TYPE uA710M
DIFFERENTIAL COMPARATOR

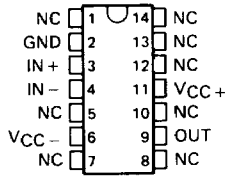
D2229, JUNE 1976—REVISED OCTOBER 1979

- **Fast Response Times**
- **Low Offset Characteristics**
- **Output Compatible with Most TTL Circuits**
- **Designed to be Interchangeable with Fairchild μA710**

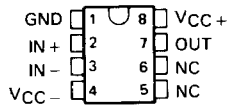
description

The uA710 is a monolithic high-speed comparator having differential inputs and a low-impedance output. Component matching, inherent in silicon integrated circuit fabrication techniques, produces a comparator with low-drift and low-offset characteristics. This circuit is especially useful for applications requiring an amplitude discriminator, memory sense amplifier, or a high-speed voltage comparator. The uA710M is characterized for operation over the full military temperature range of −55°C to 125°C.

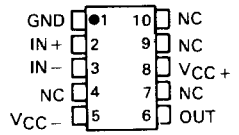
J DUAL-IN-LINE PACKAGE
(TOP VIEW)



JG DUAL-IN-LINE PACKAGE
(TOP VIEW)

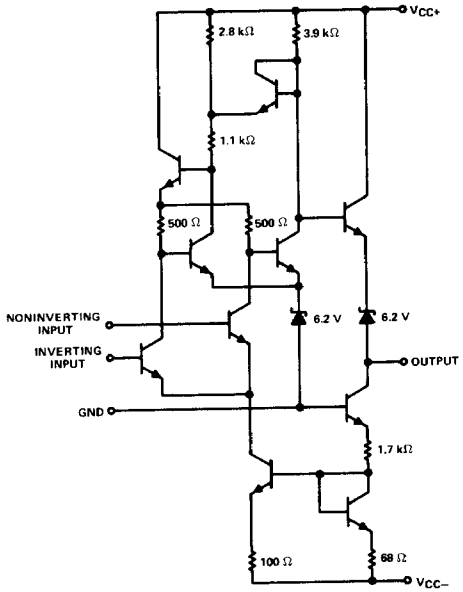


U FLAT PACKAGE
(TOP VIEW)



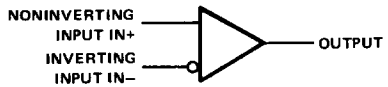
NC—No internal connection

schematic



Component values shown are nominal.

symbol



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage V_{CC+} (see Note 1) . . . . . 14 V
Supply voltage V_{CC-} (see Note 1) . . . . . −7 V
Differential input voltage (see Note 2) . . . . . ±5 V
Input voltage at either input (see Note 1) . . . . . ±7 V
Peak output current ($t_w \leq 1$ s) . . . . . 10 mA
Continuous total power dissipation at (or below) 25°C free-air temperature (see Note 3) . . 300 mW
Operating free-air temperature range . . . . . −55°C to 125°C
Storage temperature range . . . . . −65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds . . . . . 300°C

NOTES: 1. All voltage values, except differential voltages, are with respect to the network ground terminal.
2. Differential voltages are at the noninverting input terminal with respect to the inverting input terminal.
3. For operation above 25°C free-air temperature, refer to the Dissipation Derating Curves in Section 2. In the J and JG packages, uA710M chips are alloy mounted.

electrical characteristics at specified free-air temperature, V_{CC+} = 12 V, V_{CC-} = −6 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS†			MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage	$R_S \leq 200\ \Omega$,	See Note 4	25°C		0.6	2	mV
				Full range			3	
α_{VIO}	Average temperature coefficient of input offset voltage	$R_S \leq 50\ \Omega$,	See Note 4	Full range		3	10	μV/°C
I_{IO}	Input offset current	See Note 4		25°C		0.75	3	μA
				Full range			7	
α_{IIO}	Average temperature coefficient of input offset current	See Note 4		−55°C to 25°C		5	25	nA/°C
				25°C to 125°C		15	75	
I_{IB}	Input bias current	See Note 4		25°C		13	20	μA
				Full range			45	
V_{ICR}	Common-mode input voltage range	V_{CC-} = −7 V		25°C	±5			V
V_{ID}	Differential input voltage range			25°C	±5			V
A_{VD}	Large-signal differential voltage amplification	No load,	See Note 4	25°C	1250	1700		
				Full range	1000			
V_{OH}	High-level output voltage	V_{ID} = 5 mV,	I_{OH} = −5 mA	25°C	2.5	3.2	4	V
V_{OL}	Low-level output voltage	V_{ID} = −5 mV,	I_{OL} = 0	25°C	−1	−0.5	6‡	V
I_{OL}	Low-level output current	V_{ID} = −5 mV,	V_O = 0	25°C	2	2.5		mA
				−55°C	1	2.3		
				125°C	0.5	1.7		
r_o	Output resistance	V_O = 1.4 V		25°C		200		Ω
CMRR	Common-mode rejection ratio	$R_S \leq 200\ \Omega$		25°C	80	100		dB
I_{CC+}	Supply current from V_{CC+}	V_{ID} = −5 V to 5 V (−10 mV for typ), No load		25°C		5.2	9	mA
I_{CC-}	Supply current from V_{CC-}			25°C		−4.6	−7	mA
P_D	Total power dissipation			25°C		90	150	mW

NOTE 4: These characteristics are verified by measurements at the following temperatures and output voltage levels: V_O = 1.8 V at T_A = −55°C, V_O = 1.4 V at T_A = 25°C, and V_O = 1 V at T_A = 125°C. These output voltage levels were selected to approximate the logic threshold voltages of the types of digital logic circuits these comparators are intended to drive.

