Advance Information

CADEKA
Amplify the Human Experience

Comlinear™ CLC1605, CLC3605

Single and Triple, 1.4GHz Amplifiers

FEATURES

- 0.1dB gain flatness to 120MHz
- 0.02%/0.02° differential gain/phase
- 1.4GHz -3dB bandwidth at G = 2
- 650MHz large signal bandwidth
- 2,500V/µs slew rate
- 5nV/√Hz input voltage noise
- 120mA output current
- Triple offers disable
- Fully specified at 5V and ±5V supplies
- CLC1605: Lead-free SOT23-6
- CLC3605: Lead-free TSSOP-16

APPLICATIONS

- RGB video line drivers
- High definition video driver
- Video switchers and routers
- ADC buffer
- Active filters
- High-speed instrumentation
- Wide dynamic range IF amp
- Radar/communication receivers

General Description

The *Comlinear* CLC1605 (single) and CLC3605 (triple) are high-performance, current feedback amplifiers that provide 1.4GHz gain of 2 bandwidth, ±0.1dB gain flatness to 120MHz, and 2,500V/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* CLC1605 and CLC3605 are designed to operate from ±5V or +5V supplies. The CLC3605 offers 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 perfomance make these amplifiers well suited for use in many general purpose, high-speed applications including high-definition video, imaging applications, and radar/communications receivers.

Typical Application - TBD

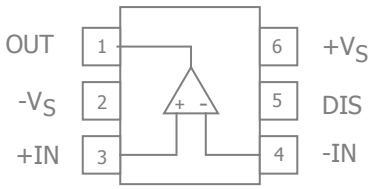
Ordering Information

Part Number	Package	Pb-Free	Operating Temperature Range	Packaging Method
CLC1605IST6X*	SOT23-6	Yes	-40°C to +85°C	Reel
CLC1605IST6*	SOT23-6	Yes	-40°C to +85°C	Rail
CLC3605ITP16X*	TSSOP-16	Yes	-40°C to +85°C	Reel
CLC3605ITP16*	TSSOP-16	Yes	-40°C to +85°C	Rail

*Preliminary Product Information

Moisture sensitivity level for all parts is MSL-1.

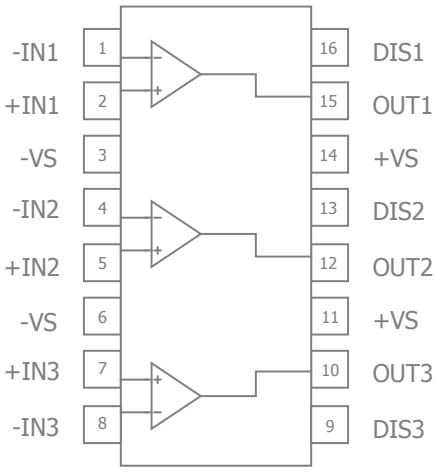
CLC1605 Pin Configuration



CLC1605 Pin Assignments

Pin No.	Pin Name	Description
1	OUT	Output
2	$-V_S$	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	$+V_S$	Positive supply

CLC3605 Pin Configuration



CLC3605 Pin Configuration

Pin No.	Pin Name	Description
1	-IN1	Negative input, channel 1
2	+IN1	Positive input, channel 1
3	$-V_S$	Negative supply
4	-IN2	Negative input, channel 2
5	+IN2	Positive input, channel 2
6	$-V_S$	Negative supply
7	+IN3	Positive input, channel 3
8	-IN3	Negative input, channel 3
9	DIS3	Disable pin. Enabled if pin is grounded, left floating or pulled below V_{ON}, disabled if pin is pulled above V_{OFF}.
10	OUT3	Output, channel 3
11	$+V_S$	Positive supply
12	OUT2	Output, channel 2
13	DIS2	Disable pin. Enabled if pin is grounded, left floating or pulled below V_{ON}, disabled if pin is pulled above V_{OFF}.
14	$+V_S$	Positive supply
15	OUT1	Output, channel 1
16	DIS1	Disable pin. Enabled if pin is grounded, left floating or pulled below V_{ON}, disabled if pin is pulled above V_{OFF}.

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 (θ_{JA}), JDEC 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

Notes:
0.8kV between the input pairs (+IN and -IN) pins only. All other pins are 2kV.

