

μA710

HIGH SPEED DIFFERENTIAL COMPARATOR

FAIRCHILD LINEAR INTEGRATED CIRCUIT

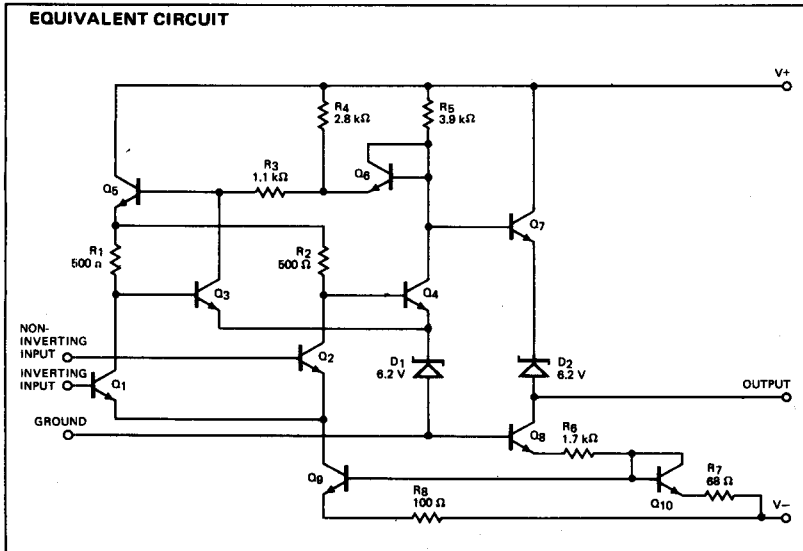
GENERAL DESCRIPTION — The μA710 is a Differential Voltage Comparator intended for applications requiring high accuracy and fast response times. It is constructed on a single silicon chip using the Fairchild Planar* epitaxial process. The device is useful as a variable threshold Schmitt trigger, a pulse height discriminator, a voltage comparator in high speed A/D converters, a memory sense amplifier or a high noise immunity line receiver. The output of the comparator is compatible with all integrated logic forms.

- 5 mV MAXIMUM OFFSET VOLTAGE
- 5 μA MAXIMUM OFFSET CURRENT
- 1000 MINIMUM VOLTAGE GAIN
- 20 μV/°C MAXIMUM OFFSET VOLTAGE DRIFT

ABSOLUTE MAXIMUM RATINGS

Positive Supply Voltage	+14.0 V
Negative Supply Voltage	-7.0 V
Peak Output Current	10 mA
Differential Input Voltage	±5.0 V
Input Voltage	±7.0 V
Internal Power Dissipation (Note 1)	
Metal Can	500 mW
DIP	670 mW
Flatpak	570 mW
Storage Temperature Range	
Metal Can, Hermetic DIP and Flatpak	-65°C to +150°C
Molded DIP	-55°C to +125°C
Operating Temperature Range	
Military (μA710)	-55°C to +125°C
Commercial (μA710C)	0°C to +70°C
Lead Temperature	
Metal Can, Hermetic DIP and Flatpak (Soldering, 60 s)	300°C
Molded DIP (Soldering, 10 s)	260°C

EQUIVALENT CIRCUIT

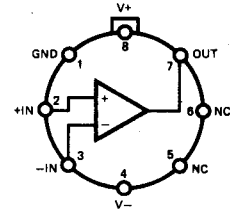


Notes on following pages.

CONNECTION DIAGRAMS

8-LEAD METAL CAN

(TOP VIEW)
PACKAGE OUTLINE 5S
PACKAGE CODE H

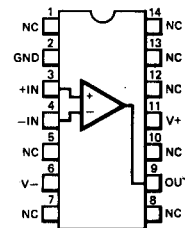


NOTE: Pin 4 connected to case.

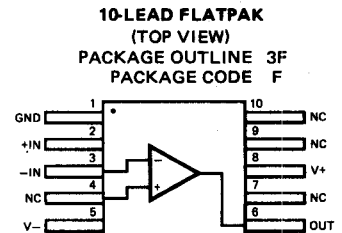
ORDER INFORMATION	
TYPE	PART NO.
μA710	μA710HM
μA710C	μA710HC

14-LEAD DIP

(TOP VIEW)
PACKAGE OUTLINES 6A 9A
PACKAGE CODES D P



ORDER INFORMATION	
TYPE	PART NO.
μA710	μA710DM
μA710C	μA710DC
μA710C	μA710PC



ORDER INFORMATION	
TYPE	PART NO.
μA710	μA710FM

*Planar is a patented Fairchild process.

