub>OUT</sub>	Output Current	R <sub>L</sub> = 10Ω to GND	95	120		mA
<b>Enable (selected packages only)</b>						
t <sub>EN</sub>	Enable Time			40		ns
t <sub>DIS</sub>	Disable Time			TBD		ns
I <sub>IHCE</sub>	CE pin Input High Current	CE = V <sub>S+</sub>		0.8	6	μA
I <sub>ILCE</sub>	CE pin Input Low Current	CE = V <sub>S-</sub>		0	-0.1	μA
V <sub>IHCE</sub>	CE pin Input High Voltage for Power Down		V <sub>S+</sub> - 0.5			V
V <sub>ILCE</sub>	CE pin Input Low Voltage for Power Up				V <sub>S+</sub> - 3	V

# *EL5396C - Preliminary*

## *Triple 400MHz Fixed Gain Amplifier*

EL5396C - Preliminary

### Electrical Characteristics

$V_{S+} = +5V$ ,  $V_{S-} = -5V$ ,  $R_L = 150\Omega$ ,  $T_A = 25^\circ C$  unless otherwise specified.

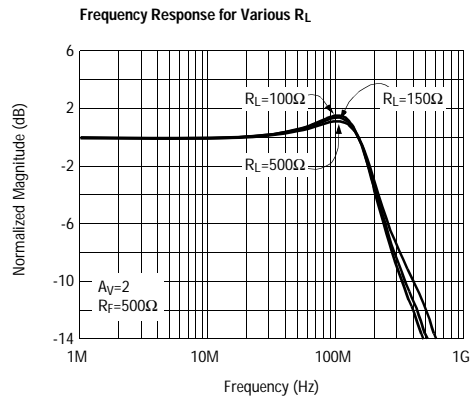
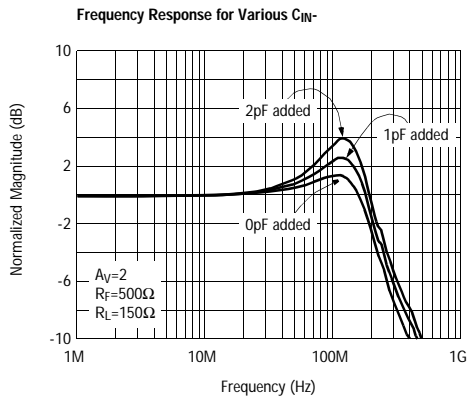
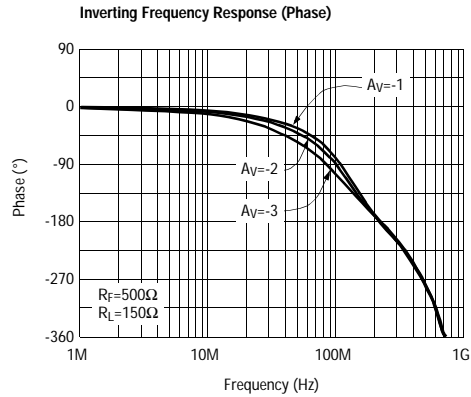
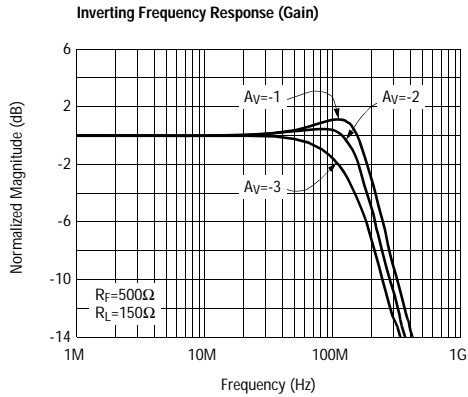
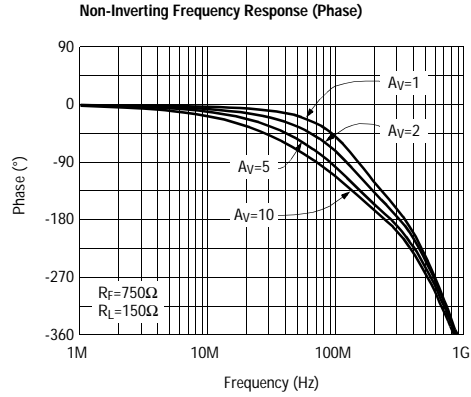
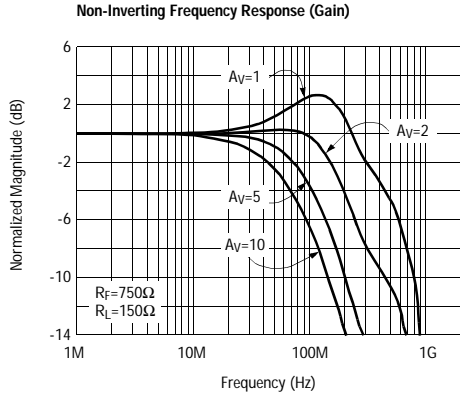
Parameter	Description	Conditions	Min	Typ	Max	Unit
<b>Supply</b>						
ISON	Supply Current - Enabled (per amplifier)	No Load, $V_{IN} = 0V$ , $\overline{CE} = -5V$	8	9	10.5	mA
ISOFF	Supply Current - Disabled (per amplifier)	No Load, $V_{IN} = 0V$ , $CE = +4.5V$		95	130	$\mu A$
PSRR	Power Supply Rejection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

