

REMOTE CONTROL PREAMPLIFIER

DESCRIPTION

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

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

The μ PC1490's output polarity is active "Low" and the μ PC1491's output polarity is active "High".

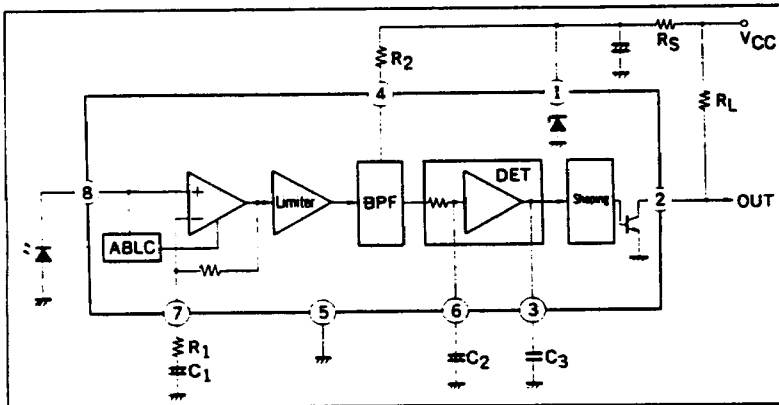
FEATURES

- 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
μ PC1490HA	8 pin PLASTIC slim SIP	active "L"
μ PC1490G	8 pin PLASTIC SOP	
μ PC1491HA	8 pin PLASTIC slim SIP	active "H"
μ 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 ($T_a = 25^\circ\text{C}$)

Supply Voltage	V_{CC}	5.6*	V	* $R_s = 0\ \Omega$
Output Voltage	V_{out}	15	V	
Input Voltage	V_{IN}	5.0	V_{p-p}	
Supply Current	I_{CC}	6.0	mA	
Output Current	I_{OUT}	2.5	mA	
Power Dissipation	P_D	270	mW	
Operating Temperature	T_{opt}	-20 to +75	$^\circ\text{C}$	
Storage Temperature	T_{stg}	-40 to +125	$^\circ\text{C}$	

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Power Supply Voltage	V_{CC}	4.5	5.0	5.5	V	$R_s = 0\ \Omega$
Power Supply Voltage	V_{CC}'	11	12	13	V	$R_s = 1.5\ \text{k}\Omega$
Operating Frequency	f_0	30		60	kHz	

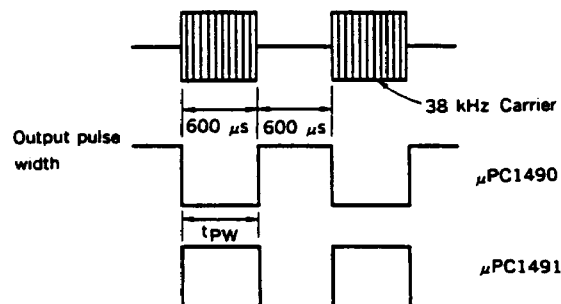
ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$, $V_{CC} = 5.0\ \text{V}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	ON-SW	TEST PIN	TEST CONDITIONS
Power Supply Current	I_{CC}		1.6	2.5	mA	1, 7	V_{CC}	μ PC1490
			1.9	2.8	mA	1, 7	V_{CC}	μ PC1491
Input Pin Voltage 1	V_{IN1}	2.0	2.5	3.1	V	7	8	
Input Pin Voltage 2	V_{IN2}	0.6	0.9	1.7	V	2, 3, 7	8	$I_1 = -100\ \mu\text{A}$
Voltage Gain	A_v	74	86	89	dB	2, 4, 6	6	38 kHz CW, $v_i = 30\ \mu\text{V}_{p-p}$
Frequency Response	A_{vQ}	4.0	10		dB	2, 4, 6	6	28, 35, 41, 48 kHz CW $v_i = 30\ \mu\text{V}_{p-p}$, Note 1
Input Impedance	r_{in}	27	40	55	$\text{k}\Omega$	2, 7	8	38 kHz CW, Note 2 $v_i = 0.2\ \text{V}_{p-p}$
Output Pulse Width 1	$tpw1$	440		770	μs	2, 4, 7, 9	2	38 kHz Burst, $v_i = 60\ \mu\text{V}_{p-p}$, Note 3
Output Pulse Width 2	$tpw2$	440		770	μs	2, 4, 7, 9	2	$V_{CC} = 4\ \text{V}$, 38 kHz Burst, $v_i = 50\ \text{mV}_{p-p}$, Note 3
Output Voltage	V_{OL}		0.2	0.4	V	1, 5, 9	2	μ PC1490HA: $E_1 = 1.0\ \text{V}$ μ PC1491HA: $E_1 = 2.5\ \text{V}$
Output Leak Current	I_{OH}			2.0	μA	1, 5, 8	2	$E_2 = 15\ \text{V}$, μ PC1490: $E_1 = 2.5\ \text{V}$ μ PC1491: $E_1 = 1.0\ \text{V}$

