μA710
HIGH SPEED DIFFERENTIAL COMPARATOR
FAIRCHILD LINEAR INTEGRATED CIRCUITS

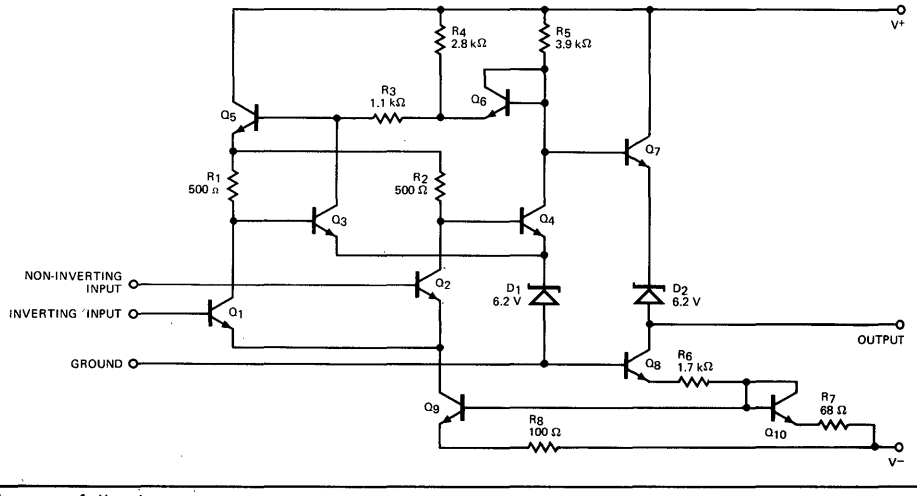
GENERAL DESCRIPTION – The μA710 is a Differential Voltage Comparator intended for applications requiring high accuracy and fast response times. It is constructed on a single silicon chip using the Fairchild Planar* epitaxial process. The device is useful as a variable threshold Schmitt trigger, a pulse 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

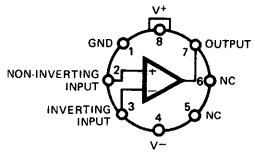
Positive Supply Voltage	+14.0 V
Negative Supply Voltage	−7.0 V
Peak Output Current	10 mA
Differential Input Voltage	±5.0 V
Input Voltage	±7.0 V
Internal Power Dissipation (Note 1)	
Metal Can	500 mW
DIP	670 mW
Flatpak	570 mW
Storage Temperature Range	
Metal Can, DIP, and Flatpak	−65°C to +150°C
Operating Temperature Range	
Military (710)	−55°C to +125°C
Commercial (710C)	0°C to + 70°C
Lead Temperature	
Metal Can, DIP and Flatpak (Soldering, 60 seconds)	300°C

EQUIVALENT CIRCUIT



CONNECTION DIAGRAMS

8-LEAD METAL CAN
(TOP VIEW)
PACKAGE OUTLINE 5B

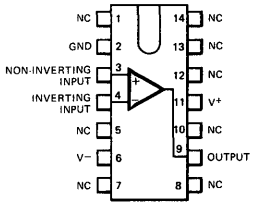


NOTE: Pin 4 connected to case.

ORDER INFORMATION

TYPE	PART NO.
710	710HM
710C	710HC

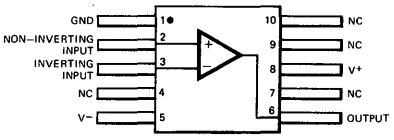
14-LEAD DIP
(TOP VIEW)
PACKAGE OUTLINE 6A



ORDER INFORMATION

TYPE	PART NO.
710	710DM
710C	710DC

10-LEAD FLATPAK
(TOP VIEW)
PACKAGE OUTLINE 3F



ORDER INFORMATION

TYPE	PART NO.
710	710FM

Notes on following pages.

*Planar is a patented Fairchild process.