- Standard NTSC test, AC signal amplitude =  $286mV_{p-p}$ ,  $f = 3.58MHz$

# EL5396C - Preliminary

## Triple 400MHz Fixed Gain Amplifier

### Typical Performance Curves

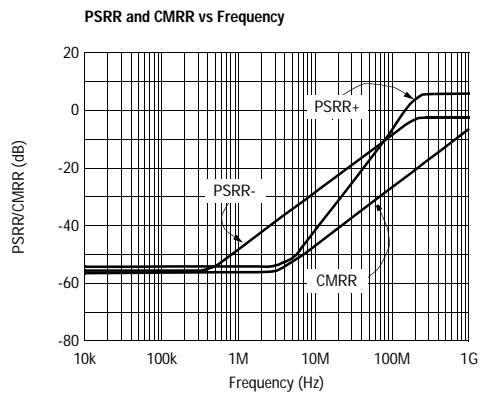
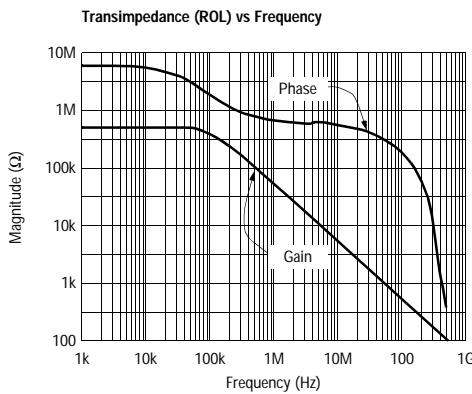
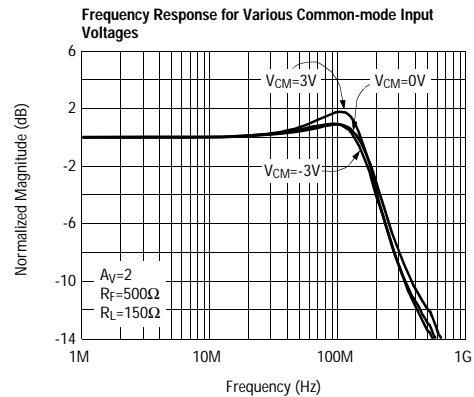
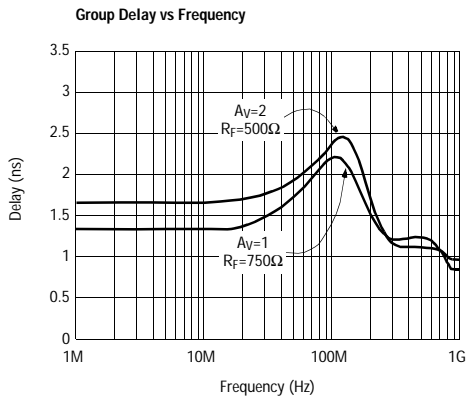
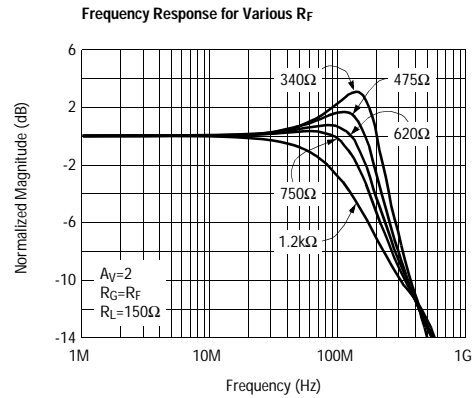
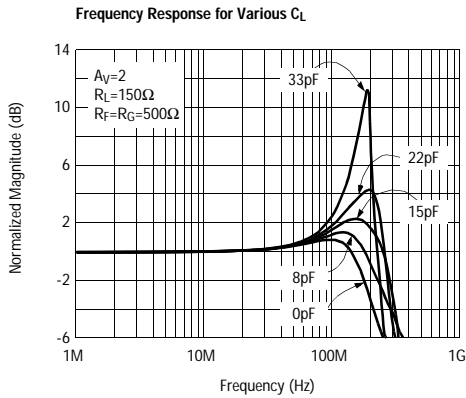