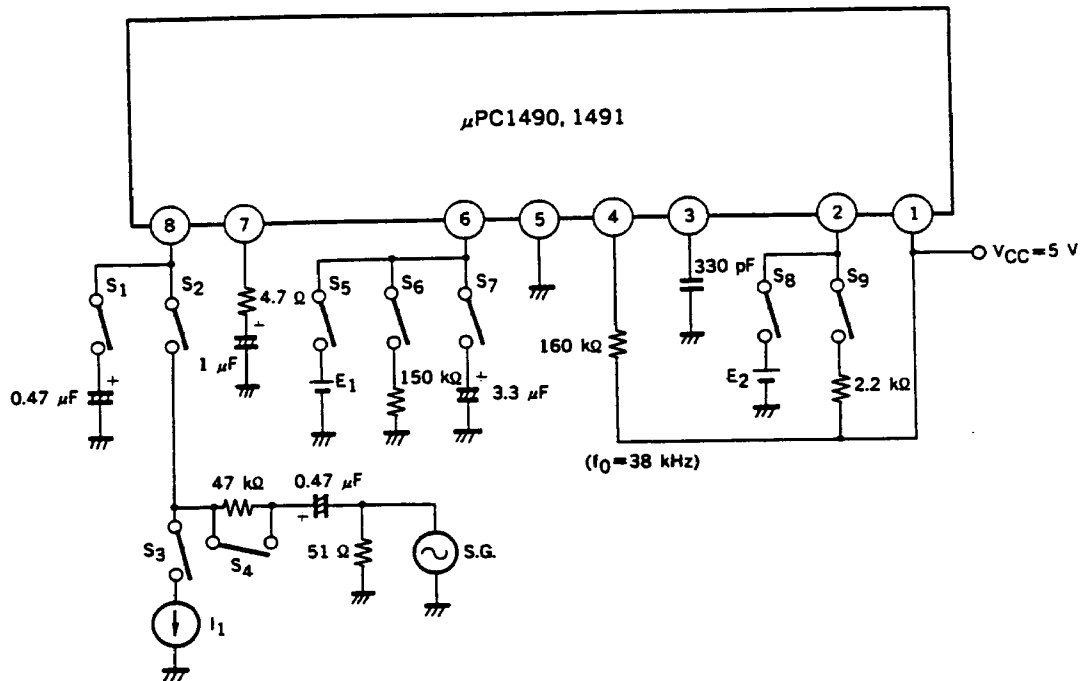
Note 1: Voltage gain difference $A_{vQ} = A_v(35\ \text{kHz}) - A_v(28\ \text{kHz})$
 $A_{vQ} = A_v(41\ \text{kHz}) - A_v(48\ \text{kHz})$

Note 2: $r_{in} = \frac{47}{v_i/v_x - 1}$ ($\text{k}\Omega$), v_x : Input voltage, v_i : SG output voltage

