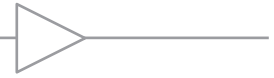


# Comlinear™ CLC1004, CLC3004

## Single and Triple, 750MHz Amplifiers with Disable



### FEATURES

- 0.1dB gain flatness to 40MHz
- 0.07%/0.01° differential gain/phase
- 750MHz -3dB bandwidth at G = 2
- 350MHz large signal bandwidth
- 1,700V/μs slew rate
- 5nV/√Hz input voltage noise
- 100mA output current
- 20ns enable time
- Stable for gains of 2V/V or larger
- Fully specified at 5V and ±5V supplies
- CLC1004: Lead-free SOT23-6
- CLC3004: Lead-free TSSOP-16

### APPLICATIONS

- RGB video line drivers
- High definition video driver
- Video switchers and routers
- ADC buffer
- Active filters
- Cable drivers
- Imaging applicaitons
- Radar/communication receivers

### General Description

The *Comlinear* CLC1004 (single) and CLC3004 (triple) are high-performance, voltage feedback amplifiers that provide 750MHz gain of 2 bandwidth, ±0.1dB gain flatness to 40MHz, and 1,700V/μs slew rate. This high performance exceeds the requirements of high-definition television (HDTV) and other multimedia applications. These *Comlinear* high-performance amplifiers also provide ample output current to drive multiple video loads.

The *Comlinear* CLC1004 and CLC3004 are designed to operate from ±5V or +5V supplies. Both amplifiers offer a fast enable/disable feature to save power. While disabled, the outputs are in a high-impedance state to allow for multiplexing applications. The combination of high-speed, low-power, and excellent video performance make these amplifiers well suited for use in many general purpose, high-speed applications including video line driving and imaging applications.

### Typical Application - TBD

### Ordering Information

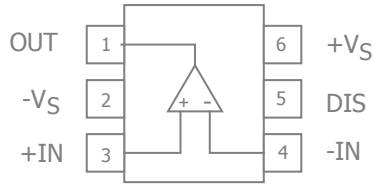
Part Number	Package	Pb-Free	Operating Temperature Range	Packaging Method
CLC1004IST6X*	SOT23-6	Yes	-40°C to +85°C	Reel
CLC1004IST6*	SOT23-6	Yes	-40°C to +85°C	Rail
CLC3004ITP16X*	TSSOP-16	Yes	-40°C to +85°C	Reel
CLC3004ITP16*	TSSOP-16	Yes	-40°C to +85°C	Rail

\*Preliminary Product Information

Moisture sensitivity level for all parts is MSL-1.



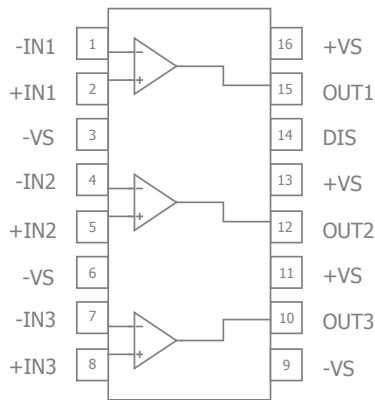
### CLC1004 Pin Configuration



### CLC1004 Pin Assignments

Pin No.	Pin Name	Description
1	OUT	Output
2	-VS	Negative supply
3	+IN	Positive input
4	-IN	Negative input
5	DIS	Disable pin. Enabled if pin is grounded, left floating or pulled below $V_{ON}$ , disabled if pin is pulled above $V_{OFF}$ .
6	+VS	Positive supply

### CLC3004 Pin Configuration



### CLC3004 Pin Configuration

Pin No.	Pin Name	Description
1	-IN1	Negative input, channel 1
2	+IN1	Positive input, channel 1
3	-VS	Negative supply
4	-IN2	Negative input, channel 2
5	+IN2	Positive input, channel 2
6	-VS	Negative supply
7	-IN3	Negative input, channel 3
8	+IN3	Positive input, channel 3
9	-VS	Negative supply
10	OUT3	Output, channel 3
11	+VS	Positive supply
12	OUT2	Output, channel 2
13	+VS	Positive supply
14	DIS	Disable pin. Enabled if pin is grounded, left floating or pulled below $V_{ON}$ , disabled if pin is pulled above $V_{OFF}$ .
15	OUT1	Output, channel 1
16	+VS	Positive supply

### Disable Pin Truth Table

Pin	High	Low*
DIS	Disabled	Enabled

\*Default Open State



## Absolute Maximum Ratings

The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table defines the conditions for actual device operation.

