Die Characteristics

DIE DIMENSIONS:
93 x 68 x 19 mils ± 1 mils
2360 x 1720 x 483µm ± 25.4µm

METALLIZATION:
Type: Al, 1% Cu
Thickness: 16kÅ ± 2kÅ

GLASSIVATION:
Type: Nitride (Si3N4) over Silox (SiO2, 5% Phos.)
Silox Thickness: 12kÅ ± 2kÅ
Nitride Thickness: 3.5kÅ ± 1.5kÅ

WORST CASE CURRENT DENSITY:
5.0 x 10^4 A/cm^2 at 12mA

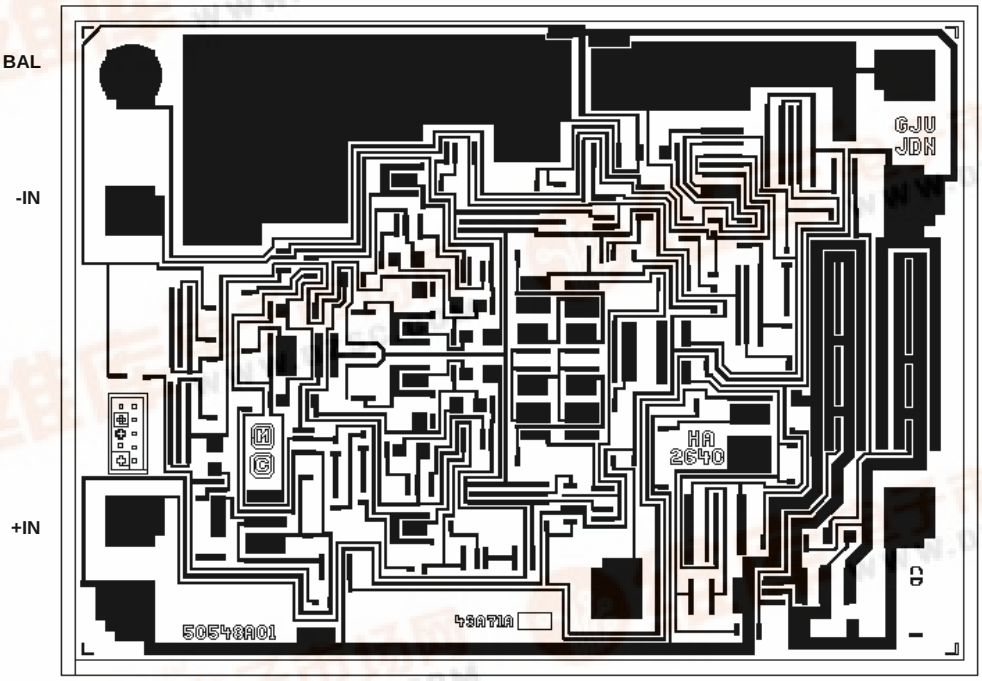
SUBSTRATE POTENTIAL (Powered Up):
Unbiased

TRANSISTOR COUNT: 76

PROCESS: HV200 Bipolar Dielectric Isolation

Metallization Mask Layout

HA-2640/883



All Intersil semiconductor products are manufactured, assembled and tested under **ISO9000** quality systems certification.

TABLE 3. ELECTRICAL PERFORMANCE CHARACTERISTICS

Device Characterized at: V_{SUPPLY} = ±40V, R_{LOAD} = 5kΩ, C_{LOAD} = 10pF, A_V = 1V/V, Unless Otherwise Specified.

PARAMETERS	SYMBOL	CONDITIONS	NOTES	TEMPERATURE	LIMITS		UNITS
					MIN	MAX	
Differential Input Resistance	R_{IN}	V_{CM} = 0V	1	+25°C	50	-	MΩ
Full Power Bandwidth	FPBW	V_{PEAK} = 10V	1, 2	+25°C	45	-	kHz
		V_{PEAK} = 35V	1, 2	+25°C	13.6	-	kHz
Minimum Closed Loop Stable Gain	CLSG	R_L = 5kΩ, C_L = 50pF	1	-55°C to +125°C	1	-	V/V
Output Short Circuit Current	$+I_{SC}$	V_{OUT} = 0V, R_L = 10Ω	1	+25°C	-	25	mA
	$-I_{SC}$	V_{OUT} = 0V, R_L = 10Ω	1	+25°C	-25	-	mA
Output Resistance	R_{OUT}	Open Loop	1	+25°C	-	600	Ω
Quiescent Power Consumption	PC	V_{OUT} = 0V, I_{OUT} = 0mA	1, 3	-55°C to +125°C	-	320	mW

