



# Voltage Comparators/Buffers

## LM106/LM206 voltage comparator/buffer general description

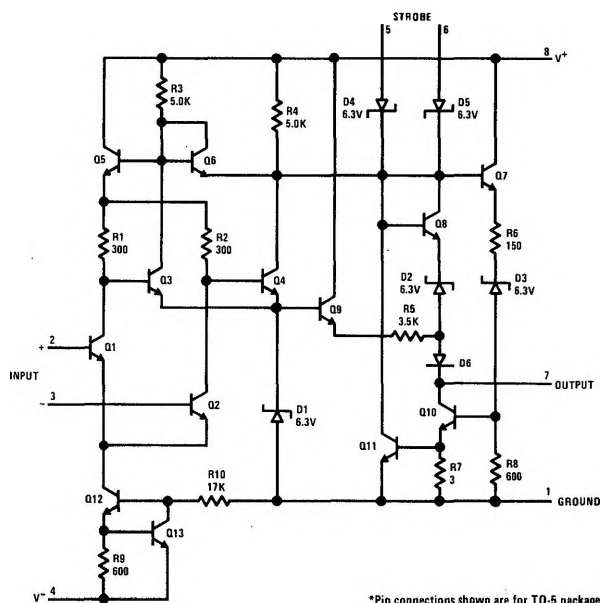
The LM106 and LM206 are high-speed voltage comparators designed to accurately detect low-level analog signals and drive a digital load. They are equivalent to an LM710, combined with a two input NAND gate and an output buffer. The circuits can drive RTL, DTL or TTL integrated circuits directly. Furthermore, their outputs can switch voltages up to 24V at currents as high as 100 mA. Other features include:

- Improved accuracy: 2 mV (max) offset, 40,000 gain
- Fan-out of 10 with DTL or TTL
- Added logic or strobe capability

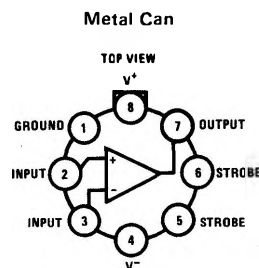
- Useful as a relay or lamp driver
- Plug-in replacement for the LM710.

The devices have short-circuit protection which limits the inrush current when it is used to drive incandescent lamps, in addition to preventing damage from accidental shorts. The speed is equivalent to that of an LM710. However, they are even faster where buffers and additional logic circuitry can be eliminated by the increased flexibility of the LM106 and LM206. They can also be operated from any negative supply voltage between -3V and -12V with little effect on performance.

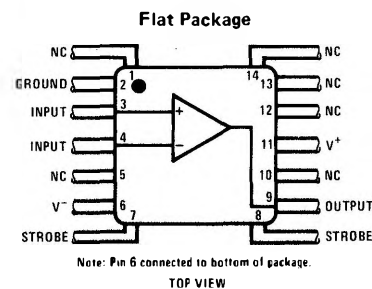
## schematic and connection diagrams \*



\*Pin connections shown are for TO-5 package



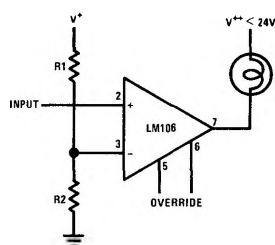
Note: Pin 4 connected to case.



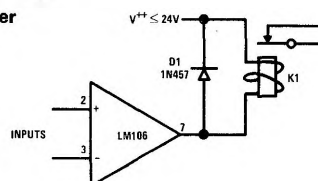
Note: Pin 6 connected to bottom of package.