710

ELECTRICAL CHARACTERISTICS (T_A = +25°C, V+ = 12.0 V, V– = –6.0 V unless otherwise specified)

PARAMETER (see definitions)	CONDITIONS (Note 2)	MIN.	TYP.	MAX.	UNITS
Input Offset Voltage	$R_S \leq 200\ \Omega$		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	$\Delta V_{IN} \geq 5$ mV, $V_{OUT} = 0$	2.0	2.5		mA
Response Time (Note 3)			40		ns
The following specifications apply for $-55°C \leq T_A \leq +125°C$:					
Input Offset Voltage	$R_S \leq 200\ \Omega$			3.0	mV
Average Temperature Coefficient of Input Offset Voltage	$R_S = 50\ \Omega$, $T_A = 25°C$ to $T_A = +125°C$		3.5	10	μV/°C
	$R_S = 50\ \Omega$, $T_A = 25°C$ to $T_A = -55°C$		2.7	10	μV/°C
Input Offset Current	$T_A = +125°C$		0.25	3.0	μA
	$T_A = -55°C$		1.8	7.0	μA
Average Temperature Coefficient of Input Offset Current	$T_A = 25°C$ to $T_A = +125°C$		5.0	25	nA/°C
	$T_A = 25°C$ to $T_A = -55°C$		15	75	nA/°C
Input Bias Current	$T_A = -55°C$		27	45	μA
Input Voltage Range	V– = –7.0 V	±5.0			V
Common Mode Rejection Ratio	$R_S \leq 200\ \Omega$	80	100		dB
Differential Input Voltage Range		±5.0			V
Voltage Gain		1000			
Output HIGH Voltage	$\Delta V_{IN} \geq 5$ mV, $0 \leq I_{OUT} \leq 5.0$ mA	2.5	3.2	4.0	V
Output LOW Voltage	$\Delta V_{IN} \geq 5$ mV	–1.0	–0.5	0	V
Output Sink Current	$T_A = +125°C$, $\Delta V_{IN} \geq 5$ mV, $V_{OUT} = 0$	0.5	1.7		mA
	$T_A = -55°C$, $\Delta V_{IN} \geq 5$ mV, $V_{OUT} = 0$	1.0	2.3		mA
Positive Supply Current	$V_{OUT} \leq 0$		5.2	9.0	mA
Negative Supply Current	V_{OUT} = Gnd, Inverting Input = +5mV.		4.6	7.0	mA
Power Consumption	V_{OUT} = Gnd, Inverting Input = +10mV.		90	150	mW

710C

ELECTRICAL CHARACTERISTICS (T_A = 25°C, V+ = 12.0 V, V– = –6.0 V unless otherwise specified)

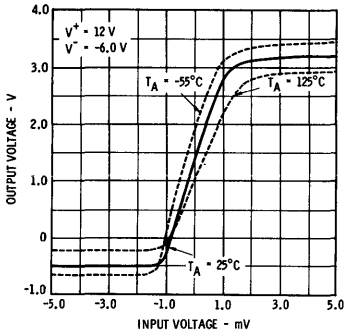
PARAMETER (see definitions)	CONDITIONS (Note 2)	MIN.	TYP.	MAX.	UNITS
Input Offset Voltage	$R_S \leq 200\ \Omega$		1.6	5.0	mV
Input Offset Current			1.8	5.0	μA
Input Bias Current			16	25	μA
Voltage Gain		1000	1500		
Output Resistance			200		Ω
Output Sink Current	$\Delta V_{IN} \geq 5$ mV, $V_{OUT} = 0$	1.6	2.5		mA
Response Time (Note 2)			40		ns
The following specifications apply for $0°C \leq T_A \leq +70°C$:					
Input Offset Voltage	$R_S \leq 200\ \Omega$			6.5	mV
Average Temperature Coefficient of Input Offset Voltage	$R_S = 50\ \Omega$, $T_A = 0°C$ to $T_A = +70°C$		5.0	20	μV/°C
Input Offset Current				7.5	μA
Average Temperature Coefficient of Input Offset Current	$T_A = 25°C$ to $T_A = +70°C$		15	50	nA/°C
	$T_A = 25°C$ to $T_A = 0°C$		24	100	nA/°C
Input Bias Current	$T_A = 0°C$		25	40	μA
Input Voltage Range	V = –7.0 V	±5.0			V
Common Mode Rejection Ratio	$R_S \leq 200\ \Omega$	70	98		dB
Differential Input Voltage Range		±5.0			V
Voltage Gain		800			
Output HIGH Voltage	$\Delta V_{IN} \geq 5$ mV, $0 \leq I_{OUT} \leq 5.0$ mA	2.5	3.2	4.0	V
Output LOW Voltage	$\Delta V_{IN} \geq 5$ mV	–1.0	–0.5	0	V
Output Sink Current	$\Delta V_{IN} \geq 5$ mV, $V_{OUT} = 0$	0.5			mA
Positive Supply Current	$V_{OUT} \leq 0$		5.2	9.0	mA
Negative Supply Current	V_{OUT} = Gnd, Inverting Input = +5mV.		4.6	7.0	mA
Power Consumption	V_{OUT} = Gnd, Inverting Input = +10mV.		90	150	mW