Parameter	Min	Max	Unit
Supply Voltage	0	14	V
Input Voltage Range	$-V_S - 0.5V$	$+V_S + 0.5V$	V

## Reliability Information

Parameter	Min	Typ	Max	Unit
Junction Temperature			150	°C
Storage Temperature Range	-65		150	°C
Lead Temperature (Soldering, 10s)			300	°C
Package Thermal Resistance				
6-Lead SOT23		TBD		°C/W
16-Lead TSSOP		TBD		°C/W

Notes:

Package thermal resistance ( $\theta_{JA}$ ), JEDEC standard, multi-layer test boards, still air.

## ESD Protection

Product	SOT23-6	TSSOP-16
Human Body Model (HBM)	2kV	2kV
Charged Device Model (CDM)	1kV	1kV

## Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit
Operating Temperature Range	-40		+85	°C
Supply Voltage Range	4.5		12	V



## Electrical Characteristics at +5V

$T_A = 25^\circ\text{C}$ ,  $V_S = +5\text{V}$ ,  $R_f = R_g = 150\Omega$ ,  $R_L = 150\Omega$  to  $V_S/2$ ,  $G = 2$ ; unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Frequency Domain Response						
$BW_{SS}$	-3dB Bandwidth	$G = +2$ , $V_{OUT} = 0.2V_{pp}$		550		MHz
$BW_{LS}$	Large Signal Bandwidth	$G = +2$ , $V_{OUT} = 2V_{pp}$		200		MHz
$BW_{0.1dBSS}$	0.1dB Gain Flatness	$G = +2$ , $V_{OUT} = 0.2V_{pp}$		35		MHz
$BW_{0.1dBLS}$	0.1dB Gain Flatness	$G = +2$ , $V_{OUT} = 2V_{pp}$		TBD		MHz
Time Domain Response						
$t_R, t_F$	Rise and Fall Time	$V_{OUT} = 1\text{V}$ step; (10% to 90%)		1.7		ns
$t_S$	Settling Time to 0.1%	$V_{OUT} = 1\text{V}$ step		10		ns
OS	Overshoot	$V_{OUT} = 0.2\text{V}$ step		TBD		%
SR	Slew Rate	2V step		900		V/ $\mu\text{s}$
Distortion/Noise Response						
HD2	2nd Harmonic Distortion	$V_{OUT} = 1V_{pp}$ , 5MHz		-65		dBc
HD3	3rd Harmonic Distortion	$V_{OUT} = 1V_{pp}$ , 5MHz		-63		dBc
THD	Total Harmonic Distortion	$V_{OUT} = 1V_{pp}$ , 5MHz		60		dB
$D_G$	Differential Gain	NTSC (3.58MHz), DC-coupled, $R_L = 150\Omega$		0.07		%
$D_P$	Differential Phase	NTSC (3.58MHz), DC-coupled, $R_L = 150\Omega$		0.02		°
IP3	Third Order Intercept	$V_{OUT} = 0.5V_{pp}$ , 10MHz		35		dBm
SFDR	Spurious Free Dynamic Range	$V_{OUT} = 1V_{pp}$ , 5MHz		63		dBc
$e_n$	Input Voltage Noise	> 1MHz		5		nV/ $\sqrt{\text{Hz}}$
$i_n$	Input Current Noise	> 1MHz		4		pA/ $\sqrt{\text{Hz}}$
$X_{TALK}$	Crosstalk	Channel-to-channel 5MHz		85		dB
DC Performance						
$V_{IO}$	Input Offset Voltage			0		mV
$dV_{IO}$	Average Drift			6		$\mu\text{V}/^\circ\text{C}$
$I_b$	Input Bias Current			3.2		$\mu\text{A}$
$dI_b$	Average Drift			40		nA/ $^\circ\text{C}$
PSRR	Power Supply Rejection Ratio	DC		56		dB
$A_{OL}$	Open-Loop Gain	$V_{OUT} = V_S / 2$		TBD		dB
$I_S$	Supply Current	per channel		11		mA
Disable Characteristics						
$T_{ON}$	Turn On Time			20		ns
$T_{OFF}$	Turn Off Time			40		ns
$OFF_{IOS}$	Off Isolation	5MHz		TBD		dB
$OFF_{COUT}$	Off Output Capacitance			TBD		pF
$OFF_{ROUT}$	Off Output Resistance			TBD		k $\Omega$
$V_{OFF}$	Power Down Input Voltage	DIS pin, disabled if pin is pulled above $V_{OFF}$			0.5	V
$V_{ON}$	Enable Input Voltage	DIS pin, enabled if pin is grounded, left open or pulled below $V_{ON}$	1.5			V
$I_{SD}$	Disable Supply Current	DIS pin is pulled to $V_S$		0.1		mA
Input Characteristics						
$R_{IN}$	Input Resistance	Non-inverting		4.5		M $\Omega$
$C_{IN}$	Input Capacitance			1.0		pF
CMIR	Common Mode Input Range			1.5 to 3.5		V
CMRR	Common Mode Rejection Ratio	DC		50		dB