FAIRCHILD LINEAR INTEGRATED CIRCUITS • μ A710

μ A710

ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, $V_+ = 12.0\text{ V}$, $V_- = -6.0\text{ V}$ unless otherwise specified)

PARAMETER	CONDITIONS (Note 2)	MIN	TYP	MAX	UNITS
Input Offset Voltage	$R_S < 200\ \Omega$		0.6	2.0	mV
Input Offset Current			0.75	3.0	μA
Input Bias Current			13	20	μA
Voltage Gain		1250	1700		
Output Resistance			200		Ω
Output Sink Current	$\Delta V_{IN} > 5\text{ mV}$, $V_{OUT} = 0$	2.0	2.5		mA
Response Time (Note 3)			40		ns

The following specifications apply for $-55^\circ\text{C} < T_A < +125^\circ\text{C}$:

Input Offset Voltage	$R_S < 200\ \Omega$			3.0	mV
Average Temperature Coefficient of Input Offset Voltage	$R_S = 50\ \Omega$, $T_A = 25^\circ\text{C}$ to $T_A = +125^\circ\text{C}$ $R_S = 50\ \Omega$, $T_A = 25^\circ\text{C}$ to $T_A = -55^\circ\text{C}$		3.5 2.7	10 10	$\mu\text{V}/^\circ\text{C}$ $\mu\text{V}/^\circ\text{C}$
Input Offset Current	$T_A = +125^\circ\text{C}$ $T_A = -55^\circ\text{C}$		0.25 1.8	3.0 7.0	μA μA
Average Temperature Coefficient of Input Offset Current	$T_A = 25^\circ\text{C}$ to $T_A = +125^\circ\text{C}$ $T_A = 25^\circ\text{C}$ to $T_A = -55^\circ\text{C}$		5.0 15	25 75	$\text{nA}/^\circ\text{C}$ $\text{nA}/^\circ\text{C}$
Input Bias Current	$T_A = -55^\circ\text{C}$		27	45	μA
Input Voltage Range	$V_- = -7.0\text{ V}$	± 5.0			V
Common Mode Rejection Ratio	$R_S < 200\ \Omega$	80	100		dB
Differential Input Voltage Range		± 5.0			V
Voltage Gain		1000			
Output HIGH Voltage	$\Delta V_{IN} > 5\text{ mV}$, $0 < I_{OUT} < 5.0\text{ mA}$	2.5	3.2	4.0	V
Output LOW Voltage	$\Delta V_{IN} > 5\text{ mV}$	-1.0	-0.5	0	V
Output Sink Current	$T_A = +125^\circ\text{C}$, $\Delta V_{IN} > 5\text{ mV}$, $V_{OUT} = 0$ $T_A = -55^\circ\text{C}$, $\Delta V_{IN} > 5\text{ mV}$, $V_{OUT} = 0$	0.5 1.0	1.7 2.3		mA mA
Positive Supply Current	$V_{OUT} < 0$		5.2	9.0	mA
Negative Supply Current	$V_{OUT} = \text{Gnd}$, Inverting Input = +5 mV		4.6	7.0	mA
Power Consumption	$V_{OUT} = \text{Gnd}$, Inverting Input = +10 mV		90	150	mW

μ A710C

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, $V_+ = 12.0\text{ V}$, $V_- = -6.0\text{ V}$ unless otherwise specified)

PARAMETER	CONDITIONS (Note 2)	MIN	TYP	MAX	UNITS
Input Offset Voltage	$R_S < 200\ \Omega$		1.6	5.0	mV
Input Offset Current			1.8	5.0	μA
Input Bias Current			16	25	μA
Voltage Gain		1000	1500		
Output Resistance			200		Ω
Output Sink Current	$\Delta V_{IN} > 5\text{ mV}$, $V_{OUT} = 0$	1.6	2.5		mA
Response Time (Note 2)			40		ns

The following specifications apply for $0^\circ\text{C} < T_A < +70^\circ\text{C}$:

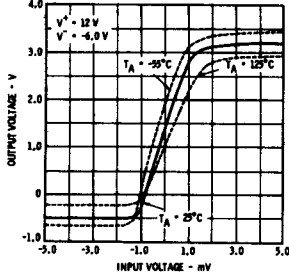
Input Offset Voltage	$R_S < 200\ \Omega$			6.5	mV
Average Temperature Coefficient of Input Offset Voltage	$R_S = 50\ \Omega$, $T_A = 0^\circ\text{C}$ to $T_A = +70^\circ\text{C}$		5.0	20	$\mu\text{V}/^\circ\text{C}$
Input Offset Current				7.5	μA
Average Temperature Coefficient of Input Offset Current	$T_A = 25^\circ\text{C}$ to $T_A = +70^\circ\text{C}$ $T_A = 25^\circ\text{C}$ to $T_A = 0^\circ\text{C}$		15 24	50 100	$\text{nA}/^\circ\text{C}$ $\text{nA}/^\circ\text{C}$
Input Bias Current	$T_A = 0^\circ\text{C}$		25	40	μA
Input Voltage Range	$V_- = -7.0\text{ V}$	± 5.0			V
Common Mode Rejection Ratio	$R_S < 200\ \Omega$	70	98		dB
Differential Input Voltage Range		± 5.0			V
Voltage Gain		800			
Output HIGH Voltage	$\Delta V_{IN} > 5\text{ mV}$, $0 < I_{OUT} < 5.0\text{ mA}$	2.5	3.2	4.0	V
Output LOW Voltage	$\Delta V_{IN} > 5\text{ mV}$	-1.0	-0.5	0	V
Output Sink Current	$\Delta V_{IN} > 5\text{ mV}$, $V_{OUT} = 0$	0.5			mA
Positive Supply Current	$V_{OUT} < 0$		5.2	9.0	mA
Negative Supply Current	$V_{OUT} = \text{Gnd}$, Inverting Input = +5 mV		4.6	7.0	mA
Power Consumption	$V_{OUT} = \text{Gnd}$, Inverting Input = +10 mV		90	150	mW