# EL5396C - Preliminary

## Triple 400MHz Fixed Gain Amplifier

EL5396C - Preliminary

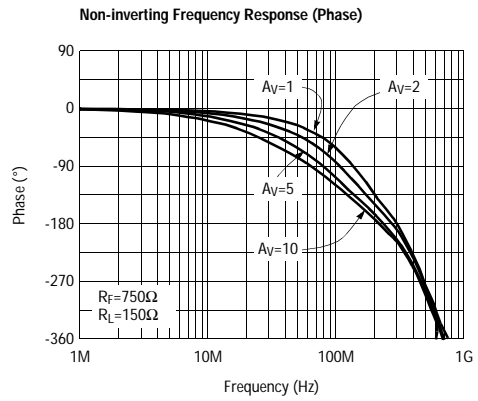
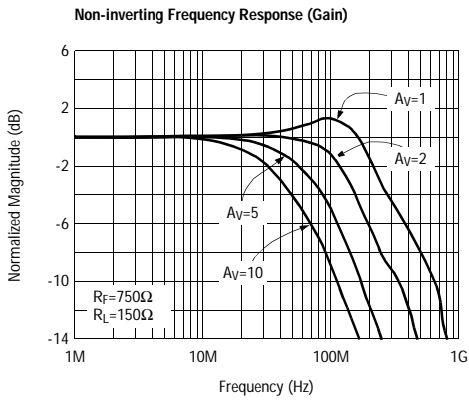
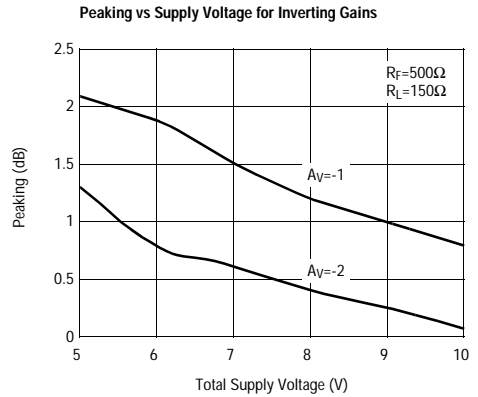
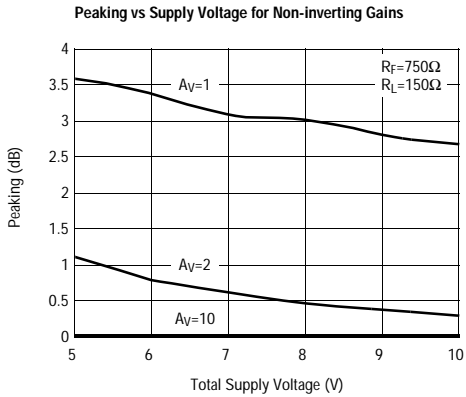
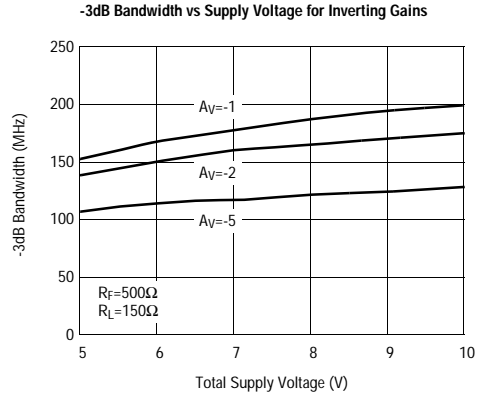
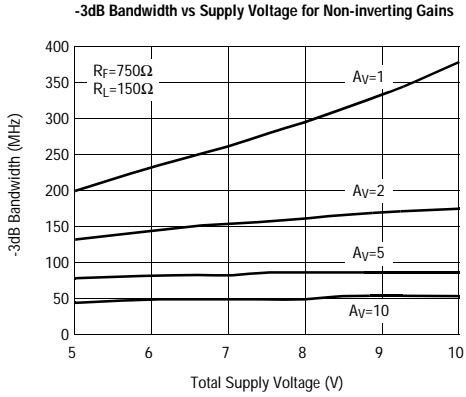
### Typical Performance Curves



