HFA1145/883

High Speed, Low Power, Current Feedback Video Operational Amplifier with Output Disable

June 1994

Features

- **This Circuit is Processed in Accordance to MIL-STD-883 and is Fully Conformant Under the Provisions of Paragraph 1.2.1.**
- **Low Supply Current. . . . . 5.9mA (Typ)**
- **Wide -3dB Bandwidth . . . . . 360MHz (Typ)**
- **High Slew Rate. . . . . 1000V/μs (Typ)**
- **Excellent Gain Flatness (to 50MHz) . . . . . ±0.07dB (Typ)**
- **Excellent Differential Gain . . . . . 0.02% (Typ)**
- **Excellent Differential Phase . . . . . 0.03 Deg. (Typ)**
- **High Output Current . . . . . 60mA (Typ)**
- **Output Enable / Disable Time. . . . . 180ns/35ns (Typ)**

Applications

- **Multiplexed Flash A/D Driver**
- **RGB Multiplexers / Preamps for Multimedia Systems**
- **Video Switching and Routing**
- **Pulse and Video Amplifiers**
- **Wideband Amplifiers**
- **RF/IF Signal Processing**
- **Medical Imaging Systems**

Description

The HFA1145/883 is a high speed, low power current feedback amplifier built with Intersil' proprietary complementary bipolar UHF-1 process.

This amplifier features a TTL/CMOS compatible disable control, pin 8, which when pulled low, reduces the supply current and forces the output into a high impedance state. This allows easy implementation of simple, low power video switching and routing systems. Component and composite video systems also benefit from this op amp's excellent gain flatness, and good differential gain and phase specifications.

Multiplexed A/D applications will also find the HFA1145/883 useful as the A/D driver/multiplexer.

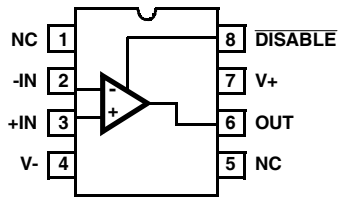
The HFA1145/883 is a low power, high performance upgrade for the CLC410.

Ordering Information

PART NUMBER	TEMPERATURE RANGE	PACKAGE
HFA1145MJ/883	-55°C to +125°C	8 Lead CerDIP

Pinout

HFA1145/883
(CERDIP)
TOP VIEW



Spec Number **511116-883**
FN3726

Absolute Maximum Ratings

Voltage Between V+ and V- 12V
Differential Input Voltage 5V
Voltage at Either Input Terminal . . . . . V+ to V-
Output Current (Note 1) . . . . . Short Circuit Protected
Output Current (50% Duty Cycle, Note 1) 60mA
Junction Temperature . . . . . +175°C
ESD Rating . . . . . > 2000V
Storage Temperature Range . . . . . $-65°C \le T_A \le +150°C$
Lead Temperature (Soldering 10s) . . . . . +300°C

Thermal Information

Thermal Resistance	θ_{JA}	θ_{JC}
CerDIP Package	115°C/W	30°C/W

Maximum Package Power Dissipation at +75°C
CerDIP Package 0.87W
Package Power Dissipation Derating Factor above +75°C
CerDIP Package . . . . . 8.7mW/°C

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Operating Conditions

Operating V_{SUPPLY} ($\pm V_S$) . . . . . ±5V R_L Š≥ 50Ω
Operating Temperature Range . . . . . $-55°C \le T_A \le +125°C$

TABLE 1. DC ELECTRICAL PERFORMANCE CHARACTERISTICS

Device Tested at: V_{SUPPLY} = ±5V, A_V = +1, R_F = 510Ω, R_{SOURCE} = 0Ω, R_L = 100Ω, V_{OUT} = 0V, $\overline{DIS}$ = Floated, Unless Otherwise Specified.

