Voltage Comparators

LM710C voltage comparator

general description

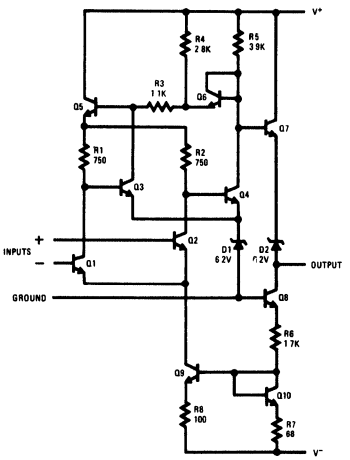
The LM710C is a high-speed voltage comparator intended for use as an accurate, low-level digital level sensor or as a replacement for operational amplifiers in comparator applications where speed is of prime importance. The circuit has a differential input and a single-ended output, with saturated output levels compatible with practically all types of integrated logic.

The device is built on a single silicon chip which insures low offset and thermal drift. The use of a minimum number of stages along with minority-carrier lifetime control (gold doping) makes the circuit much faster than operational amplifiers in saturating comparator applications. In fact, the low stray and wiring capacitances that can be realized with monolithic construction make the device difficult to duplicate with discrete components operating at equivalent power levels.

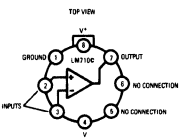
The LM710C is useful as a pulse height discriminator, a voltage comparator in high-speed A/D converters or a go, no-go detector in automatic test equipment. It also has applications in digital systems as an adjustable-threshold line receiver or an interface between logic types. In addition, the low cost of the unit suggests it for applications replacing relatively simple discrete component circuitry.

The LM710C is the commercial/industrial version of the LM710. It is identical to the LM710 except that operation is specified over a 0°C to +70°C temperature range.

schematic* and connection diagrams



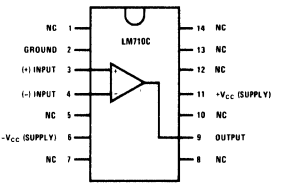
Metal Can Package



Note Pin 4 connected to case.

Order Number LM710CH
See Package 11

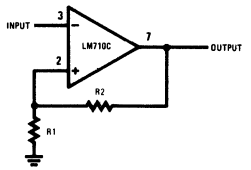
Dual-In-Line Package



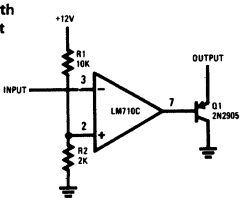
Order Number LM710CN
See Package 22

typical applications*

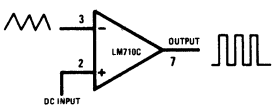
Schmidt Trigger



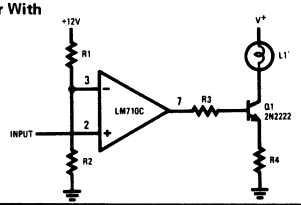
Line Receiver With Increased Output Sink Current



Pulse Width Modulator



Level Detector With Lamp Driver



*Pin connections shown are for metal can.

absolute maximum ratings

Positive Supply Voltage	14.0V
Negative Supply Voltage	−7.0V
Peak Output Current	10 mA
Differential Input Voltage	±5.0V
Input Voltage	±7.0V
Power Dissipation (Note 1)	
TO-99	300 mW
Flat Package	200 mW
Output Short Circuit Duration	10 sec
Operating Temperature Range	0°C to 70°C
Storage Temperature Range	−65°C to +150°C
Lead Temperature (Soldering, 10 sec)	300°C

