

REMOTE CONTROL PREAMPLIFIER

DESCRIPTION

The  $\mu$ PC1490 and  $\mu$ PC1491 are bipolar integrated circuit intended for application in infrared remote controls.

The  $\mu$ PC1490 and  $\mu$ PC1491 contain a high-gain amplifier, a limiter amplifier, a band-pass filter, a detector and a pulse shaper.

The  $\mu$ PC1490's output polarity is active "Low" and the  $\mu$ PC1491's output polarity is active "High".

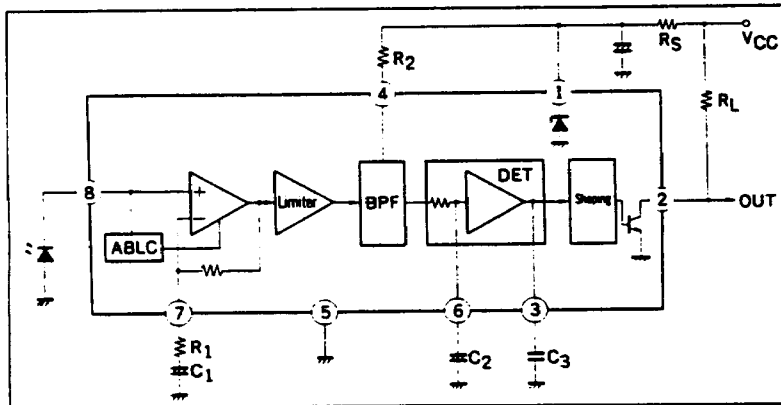
FEATURES

- On-chip band-pass filter: Frequency range 30 to 60 kHz.
- High gain pre-amplifier: 86 dB TYP.
- Detector for PCM demodulation
- Low current consumption
- Minimum external components
- Open collector output: Easy interface to all microcomputer remote control decoders.  
TTL and CMOS compatible output.

ORDERING INFORMATION

Part Number	Package	Output Data
$\mu$ PC1490HA	8 pin PLASTIC slim SIP	active "L"
$\mu$ PC1490G	8 pin PLASTIC SOP	
$\mu$ PC1491HA	8 pin PLASTIC slim SIP	active "H"
$\mu$ PC1491G	8 pin PLASTIC SOP	

BLOCK DIAGRAM



NEC cannot assume any responsibility for any circuits shown or represent that they are free from patent infringement.

**ABSOLUTE MAXIMUM RATINGS (T<sub>a</sub> = 25 °C)**

Supply Voltage	V <sub>CC</sub>	5.6*	V	*R <sub>s</sub> = 0 Ω
Output Voltage	V <sub>out</sub>	15	V	
Input Voltage	V <sub>IN</sub>	5.0	V <sub>p-p</sub>	
Supply Current	I <sub>CC</sub>	6.0	mA	
Output Current	I <sub>OUT</sub>	2.5	mA	
Power Dissipation	P <sub>D</sub>	270	mW	
Operating Temperature	T <sub>opt</sub>	-20 to +75	°C	
Storage Temperature	T <sub>stg</sub>	-40 to +125	°C	

**RECOMMENDED OPERATING CONDITIONS**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Power Supply Voltage	V <sub>CC</sub>	4.5	5.0	5.5	V	R <sub>s</sub> = 0 Ω
Power Supply Voltage	V <sub>CC'</sub>	11	12	13	V	R <sub>s</sub> = 1.5 kΩ
Operating Frequency	f <sub>0</sub>	30		60	kHz	