# EL5396C - Preliminary

## Triple 400MHz Fixed Gain Amplifier

### Typical Performance Curves

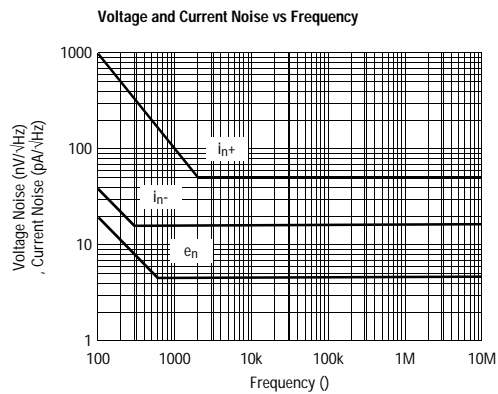
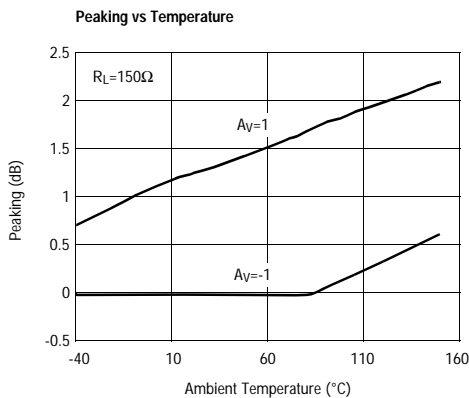
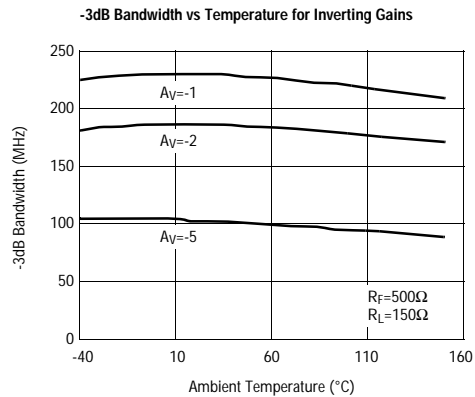
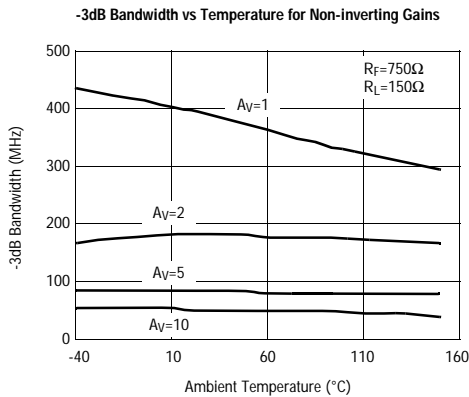
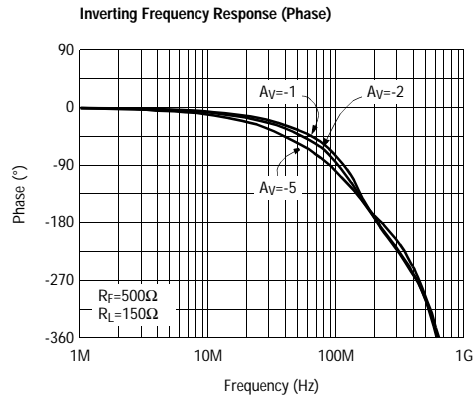
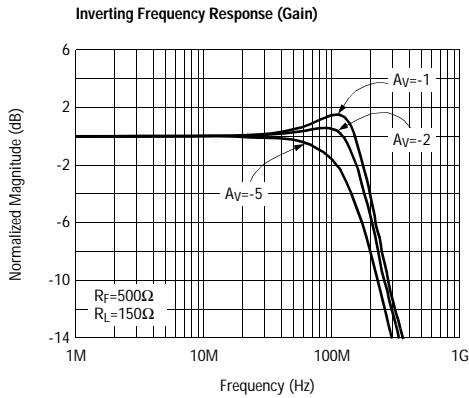