NOTES:

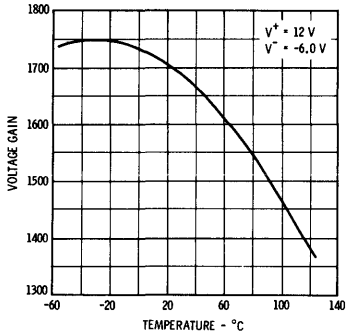
1. Rating applies to ambient temperatures up to 70°C. Above 70°C ambient derate linearly at 6.3 mW/°C for Metal Can, 8.3 mW/°C for DIP, and 7.1 mW/°C for the Flatpak.
2. The input offset voltage and input offset current (see definitions) are specified for a logic threshold voltage as follows: For 710,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

TYPICAL PERFORMANCE CURVES FOR 710

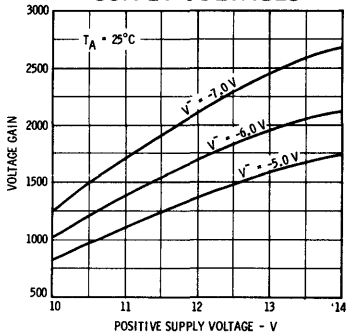
VOLTAGE TRANSFER CHARACTERISTIC



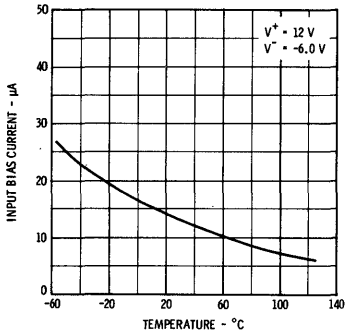
VOLTAGE GAIN AS A FUNCTION OF AMBIENT TEMPERATURE



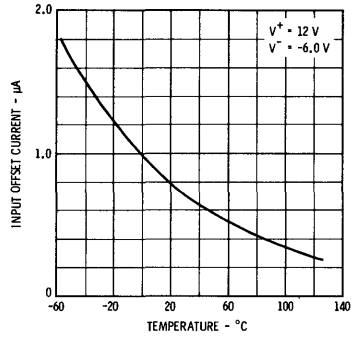
VOLTAGE GAIN AS A FUNCTION OF SUPPLY VOLTAGES



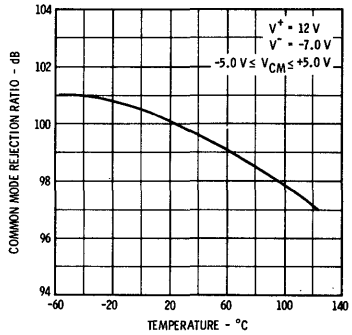
INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



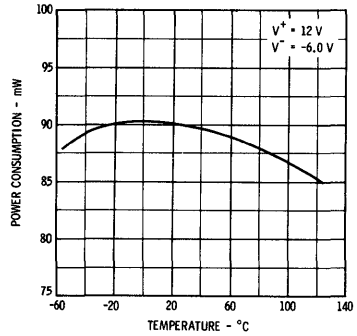
INPUT OFFSET CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