PARAMETERS	SYMBOL	CONDITIONS	GROUP A SUBGROUPS	TEMPERATURE	LIMITS MIN	LIMITS MAX	UNITS
Input Offset Voltage	V_{IO}	V_{CM} = 0V	1	+25°C	-5	5	mV
			2, 3	+125°C, -55°C	-10	10	mV
Common Mode Rejection Ratio	CMRR	ΔV_{CM} = ±1.8V V+ = 3.2V, V- = -6.8V V+ = 6.8V, V- = -3.2V	1	+25°C	47	-	dB
			2	+125°C	44	-	dB
		ΔV_{CM} = ±1.2V V+ = 3.8V, V- = -6.2V V+ = 6.2V, V- = -3.8V	3	-55°C	44	-	dB
Power Supply Rejection Ratio	PSRRP	ΔV_{SUPPLY} = ±1.8V V+ = 6.8V, V- = -5V V+ = 3.2V, V- = -5V	1	+25°C	50	-	dB
			2	+125°C	46	-	dB
		ΔV_{SUPPLY} = ±1.2V V+ = 6.2V, V- = -5V V+ = 3.8V, V- = -5V	3	-55°C	46	-	dB
	PSRRN	ΔV_{SUPPLY} = ±1.8V V+ = 5V, V- = -6.8V V+ = 5V, V- = -3.2V	1	+25°C	50	-	dB
			2	+125°C	46	-	dB
		ΔV_{SUPPLY} = ±1.2V V+ = 5V, V- = -6.2V V+ = 5V, V- = -3.8V	3	-55°C	46	-	dB
Non-Inverting Input (+IN) Current	I_{BSP}	V_{CM} = 0V	1	+25°C	-15	15	µA
			2, 3	+125°C, -55°C	-25	25	µA
+IN Current Common Mode Sensitivity	CMS_{IBP}	ΔV_{CM} = ±1.8V V+ = 3.2V, V- = -6.8V V+ = 6.8V, V- = -3.2V	1	+25°C	-	1.25	µA/V
			2	+125°C	-	2.85	µA/V
		ΔV_{CM} = ±1.2V V+ = 3.8V, V- = -6.2V V+ = 6.2V, V- = -3.8V	3	-55°C	-	2.85	µA/V
+IN Resistance	$+R_{IN}$	Note 2	1	+25°C	800	-	kΩ
			2, 3	+125°C, -55°C	350	-	kΩ

TABLE 1. DC ELECTRICAL PERFORMANCE CHARACTERISTICS (Continued)

Device Tested at: $V_{SUPPLY} = \pm5V$, $A_V = +1$, $R_F = 510\Omega$, $R_{SOURCE} = 0\Omega$, $R_L = 100\Omega$, $V_{OUT} = 0V$, $\overline{DIS}$ = Floated, Unless Otherwise Specified.