# EL5396C - Preliminary

## Triple 400MHz Fixed Gain Amplifier

EL5396C - Preliminary

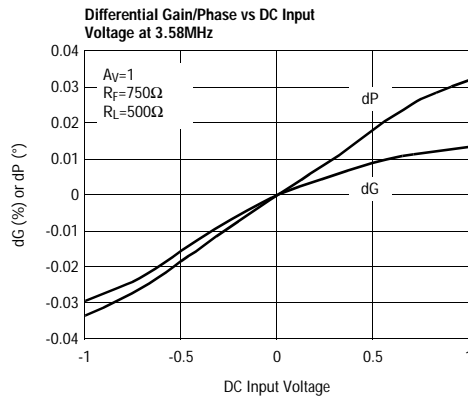
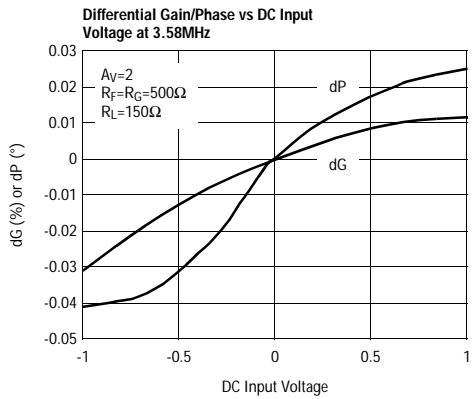
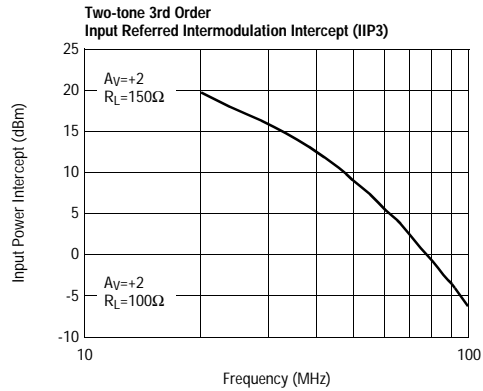
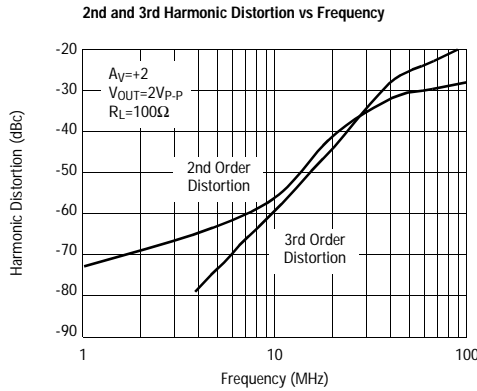
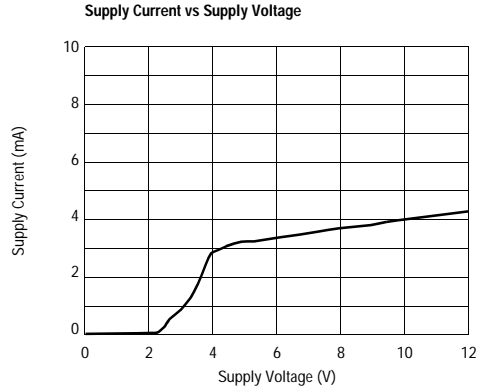
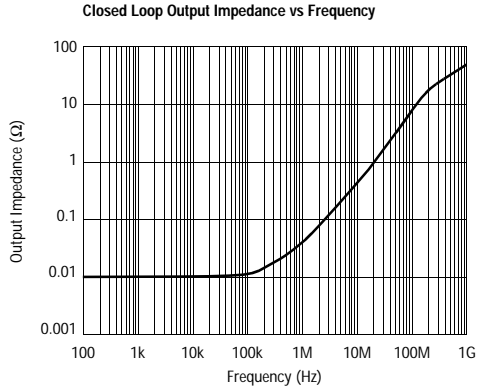
### Typical Performance Curves