## Electrical Characteristics at +5V continued

$T_A = 25^\circ\text{C}$ ,  $V_S = +5\text{V}$ ,  $R_f = R_g = 150\Omega$ ,  $R_L = 150\Omega$  to  $V_S/2$ ,  $G = 2$ ; unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Output Characteristics						
$R_O$	Output Resistance	Closed Loop, DC		0.1		$\Omega$
$V_{OUT}$	Output Voltage Swing	$R_L = 150\Omega$		1.5 to 3.5		V
		$R_L = 1\text{k}\Omega$		TBD		V
$I_{OUT}$	Output Current			$\pm 100$		mA
$I_{SC}$	Short-Circuit Output Current	$V_{OUT} = V_S / 2$		TBD		mA

### Notes:

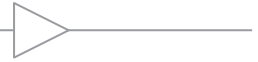
1. 100% tested at  $25^\circ\text{C}$



## Electrical Characteristics at $\pm 5V$

$T_A = 25^\circ C$ ,  $V_S = \pm 5V$ ,  $R_f = R_g = 150\Omega$ ,  $R_L = 150\Omega$  to GND,  $G = 2$ ; unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Frequency Domain Response						
$BW_{SS}$	-3dB Bandwidth	$G = +2$ , $V_{OUT} = 0.2V_{pp}$		750		MHz
$BW_{LS}$	Large Signal Bandwidth	$G = +2$ , $V_{OUT} = 2V_{pp}$		350		MHz
$BW_{0.1dBSS}$	0.1dB Gain Flatness	$G = +2$ , $V_{OUT} = 0.2V_{pp}$		40		MHz
$BW_{0.1dBLS}$	0.1dB Gain Flatness	$G = +2$ , $V_{OUT} = 2V_{pp}$		TBD		MHz
Time Domain Response						
$t_R$ , $t_F$	Rise and Fall Time	$V_{OUT} = 2V$ step; (10% to 90%)		2		ns
$t_S$	Settling Time to 0.1%	$V_{OUT} = 2V$ step		10		ns
OS	Overshoot	$V_{OUT} = 0.2V$ step		TBD		%
SR	Slew Rate	2V step		1700		V/ $\mu s$
Distortion/Noise Response						
HD2	2nd Harmonic Distortion	$V_{OUT} = 2V_{pp}$ , 5MHz		-65		dBc
HD3	3rd Harmonic Distortion	$V_{OUT} = 2V_{pp}$ , 5MHz		-75		dBc
THD	Total Harmonic Distortion	$V_{OUT} = 2V_{pp}$ , 5MHz		64		dB
$D_G$	Differential Gain	NTSC (3.58MHz), DC-coupled, $R_L = 150\Omega$		0.07		%
$D_P$	Differential Phase	NTSC (3.58MHz), DC-coupled, $R_L = 150\Omega$		0.01		°
IP3	Third Order Intercept	$V_{OUT} = 0.5V_{pp}$ , 10MHz		40		dBm
SFDR	Spurious Free Dynamic Range	$V_{OUT} = 1V_{pp}$ , 5MHz		65		dBc
$e_n$	Input Voltage Noise	> 1MHz		5		nV/ $\sqrt{Hz}$
$i_n$	Input Current Noise	> 1MHz		4		pA/ $\sqrt{Hz}$
$X_{TALK}$	Crosstalk	Channel-to-channel 5MHz		85		dB