## typical applications \*

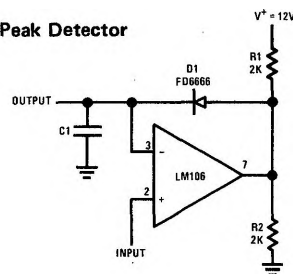
### Level Detector and Lamp Driver



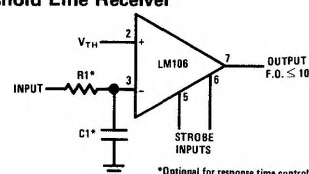
### Relay Driver



### Fast Response Peak Detector



### Adjustable Threshold Line Receiver



**absolute maximum ratings**

Positive Supply Voltage	15V	Power Dissipation (Note 1)	600 mW
Negative Supply Voltage	-15V	Output Short Circuit Duration	10 sec
Output Voltage	24V	Operating Temperature Range	LM106 -55°C to 125°C
Output to Negative Supply Voltage	30V		LM206 -25°C to 85°C
Differential Input Voltage	±5V	Storage Temperature Range	-65°C to 150°C
Input Voltage	±7V	Lead Temperature (soldering, 10 sec)	300°C

**electrical characteristics** (Note 2)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Offset Voltage	Note 3		0.5	2.0	mV
Input Offset Current	Note 3		0.7	3.0	μA
Input Bias Current			10	20	μA
Voltage Gain			40		V/mV
Response Time	Note 4		40		ns
Saturation Voltage	$V_{IN} \leq -5 \text{ mV}, I_{sink} = 100 \text{ mA}$		1.0	1.5	V
Output Leakage Current	$V_{IN} \geq 5 \text{ mV}, 8V \leq V_{OUT} \leq 24V$		0.02	1.0	μA

**electrical characteristics**

The following specifications apply for  $-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$  with the LM106 or  $-25^\circ\text{C} \leq T_A \leq 85^\circ\text{C}$  for the LM206

Input Offset Voltage	Note 3			3.0	mV
Average Temperature Coefficient of Input Offset Voltage			3.0	10	μV/°C
Input Offset Current	Note 3, $T_A = -55^\circ\text{C}$ $T_A = 125^\circ\text{C}$		1.8 0.25	7.0 3.0	μA μA
Average Temperature Coefficient of Input Offset Current	$25^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$ $-55^\circ\text{C} \leq T_A \leq 25^\circ\text{C}$		5.0 15	25 75	nA/°C nA/°C
Input Bias Current				45	μA
Input Voltage Range	$-7V \geq V^- \geq -12V$	±5.0			V
Differential Input Voltage Range		±5.0			V
Saturation Voltage	$V_{IN} \leq -5 \text{ mV}, I_{sink} = 50 \text{ mA}$			1.0	V
Saturation Voltage	$V_{IN} \leq -5 \text{ mV}, I_{sink} \leq 16 \text{ mA}$			0.4	V
Positive Output Level	$V_{IN} \geq 5 \text{ mV}, I_{OUT} = 400 \mu\text{A}$	2.5		5.5	V
Output Leakage Current	$V_{IN} \geq 5 \text{ mV}, 8V \leq V_{OUT} \leq 24V$			100	μA
Strobe Current	$V_{strobe} = 0.4V$		1.7	3.3	mA
Strobe ON Voltage		0.9	1.4		V
Strobe OFF Voltage	$I_{sink} \leq 16 \text{ mA}$		1.4	2.5	V
Positive Supply Current	$V_{IN} = -5 \text{ mV}$		5.5	10	mA
Negative Supply Current			1.5	3.6	mA

**Note 1.** The maximum junction temperature of the LM106 is 150°C, while that of the LM206 is 110°C. For operating at elevated temperatures, devices in the TO-5 package must be derated based on a thermal resistance of 150°C/W, junction to ambient, or 45°C/W, junction to case. For the flat package, the derating is based on a thermal resistance of 185°C/W when mounted on a 1/16-inch-thick epoxy glass board with ten, 0.03-inch-wide, 2-ounce copper conductors.

**Note 2.** These specifications apply for  $-3V \geq V^- \geq -12V$ ,  $V^+ = 12V$  and  $T_A = 25^\circ\text{C}$  unless otherwise specified.

**Note 3.** The offset voltages and offset currents given are the maximum values required to drive the output down to 0.5V or up to 5.0V. Thus, these parameters actually define an error band and take into account the worst-case effects of voltage gain and input impedance.

**Note 4.** The response time specified (see definitions) is for a 100 mV input step with 5 mV overdrive.

## typical performance characteristics