# EL5396C - Preliminary

## Triple 400MHz Fixed Gain Amplifier

### Typical Performance Curves



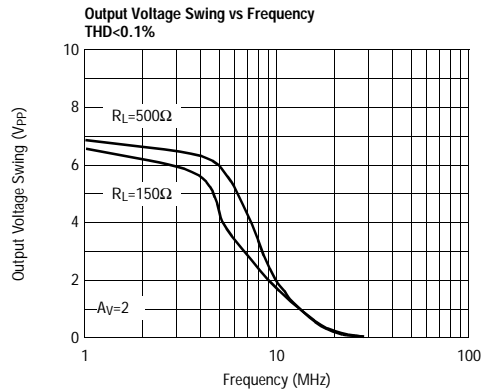
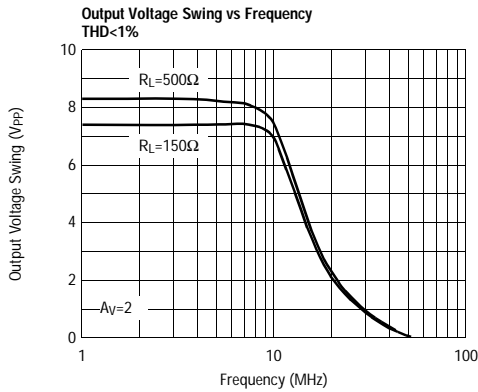


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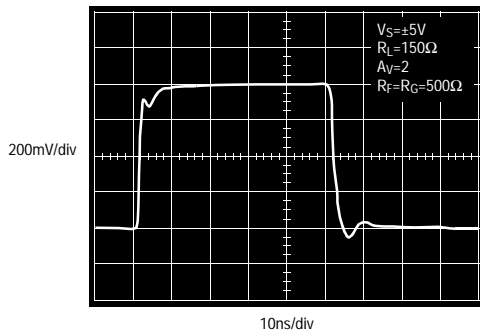
## Triple 400MHz Fixed Gain Amplifier

EL5396C - Preliminary

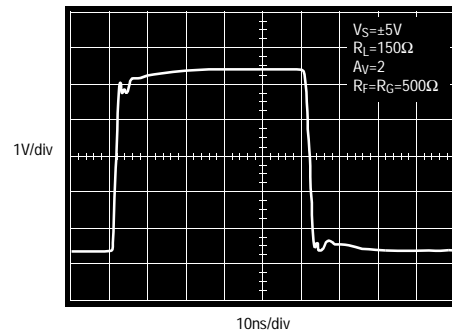
### Typical Performance Curves



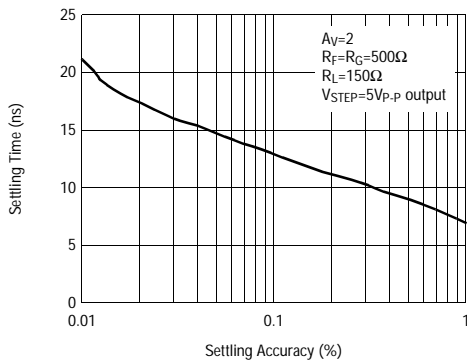
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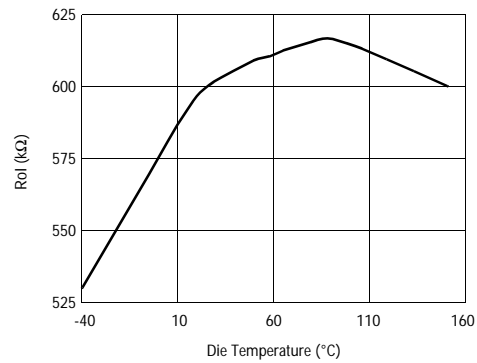
Large Signal Step Response