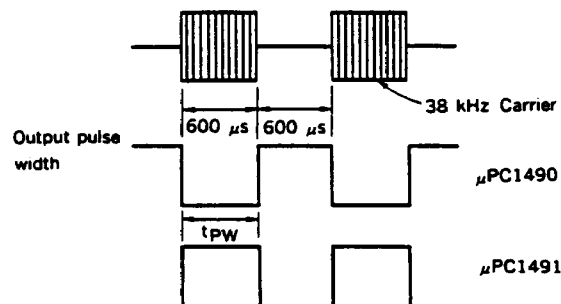
**ELECTRICAL CHARACTERISTICS (T<sub>a</sub> = 25 °C, V<sub>CC</sub> = 5.0 V)**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	ON-SW	TEST PIN	TEST CONDITIONS
Power Supply Current	I <sub>CC</sub>		1.6	2.5	mA	1, 7	V <sub>CC</sub>	μPC1490
			1.9	2.8	mA	1, 7	V <sub>CC</sub>	μPC1491
Input Pin Voltage 1	V <sub>IN1</sub>	2.0	2.5	3.1	V	7	8	
Input Pin Voltage 2	V <sub>IN2</sub>	0.6	0.9	1.7	V	2, 3, 7	8	I <sub>1</sub> = -100 μA
Voltage Gain	A <sub>v</sub>	74	86	89	dB	2, 4, 6	6	38 kHz CW, v <sub>i</sub> = 30 μV <sub>p-p</sub>
Frequency Response	A <sub>vQ</sub>	4.0	10		dB	2, 4, 6	6	28, 35, 41, 48 kHz CW v <sub>i</sub> = 30 μV <sub>p-p</sub> , Note 1
Input Impedance	r <sub>in</sub>	27	40	55	kΩ	2, 7	8	38 kHz CW, Note 2 v <sub>i</sub> = 0.2 V <sub>p-p</sub>
Output Pulse Width 1	tpw1	440		770	μs	2, 4, 7, 9	2	38 kHz Burst, v <sub>i</sub> = 60 μV <sub>p-p</sub> , Note 3
Output Pulse Width 2	tpw2	440		770	μs	2, 4, 7, 9	2	V <sub>CC</sub> = 4 V, 38 kHz Burst, v <sub>i</sub> = 50 mV <sub>p-p</sub> , Note 3
Output Voltage	V <sub>OL</sub>		0.2	0.4	V	1, 5, 9	2	μPC1490HA: E <sub>1</sub> = 1.0 V μPC1491HA: E <sub>1</sub> = 2.5 V
Output Leak Current	I <sub>OH</sub>			2.0	μA	1, 5, 8	2	E <sub>2</sub> = 15 V, μPC1490: E <sub>1</sub> = 2.5 V μPC1491: E <sub>1</sub> = 1.0 V

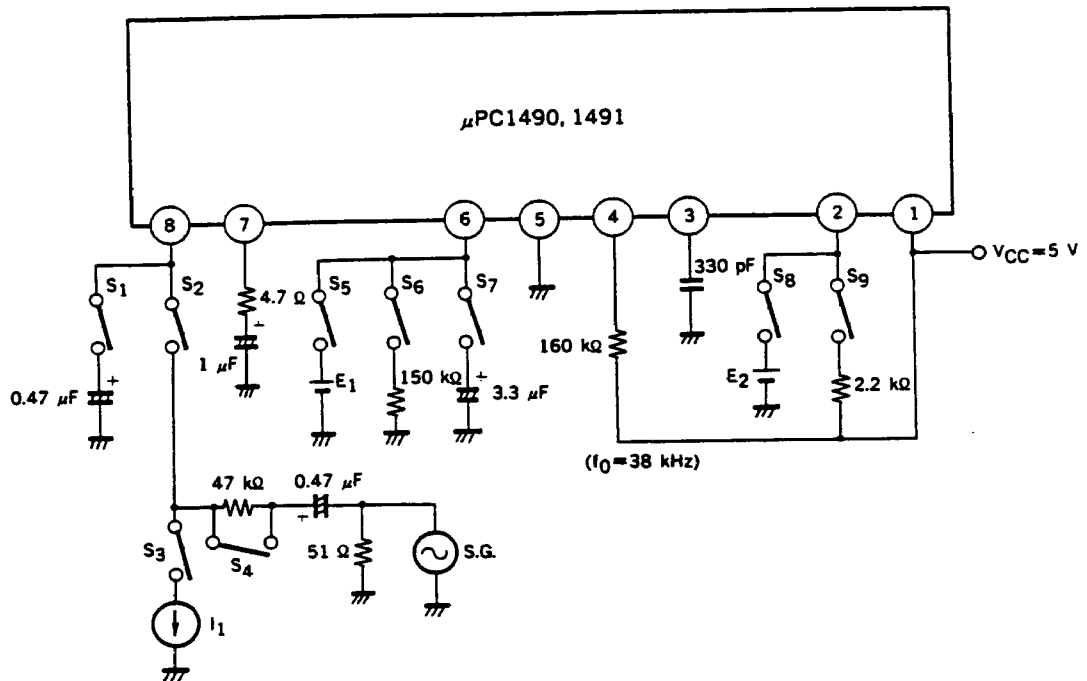
Note 1: Voltage gain difference A<sub>vQ</sub> = A<sub>v</sub> (35 kHz) - A<sub>v</sub> (28 kHz)  
A<sub>vQ</sub> = A<sub>v</sub> (41 kHz) - A<sub>v</sub> (48 kHz)