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°C, V_S = +5V, R_f = R_g =330Ω, R_L = 150Ω to V_S/2, G = 2; unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Frequency Domain Response						
UGBW	Unity Gain Bandwidth	G = +1, V_{OUT} = 0.2V_{pp}, R_f = xxxΩ		TBD		MHz
BW_{SS}	-3dB Bandwidth	G = +2, V_{OUT} = 0.2V_{pp}		800		MHz
BW_{LS}	Large Signal Bandwidth	G = +2, V_{OUT} = 1V_{pp}		450		MHz
$BW_{0.1dBSS}$	0.1dB Gain Flatness	G = +2, V_{OUT} = 0.2V_{pp}		100		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} = 1V step; (10% to 90%)		1.2		ns
t_S	Settling Time to 0.1%	V_{OUT} = 1V step		10		ns
OS	Overshoot	V_{OUT} = 0.2V step		TBD		%
SR	Slew Rate	2V step		1500		V/µs
Distortion/Noise Response						
HD2	2nd Harmonic Distortion	V_{OUT} = 1V_{pp}, 5MHz		-61		dBc
HD3	3rd Harmonic Distortion	V_{OUT} = 1V_{pp}, 5MHz		-61		dBc
THD	Total Harmonic Distortion	V_{OUT} = 1V_{pp}, 5MHz		58		dB
D_G	Differential Gain	NTSC (3.58MHz), DC-coupled, R_L = 150Ω		0.02		%
D_P	Differential Phase	NTSC (3.58MHz), DC-coupled, R_L = 150Ω		0.02		°
IP3	Third Order Intercept	V_{OUT} = 0.5V_{pp}, 10MHz		28		dBm
SFDR	Spurious Free Dynamic Range	V_{OUT} = 1V_{pp}, 5MHz		61		dBc
e_n	Input Voltage Noise	> 1MHz		5		nV/√Hz
i_n	Input Current Noise	> 1MHz, Inverting		20		pA/√Hz
		> 1MHz, Non-Inverting		30		pA/√Hz
X_{TALK}	Crosstalk	Channel-to-channel 5MHz		60		dB
DC Performance						
V_{IO}	Input Offset Voltage			0		mV
dV_{IO}	Average Drift			6		µV/°C
I_{bn}	Input Bias Current - Non-Inverting			3		µA
dI_{bn}	Average Drift			40		nA/°C
I_{bi}	Input Bias Current - Inverting			6		µA
dI_{bi}	Average Drift			10		nA/°C
PSRR	Power Supply Rejection Ratio	DC		55		dB
A_{OL}	Open-Loop Transimpendace Gain	V_{OUT} = V_S / 2		TBD		kΩ
I_S	Supply Current	per channel		11		mA
Disable Characteristics - CLC3605 only						
T_{ON}	Turn On Time			55		ns
T_{OFF}	Turn Off Time			55		ns
OFF_{IOS}	Off Isolation	5MHz		TBD		dB
OFF_{COUT}	Off Output Capacitance			TBD		pF
OFF_{ROUT}	Off Output Resistance			TBD		kΩ
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		0.09		mA

Electrical Characteristics at +5V continued

T_A = 25°C, V_s = +5V, R_f = R_g =330Ω, R_L = 150Ω to V_S/2, G = 2; unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Input Characteristics						
R_{IN}	Input Resistance	Non-inverting		150		kΩ
		Inverting		70		Ω
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
Output Characteristics						
R_O	Output Resistance	Closed Loop, DC		0.1		Ω
V_{OUT}	Output Voltage Swing	R_L = 150Ω		1.5 to 3.5		V
		R_L = 1kΩ		TBD		V
I_{OUT}	Output Current			±120		mA
I_{SC}	Short-Circuit Output Current	V_{OUT} = V_S / 2		TBD		mA

Notes:

1. 100% tested at 25°C

Electrical Characteristics at ±5V

T_A = 25°C, V_S = ±5V, R_f = R_g =330Ω, R_L = 150Ω to GND, G = 2; unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Frequency Domain Response						
UGBW	Unity Gain Bandwidth	G = +1, V_{OUT} = 0.2V_{pp}, R_f = xxxΩ		TBD		MHz
BW_{SS}	-3dB Bandwidth	G = +2, V_{OUT} = 0.2V_{pp}		1400		MHz
BW_{LS}	Large Signal Bandwidth	G = +2, V_{OUT} = 1V_{pp}		650		MHz
$BW_{0.1dBSS}$	0.1dB Gain Flatness	G = +2, V_{OUT} = 0.2V_{pp}		120		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} = 1V step; (10% to 90%)		1.5		ns
t_S	Settling Time to 0.1%	V_{OUT} = 1V step		13		ns
OS	Overshoot	V_{OUT} = 0.2V step		TBD		%
SR	Slew Rate	2V step		2500		V/µs
Distortion/Noise Response						
HD2	2nd Harmonic Distortion	V_{OUT} = 1V_{pp}, 5MHz		-73		dBc
HD3	3rd Harmonic Distortion	V_{OUT} = 1V_{pp}, 5MHz		-73		dBc
THD	Total Harmonic Distortion	V_{OUT} = 1V_{pp}, 5MHz		69		dB
D_G	Differential Gain	NTSC (3.58MHz), DC-coupled, R_L = 150Ω		0.02		%
D_P	Differential Phase	NTSC (3.58MHz), DC-coupled, R_L = 150Ω		0.02		°
IP3	Third Order Intercept	V_{OUT} = 0.5V_{pp}, 10MHz		34		dBm
SFDR	Spurious Free Dynamic Range	V_{OUT} = 1V_{pp}, 5MHz		673		dBc
e_n	Input Voltage Noise	> 1MHz		5		nV/√Hz
i_n	Input Current Noise	> 1MHz, Inverting		20		pA/√Hz
		> 1MHz, Non-Inverting		30		pA/√Hz
X_{TALK}	Crosstalk	Channel-to-channel 5MHz		60		dB
DC Performance						
V_{IO}	Input Offset Voltage (1)		-10	0	10	mV
dV_{IO}	Average Drift			6		µV/°C
I_{bn}	Input Bias Current - Non-Inverting (1)		-35	3	35	µA
dI_{bn}	Average Drift			40		nA/°C
I_{bi}	Input Bias Current - Inverting (1)		-35	6	35	µA
dI_{bi}	Average Drift			10		nA/°C
PSRR	Power Supply Rejection Ratio (1)	DC	40	55		dB
A_{OL}	Open-Loop Transimpendace Gain	V_{OUT} = V_S / 2		TBD		kΩ
I_S	Supply Current (1)	per channel		12	18	mA
Disable Characteristics - CLC3605 only						
T_{ON}	Turn On Time			55		ns
T_{OFF}	Turn Off Time			55		ns
OFF_{IOS}	Off Isolation	5MHz		TBD		dB
OFF_{COUT}	Off Output Capacitance			TBD		pF
OFF_{ROUT}	Off Output Resistance			TBD		kΩ
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 (1)	DIS pin is pulled to V_S		0.1	0.3	mA

Electrical Characteristics at ±5V continued

T_A = 25°C, V_S = ±5V, R_f = R_g =330Ω, R_L = 150Ω to GND, G = 2; unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Input Characteristics						
R_{IN}	Input Resistance	Non-inverting		150		kΩ
		Inverting		70		Ω
C_{IN}	Input Capacitance			1.0		pF
CMIR	Common Mode Input Range			±4.0		V
CMRR	Common Mode Rejection Ratio (1)	DC	40	50		dB
Output Characteristics						
R_O	Output Resistance	Closed Loop, DC		0.1		Ω
V_{OUT}	Output Voltage Swing	R_L = 150Ω (1)		±4.0		V
		R_L = 1kΩ		TBD		V
I_{OUT}	Output Current			±120		mA
I_{SC}	Short-Circuit Output Current	V_{OUT} = V_S / 2		TBD		mA

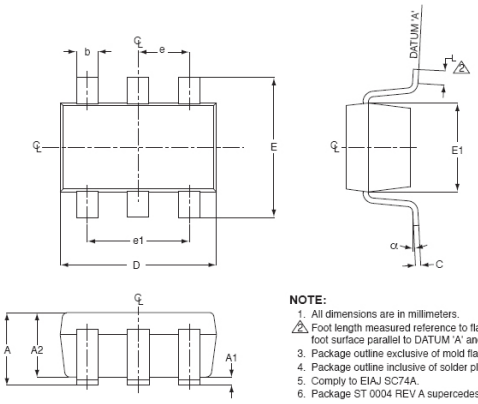
Notes:

1. 100% tested at 25°C

Mechanical Dimensions

SOT23-6 Package

SOT23-6



SYMBOL	MIN	MAX
A	0.90	1.45
A1	0.00	0.15
A2	0.90	1.30
b	0.25	0.50
C	0.09	0.20
D	2.80	3.10
E	2.60	3.00
E1	1.50	1.75
L	0.35	0.55
e	0.95 ref	
e1	1.90 ref	
α	0°	10°

NOTE:

1. All dimensions are in millimeters.
2. Foot length measured reference to flat foot surface parallel to DATUM 'A' and lead surface.
3. Package outline exclusive of mold flash & metal burr.
4. Package outline inclusive of solder plating.
5. Comply to EIAJ SC74A.
6. Package ST 0004 REV A supercedes SOT-D-2006 REV C.

TSSOP-16 Package

For additional information regarding our products, please visit CADEKA at: cadeka.com

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