Settling Time vs Settling Accuracy



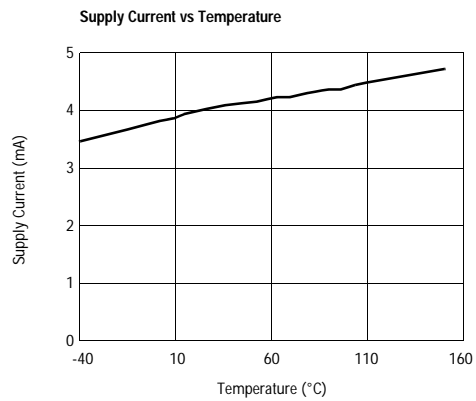
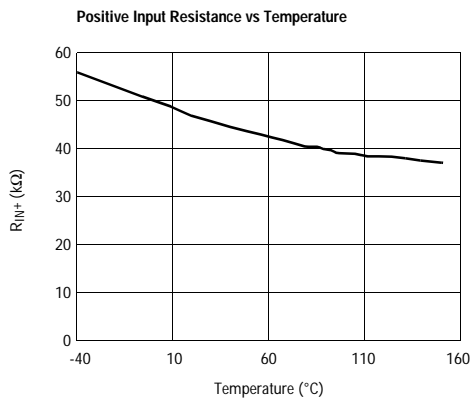
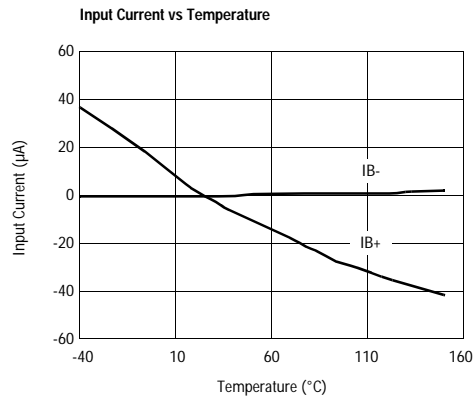
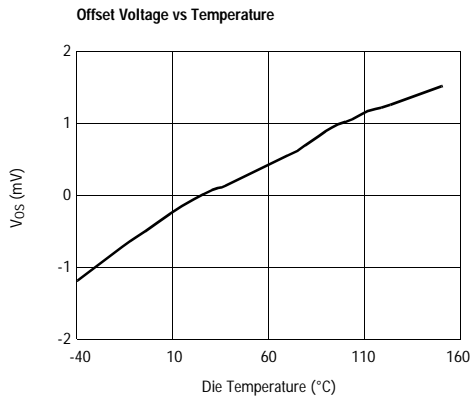
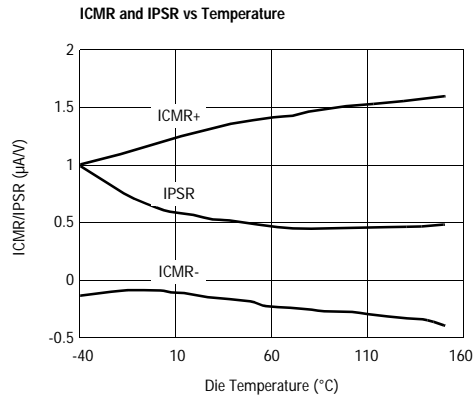
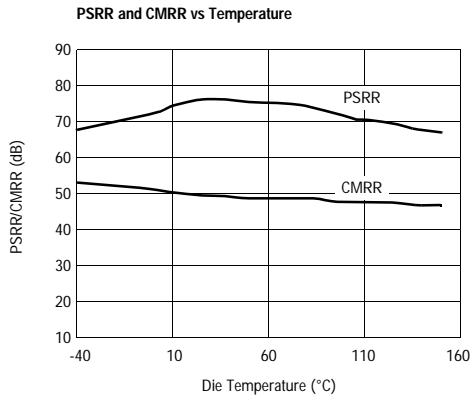
Transimpedance (RoI) vs Temperature



# EL5396C - Preliminary

Triple 400MHz Fixed Gain Amplifier

## Typical Performance Curves



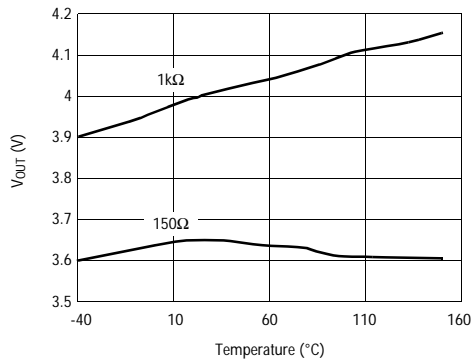
# EL5396C - Preliminary

## Triple 400MHz Fixed Gain Amplifier

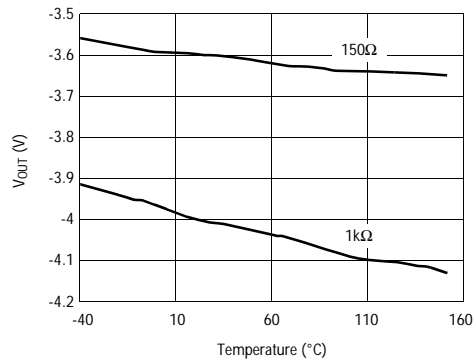
EL5396C - Preliminary

### Typical Performance Curves

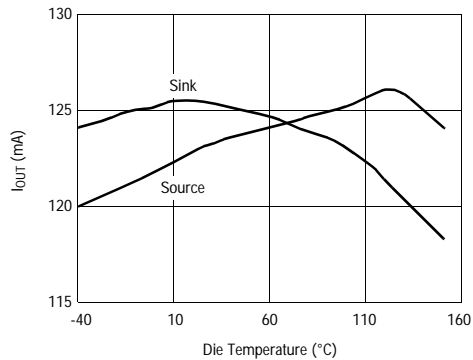
Positive Output Swing vs Temperature for Various Loads