Note 3: Input burst



TEST CIRCUIT



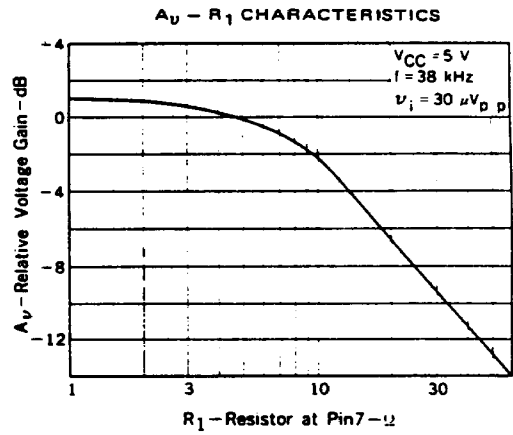
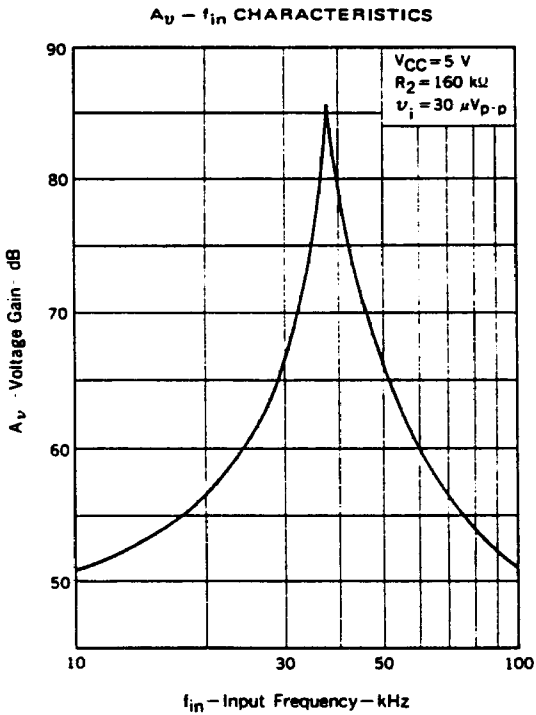
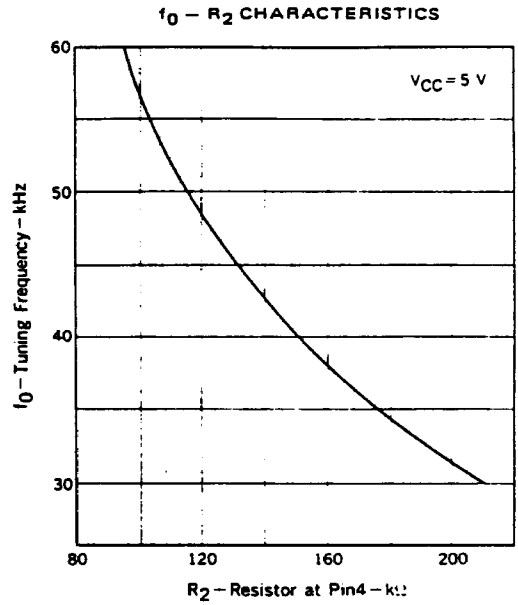
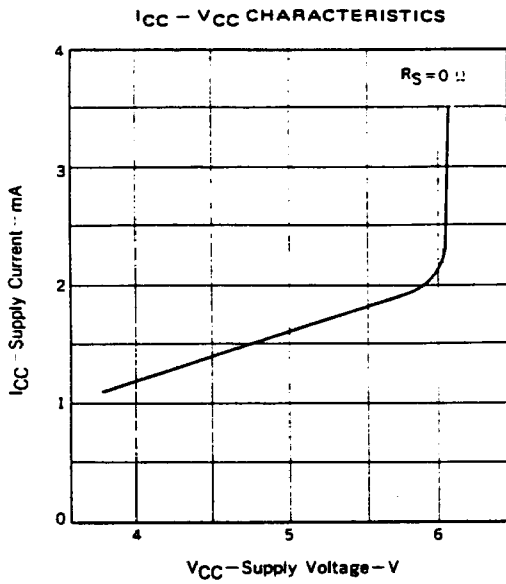
PIN DESIGNATION

PIN No.	SYMBOL	NAME & FUNCTION
1	V _{CC}	Power Supply
2	OUT	Output
3	C _I	Integral Capacitor
4	f ₀	Band-pass Filter Center Frequency Adjust
5	GND	Ground
6	C _D	Detector Capacitor
7	IN ⁻	Input -
8	IN ⁺	Input +