DC Performance						
$V_{IO}$	Input Offset Voltage <sup>(1)</sup>		-10	0	10	mV
$dV_{IO}$	Average Drift			6		$\mu V/^\circ C$
$I_b$	Input Bias Current <sup>(1)</sup>		-20	3.2	20	$\mu A$
$dI_b$	Average Drift			40		nA/ $^\circ C$
PSRR	Power Supply Rejection Ratio <sup>(1)</sup>	DC	40	56		dB
$A_{OL}$	Open-Loop Gain	$V_{OUT} = V_S / 2$		TBD		dB
$I_S$	Supply Current <sup>(1)</sup>	per channel		13	17	mA
Disable Characteristics						
$T_{ON}$	Turn On Time			20		ns
$T_{OFF}$	Turn Off Time			40		ns
$OFF_{IOS}$	Off Isolation	5MHz		TBD		dB
$OFF_{COUT}$	Off Output Capacitance			TBD		pF
$OFF_{ROUT}$	Off Output Resistance			TBD		k $\Omega$
$V_{OFF}$	Power Down Input Voltage	DIS pin, disabled if pin is pulled above $V_{OFF}$			1.0	V
$V_{ON}$	Enable Input Voltage	DIS pin, enabled if pin is grounded, left open or pulled below $V_{ON}$	3.0			V
$I_{SD}$	Disable Supply Current <sup>(1)</sup>	DIS pin is pulled to $V_S$		0.1	0.3	mA
Input Characteristics						
$R_{IN}$	Input Resistance	Non-inverting		4.5		M $\Omega$
$C_{IN}$	Input Capacitance			1.0		pF
CMIR	Common Mode Input Range			$\pm 3.2$		V
CMRR	Common Mode Rejection Ratio <sup>(1)</sup>	DC	40	50		dB



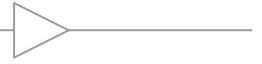
## Electrical Characteristics at $\pm 5V$ continued

$T_A = 25^\circ\text{C}$ ,  $V_S = \pm 5V$ ,  $R_f = R_g = 150\Omega$ ,  $R_L = 150\Omega$  to GND,  $G = 2$ ; unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Output Characteristics						
$R_O$	Output Resistance	Closed Loop, DC		0.1		$\Omega$
$V_{OUT}$	Output Voltage Swing	$R_L = 150\Omega$ <sup>(1)</sup>	$\pm 3.0$	$\pm 4.0$		V
		$R_L = 1k\Omega$		TBD		V
$I_{OUT}$	Output Current			$\pm 100$		mA
$I_{SC}$	Short-Circuit Output Current	$V_{OUT} = V_S / 2$		TBD		mA

### Notes:

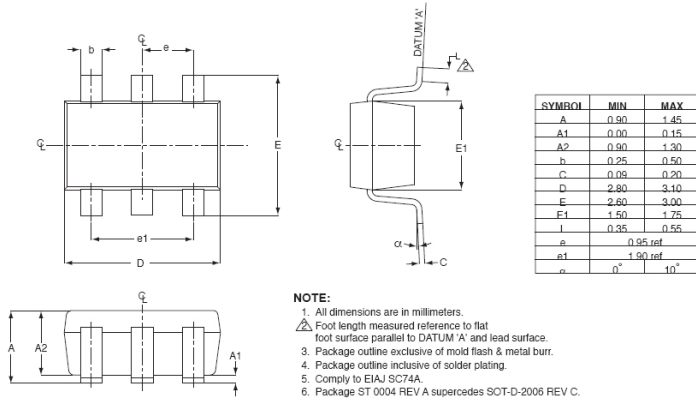
1. 100% tested at  $25^\circ\text{C}$



## Mechanical Dimensions

### SOT23-6 Package

SOT23-6



### TSSOP-16 Package

For additional information regarding our products, please visit CADEKA at: [cadeka.com](http://cadeka.com)

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