NOTES:

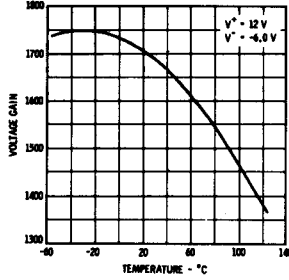
- Rating applies to ambient temperatures up to 70°C . Above 70°C ambient derate linearly at $6.3\text{ mW}/^\circ\text{C}$ for Metal Can, $8.3\text{ mW}/^\circ\text{C}$ for DIP, and $7.1\text{ mW}/^\circ\text{C}$ for the Flatpak.
- The input offset voltage and input offset current (see definitions) are specified for a logic threshold voltage as follows: For 710, 1.8 V at -55°C , 1.4 V at $+25^\circ\text{C}$, 1.0 V at $+125^\circ\text{C}$. For 710C, 1.5 V at 0°C , 1.4 V at $+25^\circ\text{C}$, and 1.2 V at $+70^\circ\text{C}$.
- The response time specified (see definitions) is for a 100 mV input step with 5 mV overdrive.

TYPICAL PERFORMANCE CURVES FOR $\mu A710$

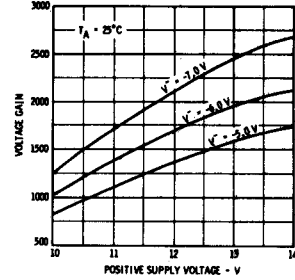
VOLTAGE TRANSFER CHARACTERISTIC



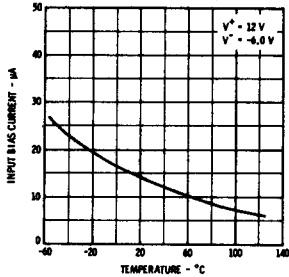
VOLTAGE GAIN AS A FUNCTION OF AMBIENT TEMPERATURE



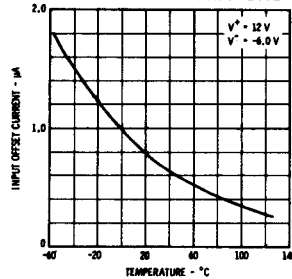
VOLTAGE GAIN AS A FUNCTION OF SUPPLY VOLTAGES



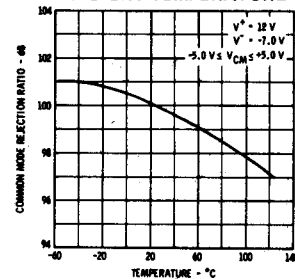
INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



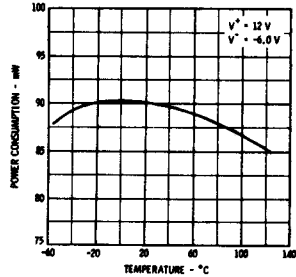
INPUT OFFSET CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



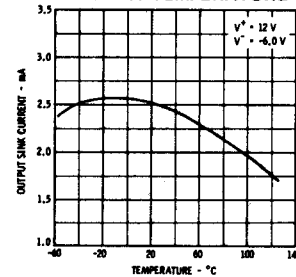
COMMON MODE REJECTION RATIO AS A FUNCTION OF AMBIENT TEMPERATURE



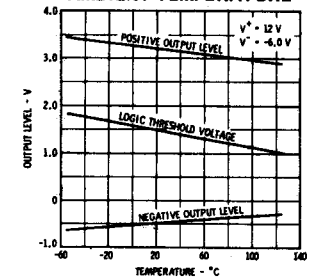
POWER CONSUMPTION AS A FUNCTION OF AMBIENT TEMPERATURE



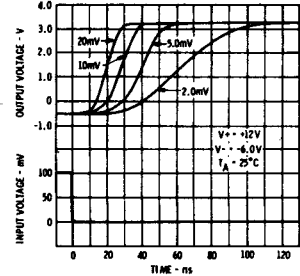
OUTPUT SINK CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



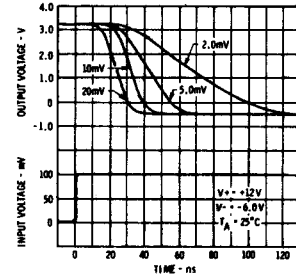
OUTPUT VOLTAGE LEVELS AS A FUNCTION OF AMBIENT TEMPERATURE



RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



COMMON MODE PULSE RESPONSE

