

ML928/9

REMOTE CONTROL RECEIVERS (WITH LATCHED OUTPUTS)

Plessey Semiconductors have developed and produced a range of monolithic integrated circuits which give a wide variety of remote control facilities. As well as ultrasonic or infra-red transmission, cable, radio or telephone links may also be utilised. Pulse position modulation (PPM) is used with or without carrier and automatic error detection is also incorporated. Although initially designed with TV remote control in mind the devices may equally easily be applied for use in radios, tuners, tape and record decks, lamps and lighting, toys and models, industrial control and monitoring.

The ML928 and ML929 are general purpose remote control receivers, each receiving and latching 16 of the 32 codes transmitted by the SL490 circuit in the PPM (Pulse Position Modulation) mode. The ML928 responds to codes 00000 to 01111 only, and the ML929 to codes 10000 to 11111. Both devices are packaged in 8-lead minidip to minimise board area. The on-chip oscillator may be adjusted from 15Hz to 150kHz, allowing different transmission rates. They have a high degree of immunity to incorrect codes; there must be two consecutive correct codes received before the outputs can change.

FEATURES

- Accepts 5 Bit PPM
- On-Chip Oscillator, 15Hz to 150kHz Range
- Easily Used With Ultrasonic, Infra-Red or Other Transmission Media
- Four High Drive Outputs
- 16 Latched States
- Minimum Sized Package

QUICK REFERENCE DATA

- Power Supply: 12V to 18V. Typical 4mA at 16V.
- Demodulation: Pulse position with time window checking by on-chip oscillator
- Decoder: 5 Bit with successive codeword comparison
- Outputs: Maximum 15mA sourced from open drain drive
- Logic convention: Logic 0 output transistor ON, pulls

transistor ON, pull output to V_{ss} Logic 1 – output transistor OFF

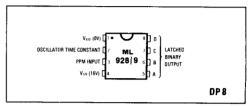


Fig.1 Pin connections - top view

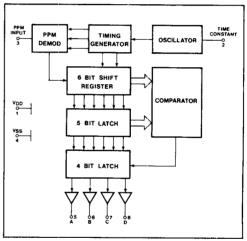


Fig. 2 ML928, ML929 remote control receivers block diagram

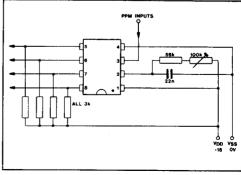


Fig. 3 Test circuit

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ELECTRICAL CHARACTERISTICS

Test conditions (unless otherwise stated):

Vss = 0V Voo = -16V

 $V_{DD} = -16V$ $T_{amb} = +25^{\circ}C$

Characteristic	Pin	Value				
		Min.	Тур.	Max.	Units	Conditions
Current Consumption V _{DD} Supply voltage	1 1	3 12	4	5 –18	mA V	
PPM input Logic '0' level Logic '1' level	3	-1 Vod		0 —6	V V	
Input pulse width		1		22T _{osc}	μS	$T_{\rm osc} = \frac{1}{f_{\rm osc}}$
Oscillator Timing Frequency	2	15	3k	150k	Hz Hz	Typical TC : 22 nF to Vss, 100kΩ to Vop
Variation w.r.t. Voo			1		%/V	
Latched binary output Logic '0' output voltage	5, 6, 7, 8	- 1.5		ov	V	RL = 3.0k to VDD
Output leakage in logic '1' state				1	μА	

Note 1, R_{osc.} (pin 2) is 56k-156k Ω . fosc. $\simeq \frac{1}{0.15 \text{CR}}$ ±20%

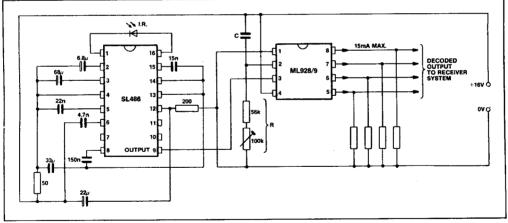


Fig.4 Typical application circuit, also shows general SL486 interface

PIN FUNCTIONS

Negative logic: '0' is 0V (V_{SS}), '1' is - 12V to -18V (V_{DD})

1. VDD --12V to --18V power supply

2. Oscillator time constant

An R-C time constant at this pin defines the internal clock frequency. The clock frequency may be varied from 15Hz at 150Hz and should be set so that there are 40 periods in one 't_o' transmitter pulse interval.

3. PPM input

The output of the 'front end' amplifier is connected to this pin; the signal must consist of a normal low level with pulses to high level corresponding to the PPM pulses from the transmitter.

4. Vss 0V (ground)

5-8. A,B,C,D

Four open-drain high power transistors give a binary coded latched output of the last valid code received.

P. Constant	Latched bin	ary outputs	
Transmitter Code	ML928	ML929	
EDCBA	DCBA	DCBA	
0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 1 0 0 0 1 0 1	0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 1 1 0 0 0 0 1 1 1 1 1 1 0 0 0 1 1 1 1 1 1 0 0 0 1	No change	
1 0 0 0 0 1 0 0 0 0 1 0 0 0 1 1 0 0 1 0 1 0 0 1 0 1 0 1 0	No change	0 0 0 0 0 0 0 1 0 0 0 1 1 0 0 1 0 0 0 1 0 1 0 1 0 1 0 1 1 1 1 0 0 0 1 1 0 1 0 1 0 1 1 1 1 0 0 1 1 1 1	

Table 1 Response to SL490 codes

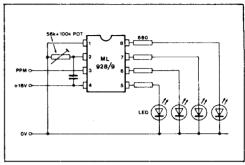


Fig. 5 Direct drive of LEDs

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