NOTES:

1. Parameters listed in Table 3 are controlled via design or process parameters and are not directly tested at final production. These parameters are lab characterized upon initial design release, or upon design changes. These parameters are guaranteed by characterization based upon data from multiple production runs which reflect lot to lot and within lot variation.
2. Full Power Bandwidth guarantee based on Slew Rate measurement using FPBW = Slew Rate/($2\pi V_{PEAK}$).
3. Power Consumption based upon Quiescent Supply Current test maximum. (No load on outputs.)

TABLE 4. ELECTRICAL TEST REQUIREMENTS

MIL-STD-883 TEST REQUIREMENTS	SUBGROUPS (SEE TABLES 1 AND 2)
Interim Electrical Parameters (Pre Burn-In)	1
Final Electrical Test Parameters	1 (Note 1), 2, 3, 4, 5, 6
Group A Test Requirements	1, 2, 3, 4, 5, 6
Groups C and D Endpoints	1

NOTE:

1. PDA applies to Subgroup 1 only.

TABLE 1. DC ELECTRICAL PERFORMANCE CHARACTERISTICS (Continued)

Device Tested at: V_{SUPPLY} = ±40V, R_{SOURCE} = 100Ω, R_{LOAD} = 500kΩ, V_{OUT} = 0V, Unless Otherwise Specified.

PARAMETERS	SYMBOL	CONDITIONS	GROUP A SUBGROUPS	TEMPERATURE	LIMITS		UNITS
					MIN	MAX	
Output Voltage Swing	$+V_{OUT}$	R_L = 5kΩ	1	+25°C	35	-	V
			2, 3	+125°C, -55°C	35	-	V
	$-V_{OUT}$	R_L = 5kΩ	1	+25°C	-	-35	V
			2, 3	+125°C, -55°C	-	-35	V
Output Current	$+I_{OUT}$	V_{OUT} = -10V	4	+25°C	12	-	mA
	$-I_{OUT}$	V_{OUT} = +10V	4	+25°C	-	-12	mA
Quiescent Power Supply Current	$+I_{CC}$	V_{OUT} = 0V, I_{OUT} = 0mA	1	+25°C	-	3.8	mA
			2, 3	+125°C, -55°C	-	4.0	mA
	$-I_{CC}$	V_{OUT} = 0V, I_{OUT} = 0mA	1	+25°C	-3.8	-	mA
			2, 3	+125°C, -55°C	-4.0	-	mA
Power Supply Rejection Ratio	+PSRR	ΔV_{SUP} = 30V, V+ = +10V, V- = -40V, V+ = +40V, V- = -40V	4	+25°C	80	-	dB
			5, 6	+125°C, -55°C	80	-	dB
	-PSRR	ΔV_{SUP} = 30V, V+ = +40V, V- = -10V, V+ = +40V, V- = -40V	4	+25°C	80	-	dB
			5, 6	+125°C, -55°C	80	-	dB
Offset Voltage Adjustment	$+V_{IO}Adj$	Note 1	1	+25°C	V_{IO}-1	-	mV
			2, 3	+125°C, -55°C	V_{IO}-1	-	mV
	$-V_{IO}Adj$	Note 1	1	+25°C	V_{IO}+1	-	mV
			2, 3	+125°C, -55°C	V_{IO}+1	-	mV

NOTE:

1. Offset adjustment range is [V_{IO}(Measured) ±1mV] minimum referred to output. This test is for functionality only to assure adjustment through 0V.