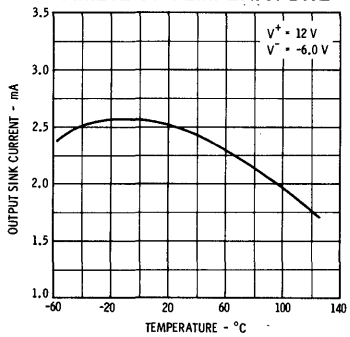
COMMON MODE REJECTION RATIO AS A FUNCTION OF AMBIENT TEMPERATURE



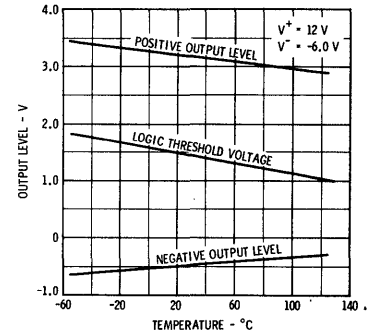
POWER CONSUMPTION AS A FUNCTION OF AMBIENT TEMPERATURE



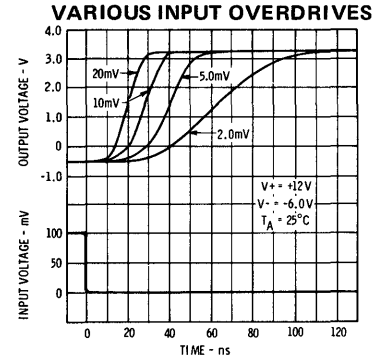
OUTPUT SINK CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



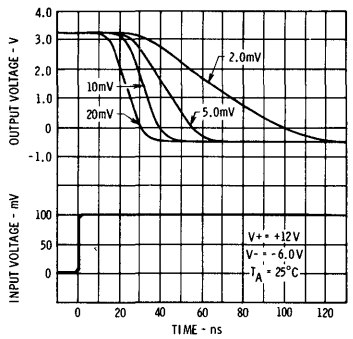
OUTPUT VOLTAGE LEVELS AS A FUNCTION OF AMBIENT TEMPERATURE



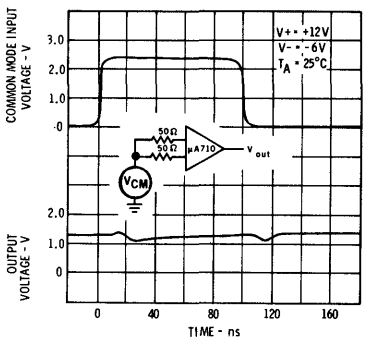
RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES

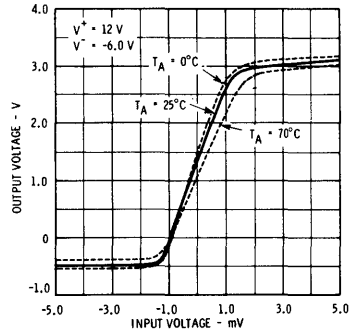


COMMON MODE PULSE RESPONSE

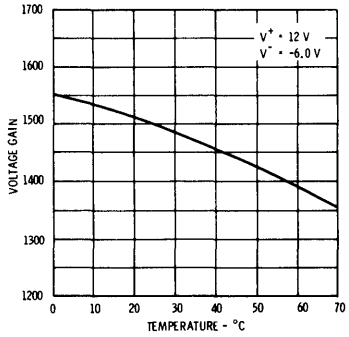


TYPICAL PERFORMANCE CURVES FOR 710C

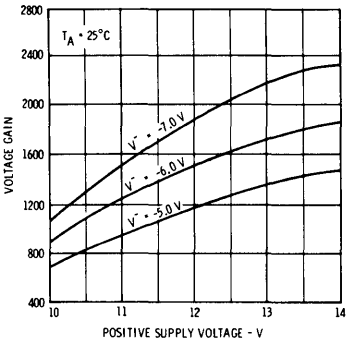
VOLTAGE TRANSFER CHARACTERISTIC



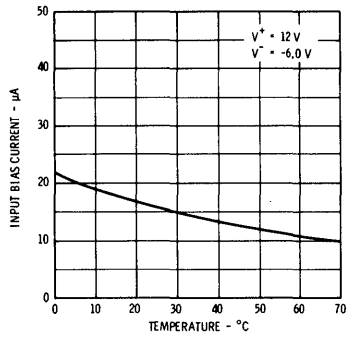
VOLTAGE GAIN AS A FUNCTION OF AMBIENT TEMPERATURE