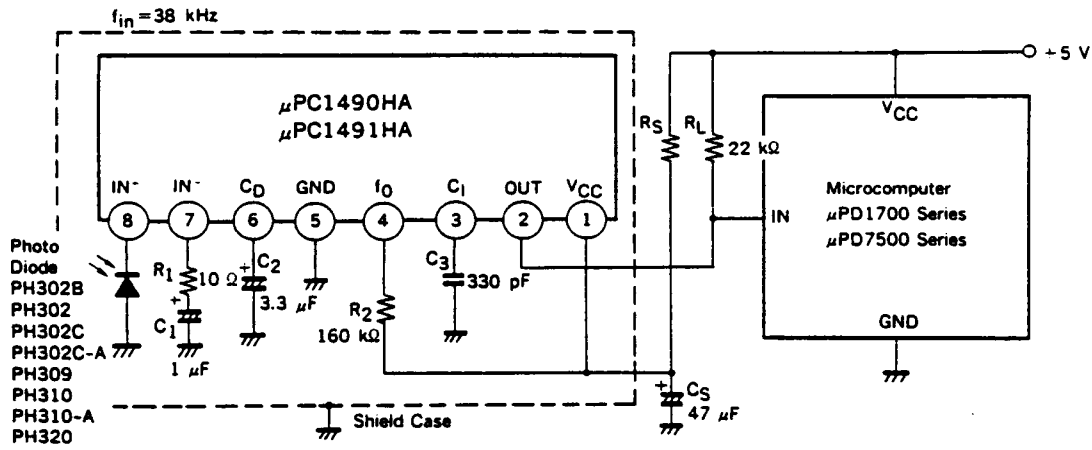
PIN FUNCTION

- 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 V . Do not supply the circuit current more than 6.0 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 kHz to 60 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 V , so it is easy to interface to all microcomputer remote control decoders.
 - The μ PC1490 is active "Low" output. The μ PC1491 is active "High" output.

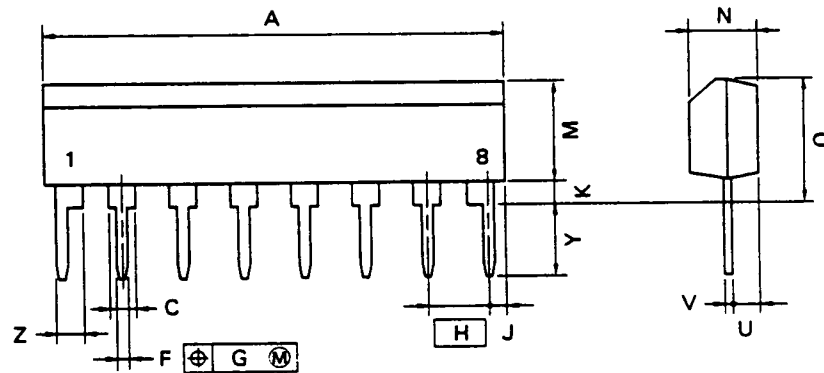
TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)



APPLICATION



8 PIN PLASTIC SLIM SIP



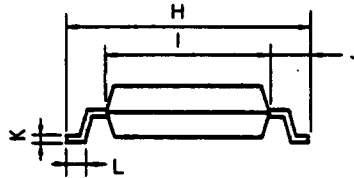
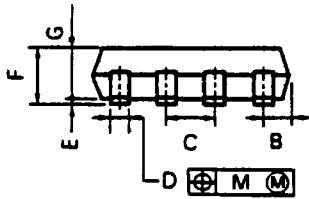
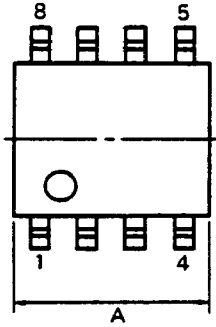
NOTE

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	$3.2^{+0.5}$	$0.126^{+0.02}$
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} _{-0.10}	0.016 ^{+0.004} _{-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} _{-0.10}	0.006 ^{+0.002} _{-0.002}
L	0.6 ^{+0.2}	0.024 ^{+0.008} _{-0.008}
M	0.12	0.005

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