Note 2:  $r_{in} = \frac{47}{v_i/v_x - 1}$  (kΩ), v<sub>x</sub>: Input voltage, v<sub>i</sub>: SG output voltage

Note 3: Input burst



TEST CIRCUIT



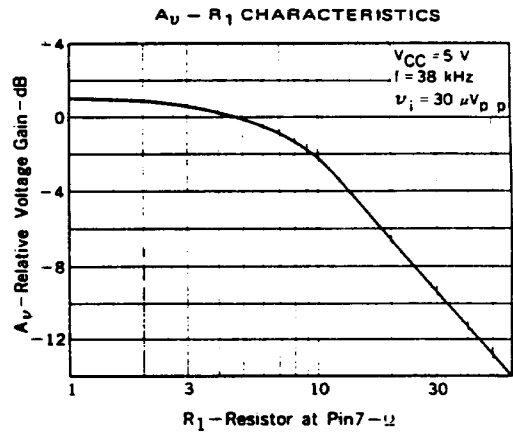
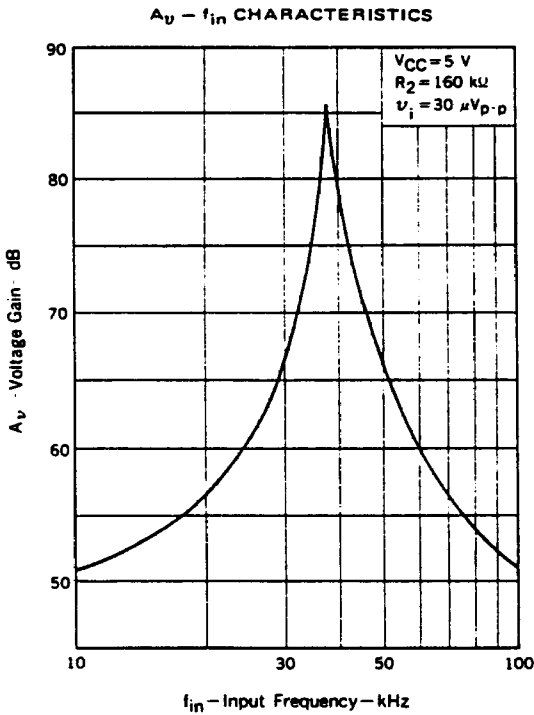
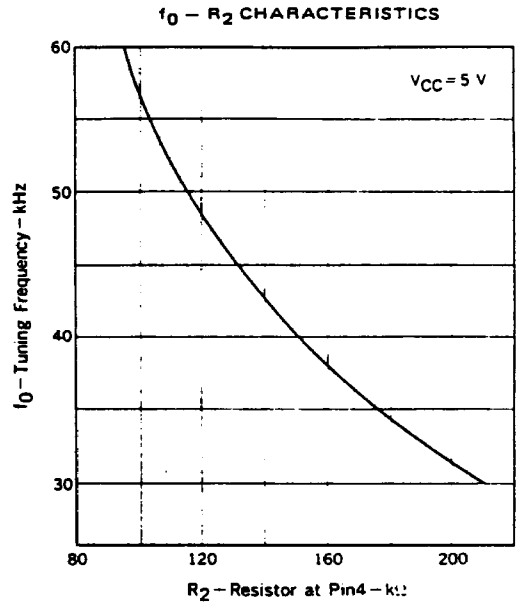
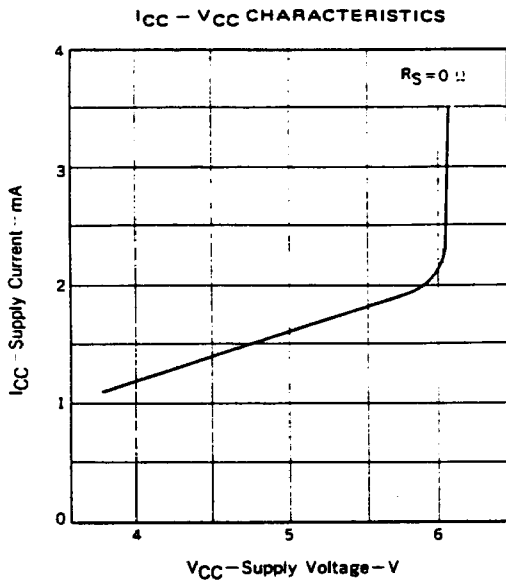
PIN DESIGNATION