TABLE 2. AC ELECTRICAL PERFORMANCE CHARACTERISTICS

Device Tested at: V_{SUPPLY} = ±40V, R_{SOURCE} = 50Ω, R_{LOAD} = 5kΩ, C_{LOAD} = 50pF, A_{VCL} = +1V/V, Unless Otherwise Specified.

PARAMETERS	SYMBOL	CONDITIONS	GROUP A SUBGROUPS	TEMPERATURE	LIMITS		UNITS
					MIN	MAX	
Slew Rate	+SR	V_{OUT} = -3V to +3V	4	+25°C	3	-	V/µs
	-SR	V_{OUT} = +3V to -3V	4	+25°C	3	-	V/µs
Rise and Fall Time	T_R	V_{OUT} = 0 to +200mV $10\% \le T_R \le 90\%$	4	+25°C	-	135	ns
	T_F	V_{OUT} = 0 to -200mV $10\% \le T_F \le 90\%$	4	+25°C	-	135	ns
Overshoot	+OS	V_{OUT} = 0 to +200mV	4	+25°C	-	30	%
	-OS	V_{OUT} = 0 to -200mV	4	+25°C	-	30	%

Absolute Maximum Ratings

Voltage Between V+ and V- Terminals 100V
Differential Input Voltage 37V
Output Current . . . . . .Full Short Circuit Protection
Output Short Circuit Duration . . . . . 5 Seconds
Junction Temperature (T_J) . . . . . +175^{o}C
Storage Temperature Range . . . . . -65^{o}C to +150^{o}C
ESD Rating. . . . . <2000V
Lead Temperature (Soldering 10s) . . . . . +300^{o}C

Thermal Information

Thermal Resistance	θ_{JA}	θ_{JC}
CerDIP Package	115^{o}C/W	28^{o}C/W
Ceramic LCC Package	65^{o}C/W	15^{o}C/W
Metal Can Package	155^{o}C/W	67^{o}C/W

Package Power Dissipation Limit at +75^{o}C for $T_J \leq$ +175^{o}C
CerDIP Package 870mW
Ceramic LCC Package 1.54W
Metal Can Package 645mW
Package Power Dissipation Derating Factor Above +75^{o}C
CerDIP Package . . . . . 8.7mW/^{o}C
Ceramic LCC Package . . . . . 15.4mW/^{o}C
Metal Can Package . . . . . 6.5mW/^{o}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 Temperature Range . . . . . -55^{o}C to +125^{o}C
Operating Supply Voltage . . . . . ±10V to ±40V

$V_{INCM} \leq 1/2$ (V+ - V-)
$R_L \geq 500\Omega$

TABLE 1. DC ELECTRICAL PERFORMANCE CHARACTERISTICS

Device Tested at: V_{SUPPLY} = ±40V, R_{SOURCE} = 100Ω, R_{LOAD} = 500kΩ, V_{OUT} = 0V, Unless Otherwise Specified.

PARAMETERS	SYMBOL	CONDITIONS	GROUP A SUBGROUPS	TEMPERATURE	LIMITS		UNITS
					MIN	MAX	
Input Offset Voltage	V_{IO}	V_{CM} = 0V	1	+25^{o}C	-4	4	mV
			2, 3	+125^{o}C, -55^{o}C	-6	6	mV
Input Bias Current	$+I_B$	V_{CM} = 0V, $+R_S$ = 100kΩ, $-R_S$ = 100Ω	1	+25^{o}C	-25	25	nA
			2, 3	+125^{o}C, -55^{o}C	-50	50	nA
	$-I_B$	V_{CM} = 0V, $+R_S$ = 100Ω, $-R_S$ = 100kΩ	1	+25^{o}C	-25	25	nA
			2, 3	+125^{o}C, -55^{o}C	-50	50	nA
Input Offset Current	I_{IO}	V_{CM} = 0V, $+R_S$ = 100kΩ, $-R_S$ = 100kΩ	1	+25^{o}C	-12	12	nA
			2, 3	+125^{o}C, -55^{o}C	-35	35	nA
Common Mode Range	+CMR	V+ = 15V, V- = -65V	1	+25^{o}C	25	-	V
			2, 3	+125^{o}C, -55^{o}C	25	-	V
	-CMR	V+ = 65V, V- = -15V	1	+25^{o}C	-	-25	V
			2, 3	+125^{o}C, -55^{o}C	-	-25	V
Large Signal Voltage Gain	$+A_{VOL}$	V_{OUT} = 0V and +30V, R_L = 5kΩ	4	+25^{o}C	100	-	kV/V
			5, 6	+125^{o}C, -55^{o}C	75	-	kV/V
	$-A_{VOL}$	V_{OUT} = 0V and -30V, R_L = 5kΩ	4	+25^{o}C	100	-	kV/V
			5, 6	+125^{o}C, -55^{o}C	75	-	kV/V
Common Mode Rejection Ratio	+CMRR	ΔV_{CM} = +20V, V+ = +20V, V- = -60V, V_{OUT} = -20V	4	+25^{o}C	80	-	dB
			5, 6	+125^{o}C, -55^{o}C	80	-	dB
	-CMRR	ΔV_{CM} = -20V, V+ = +60V, V- = -20V, V_{OUT} = +20V	4	+25^{o}C	80	-	dB
			5, 6	+125^{o}C, -55^{o}C	80	-	dB