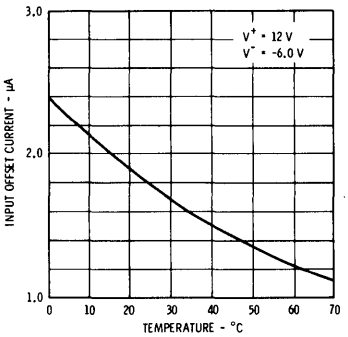
VOLTAGE GAIN AS A FUNCTION OF SUPPLY VOLTAGES



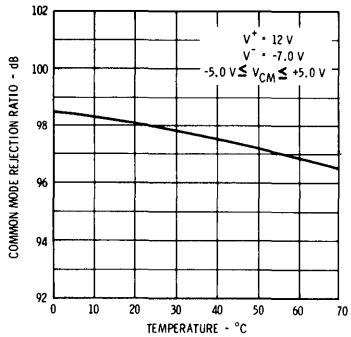
INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



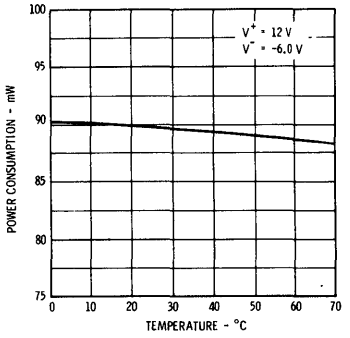
INPUT OFFSET CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



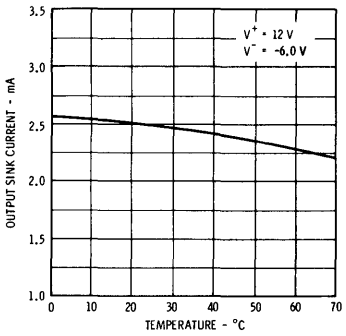
COMMON MODE REJECTION RATIO AS A FUNCTION OF AMBIENT TEMPERATURE



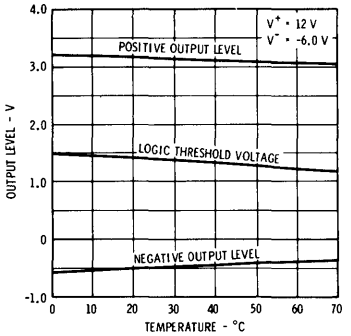
POWER CONSUMPTION AS A FUNCTION OF AMBIENT TEMPERATURE



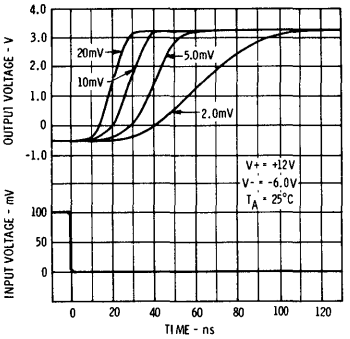
OUTPUT SINK CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



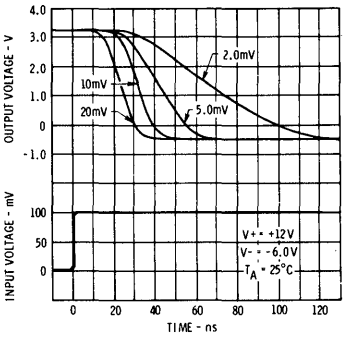
OUTPUT VOLTAGE LEVELS AS A FUNCTION OF AMBIENT TEMPERATURE



RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



COMMON MODE PULSE RESPONSE