PIN No.	SYMBOL	NAME & FUNCTION
1	VCC	Power Supply
2	OUT	Output
3	C <sub>I</sub>	Integral Capacitor
4	f <sub>0</sub>	Band-pass Filter Center Frequency Adjust
5	GND	Ground
6	C <sub>D</sub>	Detector Capacitor
7	IN <sup>-</sup>	Input -
8	IN <sup>+</sup>	Input +

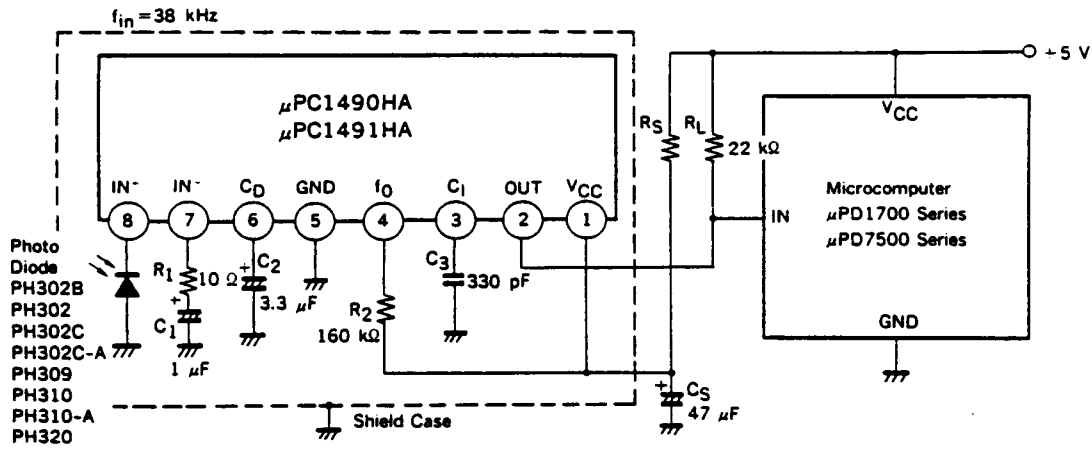
## PIN FUNCTION

- Power Supply ( $V_{CC}$ :Pin1, GND:Pin5)
  - Normal operation voltage is  $5\text{ V} \pm 10\%$ .
  - In case of using a  $12\text{ V} \pm 1\text{ V}$  power supply, insert a  $1.5\text{ k}\Omega \pm 5\%$  series resistor between  $V_{CC}$  and power supply.
  - The internal zener diode regulates the  $V_{CC}$  voltage to about  $5.9\text{ V}$ . Do not supply the circuit current more than  $6.0\text{ mA}$ .
- Input ( $IN^+$ :Pin8,  $IN^-$ :Pin7)
  - The input impedance is  $40\text{ k}\Omega$  TYP.
  - The infrared receiver diode can be directly connected to the input.
  - This input has ABLC (Automatic Bias Level Control) circuit and it keeps the amplifier properly biased from IR inputs.
  - The voltage gain of the input amplifier is determined by the external impedance  $R_1$  and  $C_1$  at Pin7.
- Band-pass Filter Center Frequency Adjust ( $f_0$ :Pin4)
  - The tuning frequency of band-pass filter is determined by internal capacitors and the external resistor  $R_2$ . The tuning frequency ranges from  $30\text{ kHz}$  to  $60\text{ kHz}$ .
- Detector Capacitor ( $C_D$ :Pin6)
  - The detector consists of a filter and a comparator. The external capacitor  $C_2$  at Pin 6 is used for the filter.
- Integral Capacitor ( $C_1$ :Pin3)
  - The external capacitor  $C_3$  at Pin 3 filters the carrier from the pulses.
- Output (OUT:Pin2)
  - The output is open collector transistor, can directly drives a TTL or a CMOS. And the break-down voltage of the output is over  $15\text{ V}$ , so it is easy to interface to all microcomputer remote control decoders.
  - The  $\mu$ PC1490 is active "Low" output. The  $\mu$ PC1491 is active "High" output.