PARAMETERS	SYMBOL	CONDITIONS	GROUP A SUBGROUPS	TEMPERATURE	LIMITS MIN	LIMITS MAX	UNITS
+IN Current Power Supply Sensitivity	$PPSS_{IBP}$	$\Delta V_{SUPPLY} = \pm1.8V$ V+ = 6.8V, V- = -5V V+ = 3.2V, V- = -5V	1	+25°C	-	1	µA/V
			2	+125°C	-	3	µA/V
		$\Delta V_{SUPPLY} = \pm1.2V$ V+ = 6.2V, V- = -5V V+ = 3.8V, V- = -5V	3	-55°C	-	3	µA/V
	$NPSS_{IBP}$	$\Delta V_{SUPPLY} = \pm1.8V$ V+ = 5V, V- = -6.8V V+ = 5V, V- = -3.2V	1	+25°C	-	1	µA/V
			2	+125°C	-	3	µA/V
		$\Delta V_{SUPPLY} = \pm1.2V$ V+ = 5V, V- = -6.2V V+ = 5V, V- = -3.8V	3	-55°C	-	3	µA/V
Inverting Input (-IN) Current	I_{BSN}	$V_{CM} = 0V$	1	+25°C	-7.5	7.5	µA
			2, 3	+125°C, -55°C	-25	25	µA
-IN Current Common Mode Sensitivity	CMS_{IBN}	$\Delta V_{CM} = \pm1.8V$ V+ = 3.2V, V- = -6.8V V+ = 6.8V, V- = -3.2V	1	+25°C	-	6	µA/V
			2	+125°C	-	8	µA/V
		$\Delta V_{CM} = \pm1.2V$ V+ = 3.8V, V- = -6.2V V+ = 6.2V, V- = -3.8V	3	-55°C	-	8	µA/V
-IN Current Power Supply Sensitivity	$PPSS_{IBN}$	$\Delta V_{SUPPLY} = \pm1.8V$ V+ = 6.8V, V- = -5V V+ = 3.2V, V- = -5V	1	+25°C	-	5	µA/V
			2	+125°C	-	8	µA/V
		$\Delta V_{SUPPLY} = \pm1.2V$ V+ = 6.2V, V- = -5V V+ = 3.8V, V- = -5V	3	-55°C	-	8	µA/V
	$NPSS_{IBN}$	$\Delta V_{SUPPLY} = \pm1.8V$ V+ = 5V, V- = -6.8V V+ = 5V, V- = -3.2V	1	+25°C	-	5	µA/V
			2	+125°C	-	8	µA/V
		$\Delta V_{SUPPLY} = \pm1.2V$ V+ = 5V, V- = -6.2V V+ = 5V, V- = -3.8V	3	-55°C	-	8	µA/V
Output Voltage Swing	V_{OP100}	$A_V = -1$, $R_L = 100\Omega$, $V_{IN} = -3.2V$	1	+25°C	3	-	V
		$V_{IN} = -3V$	2, 3	+125°C, -55°C	2.8	-	V
	V_{ON100}	$A_V = -1$, $R_L = 100\Omega$, $V_{IN} = +3.2V$	1	+25°C	-	-3	V
		$V_{IN} = +3V$	2, 3	+125°C, -55°C	-	-2.8	V
Output Voltage Swing	V_{OP50}	$A_V = -1$, $R_L = 50\Omega$, $V_{IN} = -2.7V$	1	+25°C	2.5	-	V
		$V_{IN} = -2.25V$	2	+125°C	2.0	-	V
		$V_{IN} = -2.25V$	3	-55°C	1.4	-	V
	V_{ON50}	$A_V = -1$, $R_L = 50\Omega$, $V_{IN} = +2.7V$	1	+25°C	-	-2.5	V
		$V_{IN} = +2.25V$	2	+125°C	-	-2.0	V
		$V_{IN} = +2.25V$	3	-55°C	-	-1.4	V
Output Current	$+I_{OUT}$	Note 3	1	+25°C	50	-	mA
			2	+125°C	40	-	mA
			3	-55°C	28	-	mA
	$-I_{OUT}$	Note 3	1	+25°C	-	-50	mA
			2	+125°C	-	-40	mA
			3	-55°C	-	-28	mA

TABLE 1. DC ELECTRICAL PERFORMANCE CHARACTERISTICS (Continued)

Device Tested at: $V_{SUPPLY} = \pm5V$, $A_V = +1$, $R_F = 510\Omega$, $R_{SOURCE} = 0\Omega$, $R_L = 100\Omega$, $V_{OUT} = 0V$, $\overline{DIS}$ = Floated, Unless Otherwise Specified.

PARAMETERS	SYMBOL	CONDITIONS	GROUP A SUBGROUPS	TEMPERATURE	LIMITS MIN	LIMITS MAX	UNITS
Quiescent Power Supply Current	I_{CC}	$R_L = 100\Omega$	1	+25°C	5.6	6.1	mA
			2, 3	+125°C, -55°C	5.2	6.5	mA
	I_{EE}	$R_L = 100\Omega$	1	+25°C	-6.1	-5.6	mA
			2, 3	+125°C, -55°C	-6.5	-5.2	mA
Disabled Power Supply Current	$DISI_{CC}$	$R_L = 100\Omega$, $V_{\overline{DIS}} = 0V$	1	+25°C	-	4	mA
			2, 3	+125°C, -55°C	-	4	mA
	$DISI_{EE}$	$R_L = 100\Omega$, $V_{\overline{DIS}} = 0V$	1	+25°C	-4	-	mA
			2, 3	+125°C, -55°C	-4	-	mA
Disabled Output Leakage Current	DOLC	$V_{\overline{DIS}} = 0V$, $V_{IN} = \pm2.5V$, $V_{OUT} = \mp2.5V$	1	+25°C	-10	10	µA
			2, 3	+125°C, -55°C	-10	10	µA
$\overline{\text{Disable}}$ Input Current	DILLC	$V_{\overline{DIS}} = 0V$	1	+25°C	-	200	µA
			2, 3	+125°C, -55°C	-	200	µA
	DILHC	$V_{\overline{DIS}} = 5V$	1	+25°C	-	15	µA
			2, 3	+125°C, -55°C	-	15	µA
$\overline{\text{Disable}}$ Input Logic Levels	DILLV		1	+25°C	-	0.8	V
			2, 3	+125°C, -55°C	-	0.8	V
	DILHV		1, 2	+25°C, +125°C	2.0	-	V
			3	-55°C	2.4	-	V

NOTES:

1. Output is short circuit protected to ground. Brief short circuits to ground will not degrade reliability, however continuous (100% duty cycle) output current must not exceed 30mA for maximum reliability.
2. Guaranteed from +IN Common Mode Rejection Test, by: $+R_{IN} = 1/CMS_{IBP}$.
3. Guaranteed from V_{OUT} Test with $R_L = 50\Omega$, by: $I_{OUT} = V_{OUT}/50\Omega$.