HA-2640/883

July 1994

High Voltage Operational Amplifier

Features

- **This Circuit is Processed in Accordance to MIL-STD-883 and is Fully Conformant Under the Provisions of Paragraph 1.2.1.**
- **Output Voltage Swing . . . . . ±35V (Min)**
- **Supply Voltage . . . . . ±10V to ±40V (Min)**
- **Slew Rate . . . . . 3V/µs (Min)**
- **Common Mode Input Voltage Swing . . . . . ±35V (Min)**
- **Offset Current. . . . . 12nA (Max)**
- **Unity Gain Bandwidth . . . . . 5MHz (Typ)**
- **Output Overload Protection**

Applications

- **Industrial Control Systems**
- **Power Supplies**
- **High Voltage Regulators**
- **Resolver Excitation**
- **Signal Conditioning**

Description

HA-2640/883 monolithic operational amplifier is designed to deliver unprecedented dynamic specification for a high voltage internally compensated device. This dielectrically isolated device offer very low values for offset voltage and offset current coupled with large output voltage swing and common mode input voltage.

For maximum reliability, the HA-2640/883 offers unconditional output overload protection through output short circuit current limiting. This circuitry will limit the output to typically ±25mA output drive current.

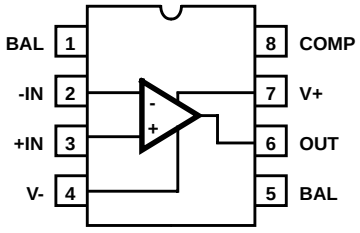
These amplifiers deliver ±35V common mode input voltage swing, ±35V output voltage swing, and up to ±40V supply range for use in such designs as regulators, power supplies, and industrial control systems. The 5MHz typical gain-bandwidth product and 5V/µs slew rate (typ) make these devices excellent components for high performance signal conditioning applications. To insure compliance, all devices are 100% tested for slew rate, rise/fall time and overshoot. Outstanding input and output voltage swings coupled with a low 5nA offset current (typ), make these amplifiers excellent components for resolver excitation designs.

Ordering Information

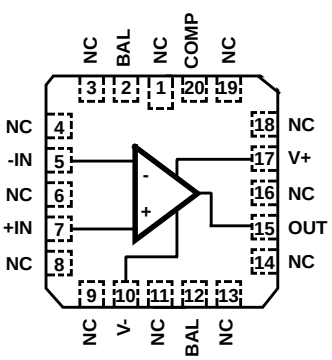
PART NUMBER	TEMPERATURE RANGE	PACKAGE
HA2-2640/883	-55°C to +125°C	8 Pin Can
HA4-2640/883	-55°C to +125°C	20 Lead Ceramic LCC
HA7-2640/883	-55°C to +125°C	8 Lead CerDIP

Pinouts

HA-2640/883 (CERDIP)
TOP VIEW



HA-2640/883 (CLCC)
TOP VIEW



HA-2640/883 (METAL CAN)