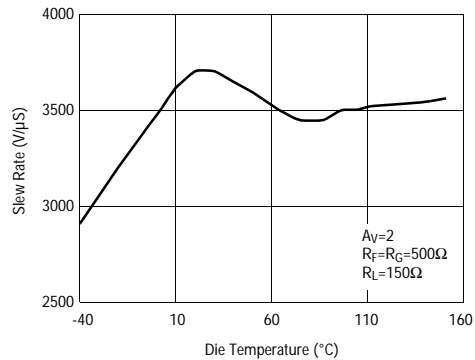
Negative Output Swing vs Temperature for Various Loads



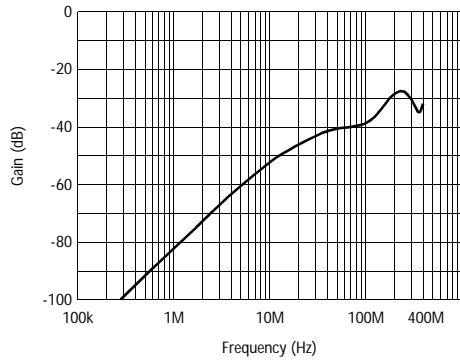
Output Current vs Temperature



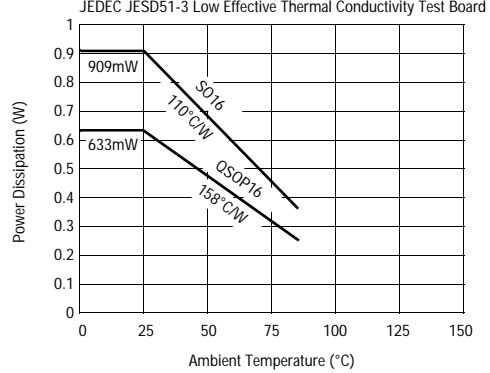
Slew Rate vs Temperature



Channel-to-Channel Isolation vs Frequency



Package Power Dissipation vs Ambient Temp.



# EL5396C - Preliminary

## Triple 400MHz Fixed Gain Amplifier

### Pin Descriptions

EL5396C 16-Pin SO & 16-Pin QSOP	Pin Name	Function	Equivalent Circuit
1	INA+	Non-inverting input, Channel A	<p style="text-align: center;">Circuit 1</p>
2	CEA	Amplifier A enable	<p style="text-align: center;">Circuit 2</p>
3	VS-	Negative supply	
4	CEB	Amplifier B enable	(Reference Circuit 2)
5	INB+	Non-inverting input, Channel B	(Reference Circuit 1)
6	NC	Not connected	
7	CEC	Amplifier C enable	(Reference Circuit 2)
8	INC+	Non-inverting input, Channel C	(Reference Circuit 1)
9	INC-	Inverting input, Channel C	(Reference Circuit 1)
10	OUTC	Output, Channel C	<p style="text-align: center;">Circuit 3</p>
11	NC	Not connected	
12	INB-	Inverting input, Channel B	(Reference Circuit 1)
13	OUTB	Output, Channel B	(Reference Circuit 3)
14	VS+	Positive supply	
15	OUTA	Output, Channel A	(Reference Circuit 3)
16	INA-	Inverting input, Channel A	(Reference Circuit 1)

# ***EL5396C - Preliminary***

*Triple 400MHz Fixed Gain Amplifier*

## **General Disclaimer**

Specifications contained in this data sheet are in effect as of the publication date shown. Elantec, Inc. reserves the right to make changes in the circuitry or specifications contained herein at any time without notice. Elantec, Inc. assumes no responsibility for the use of any circuits described herein and makes no representations that they are free from patent infringement.

***élantec***

HIGH PERFORMANCE ANALOG INTEGRATED CIRCUITS

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## **WARNING - Life Support Policy**

Elantec, Inc. products are not authorized for and should not be used within Life Support Systems without the specific written consent of Elantec, Inc. Life Support systems are equipment intended to support or sustain life and whose failure to perform when properly used in accordance with instructions provided can be reasonably expected to result in significant personal injury or death. Users contemplating application of Elantec, Inc. Products in Life Support Systems are requested to contact Elantec, Inc. factory headquarters to establish suitable terms & conditions for these applications. Elantec, Inc.'s warranty is limited to replacement of defective components and does not cover injury to persons or property or other consequential damages.