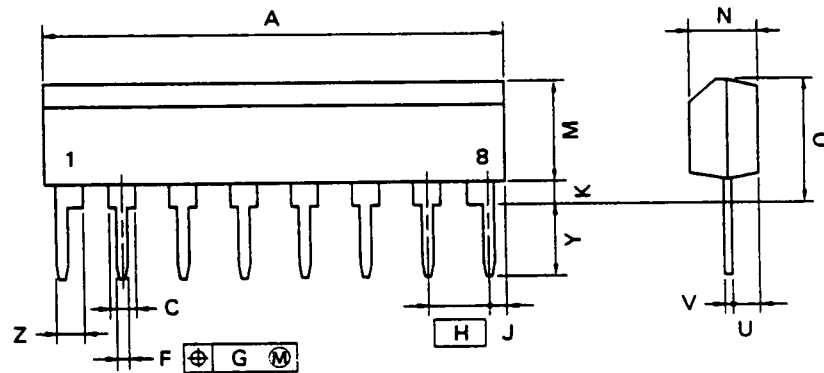
TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )



APPLICATION



8 PIN PLASTIC SLIM SIP



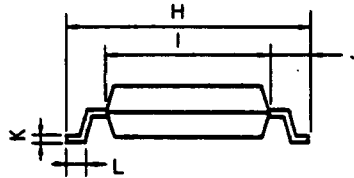
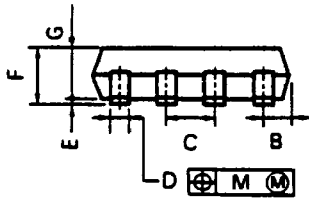
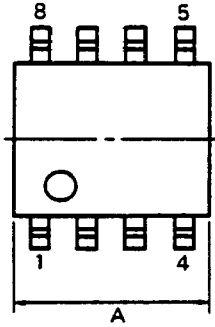
**NOTE**

Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.

P8HA-2548

ITEM	MILLIMETERS	INCHES
A	20.32 MAX.	0.8 MAX.
C	1.1 MIN.	0.043 MIN.
F	$0.5^{+0.1}$	$0.02^{+0.004}$
G	0.25	0.01
H	2.54	0.1
J	1.27 MAX.	0.05 MAX.
K	0.51 MIN.	0.02 MIN.
M	5.08 MAX.	0.2 MAX.
N	$2.8^{+0.2}$	$0.11^{+0.008}$
Q	5.75 MAX.	0.227 MAX.
U	1.5 MAX.	0.059 MAX.
V	$0.25^{+0.008}$	$0.01^{+0.0003}$
Y	$3.2^{+0.05}$	$0.126^{+0.002}$
Z	1.1 MIN.	0.043 MIN.

8PIN PLASTIC MINI FLAT (225 mil)



S8GM-50-225B

NOTE

Each lead centerline is located within 0.12 mm (0.005 inch) of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS	INCHES
A	5.70 MAX.	0.225 MAX.
B	0.94 MAX.	0.037 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	0.40 $^{+0.10}$	0.016 $^{+0.004}$
E	0.1 $^{+0.1}$	0.004 $^{+0.004}$
F	1.8 MAX.	0.071 MAX.
G	1.49	0.059
H	6.5 $^{+0.3}$	0.256 $^{+0.012}$
I	4.4	0.173
J	1.1	0.043
K	0.15 $^{+0.10}$	0.006 $^{+0.004}$
L	0.6 $^{+0.2}$	0.024 $^{+0.008}$
M	0.12	0.005

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