†Full range for uA710M is −55°C to 125°C.

‡The algebraic convention where the more-positive (less-negative) limit is designated as maximum is used in this data sheet for logic levels only, e.g., when 0 V is the maximum, the minimum limit is a more-negative voltage.

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switching characteristics, V_{CC+} = 12 V, V_{CC-} = −6 V, T_A = 25°C

PARAMETER	TEST CONDITIONS		TYP	UNIT
Response time	No load,	See Note 5	40	ns

NOTE 5: The response time specified is for a 100-mV input step with 5-mV overdrive and is the interval between the input step function and the instant when the output crosses 1.4 V.

TYPICAL CHARACTERISTICS

OUTPUT RESPONSE FOR VARIOUS INPUT OVERDRIVES

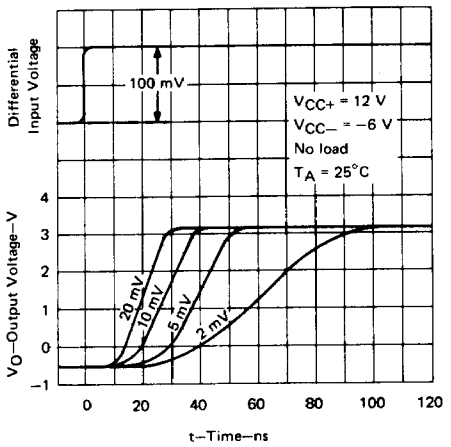

FIGURE 1

OUTPUT RESPONSE FOR VARIOUS INPUT OVERDRIVES

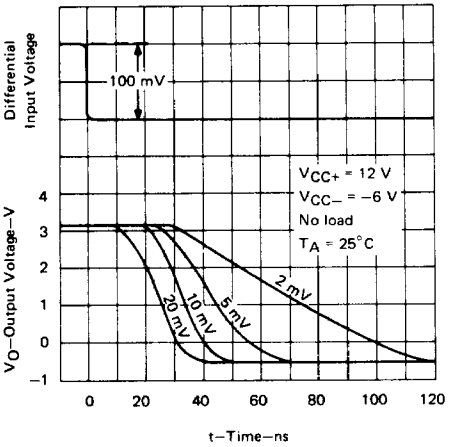

FIGURE 2

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TYPICAL CHARACTERISTICS

COMMON-MODE PULSE RESPONSE
vs
ELAPSED TIME

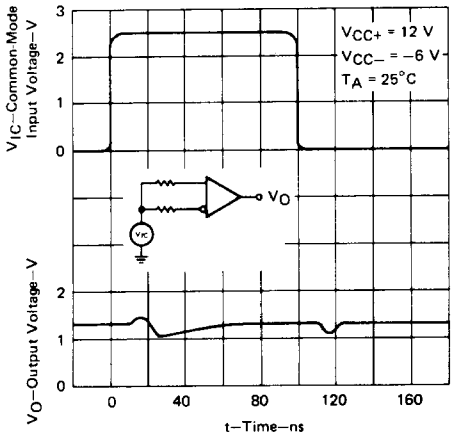

FIGURE 3

OUTPUT VOLTAGE
vs
FREE-AIR TEMPERATURE

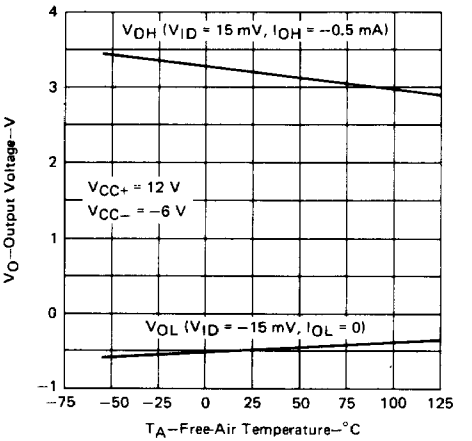

FIGURE 4

VOLTAGE TRANSFER CHARACTERISTICS

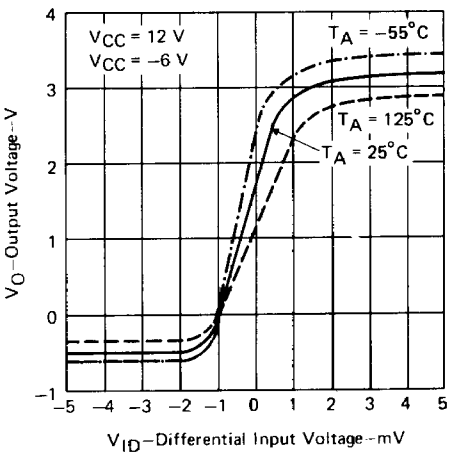

FIGURE 5

TOTAL POWER DISSIPATION
vs
FREE-AIR TEMPERATURE

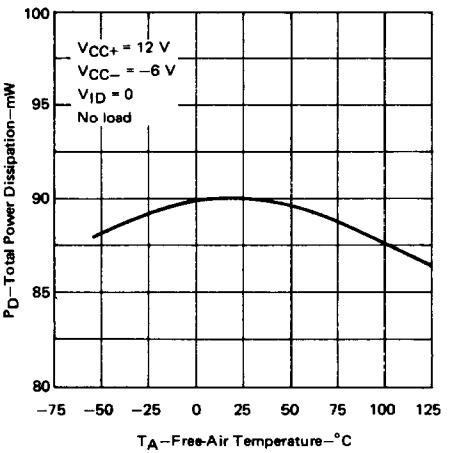

FIGURE 6

4 Voltage Comparators

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