TABLE 2. AC ELECTRICAL PERFORMANCE CHARACTERISTICS

Table 2 Intentionally Left Blank.

TABLE 3. ELECTRICAL PERFORMANCE CHARACTERISTICS

Table 3 Intentionally Left Blank.

TABLE 4. ELECTRICAL TEST REQUIREMENTS

MIL-STD-883 TEST REQUIREMENTS	SUBGROUPS (SEE TABLE 1)
Interim Electrical Parameters (Pre Burn-In)	1
Final Electrical Test Parameters	1 (Note 1), 2, 3
Group A Test Requirements	1, 2, 3
Groups C and D Endpoints	1

NOTE:

1. PDA applies to Subgroup 1 only.

Die Characteristics

DIE DIMENSIONS:

59 x 58.2 x 19 mils ± 1 mils
1500 x 1480 x 483µm ± 25.4µm

METALLIZATION:

Type: Metal 1: AlCu(2%)/TiW
Thickness: Metal 1: 8kÅ ± 0.4kÅ

Type: Metal 2: AlCu(2%)
Thickness: Metal 2: 16kÅ ± 0.8kÅ

GLASSIVATION:

Type: Nitride
Thickness: 4kÅ ± 0.5kÅ

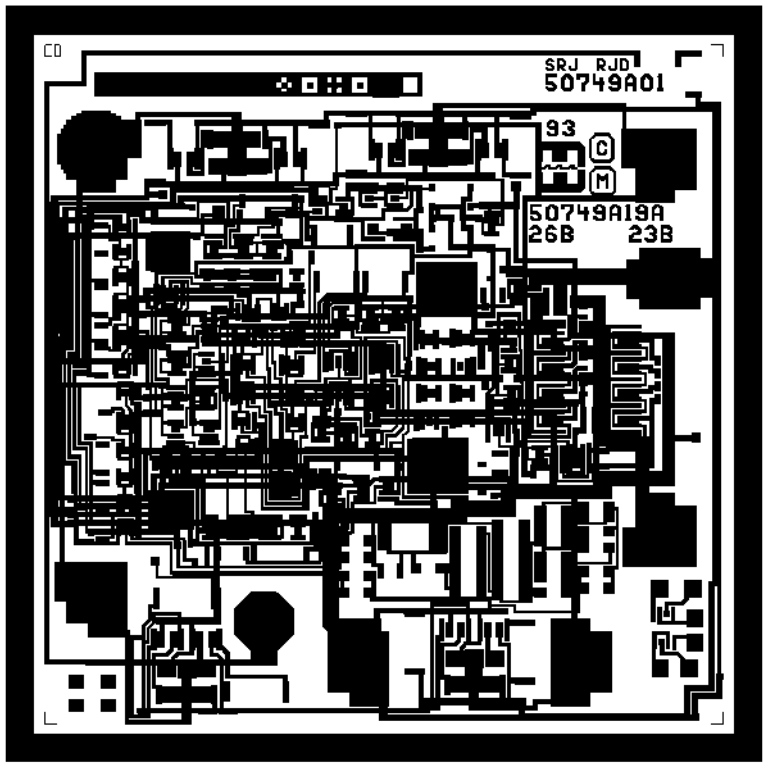
SUBSTRATE POTENTIAL (Powered Up): Floating (Recommend Connection to V-)

WORST CASE CURRENT DENSITY: TBD

TRANSISTOR COUNT: 75

Metallization Mask Layout

HFA1145/883



NOTE: This pad is not bonded out on packaged units. Die users may set a GND reference, via this pad, to ensure the TTL compatibility of the $\overline{DIS}$ input when using asymmetrical supplies (e.g. V+ = 10V, V- = 0V).