electrical characteristics (Note 2)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Offset Voltage	$T_A = 25°C$, $R_S < 200\Omega$ $V_{CM} = 0V$		1 6	5 0	mV
Input Offset Current	$T_A = 25°C$, $V_{OUT} = 1.4V$		1 8	5 0	μA
Input Bias Current	$T_A = 25°C$		16	25	μA
Voltage Gain	$T_A = 25°C$	1000	1500		
Output Resistance	$T_A = 25°C$		200		Ω
Output Sink Current	$T_A = 25°C$, $\Delta V_{IN} \geq 10$ mV $V_{OUT} = 0$	1.6	2 5		mA
Response Time (Note 3)	$T_A = 25°C$		40		ns
Input Offset Voltage	$R_S \leq 200\Omega$, $V_{CM} = 0V$			6 5	mV
Average Temperature Coefficient of Input Offset Voltage	$0°C \leq T_A \leq 70°C$ $R_S \leq 50\Omega$		5 0	20	μV/°C
Input Offset Current				7 5	μA
Average Temperature Coefficient of Input Offset Current	$25°C \leq T_A \leq 70°C$ $0°C \leq T_A \leq 25°C$		15 24	50 100	nA/°C nA/°C
Input Bias Current	$T_A = 0°C$		25	40	μA
Input Voltage Range	$V^- = -7.0V$	±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			
Positive Output Level	$V_{IN} \geq 10$ mV $0 \leq I_{OUT} \leq -5$ mA	2 5	3.2	4 0	V
Negative Output Level	$V_{IN} \leq -10$ mV	−1.0	−0.5	0	V
Output Sink Current	$V_{IN} \leq -10$ mV, $V_{OUT} = 0V$	0.5			mA
Positive Supply Current	$V_{IN} \leq -10$ mV		5.2	9 0	mA
Negative Supply Current			4.6	7 0	mA
Power Consumption				150	mW

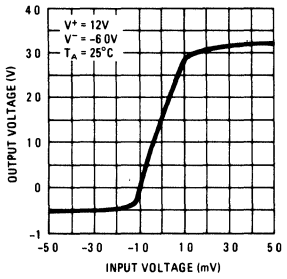
Note 1: Ratings apply for ambient temperatures to +70°C

Note 2: These specifications apply for $V^+ = 12V$, $V^- = 6.0V$, $0°C \leq T_A \leq +70°C$ unless otherwise specified. The input offset voltage and input offset current (see definitions) are specified for a logic threshold voltage of 1.5V at 0°C, 1.4V at +25°C and 1.2V at +70°C.

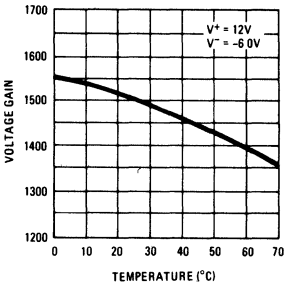
Note 3: The response time specified (see definitions) is for a 100 mV input step with 5.0 mV overdrive.

typical performance characteristics

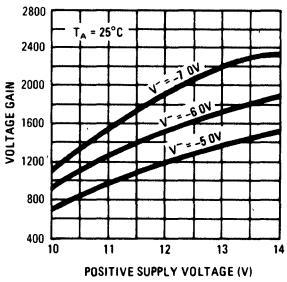
Transfer Function



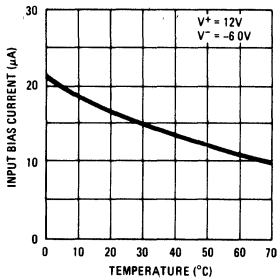
Voltage Gain



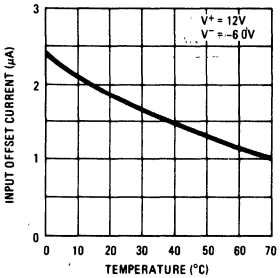
Voltage Gain



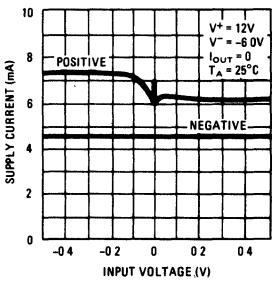
Input Bias Current



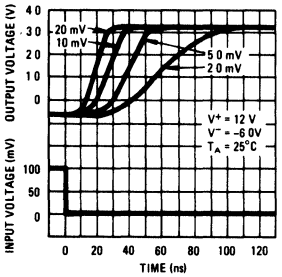
Input Offset Current



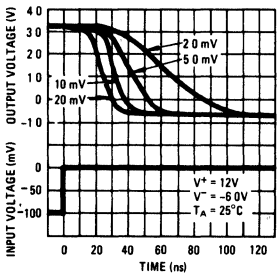
Supply Current



Response Time For Various Input Overdrives



Response Time For Various Input Overdrives



Common Mode Pulse Response