DATA SHEET

NEC
ELECTRON DEVICE

BIPOLAR ANALOG INTEGRATED CIRCUITS

μPC1490, μPC1491

REMOTE CONTROL PREAMPLIFIER

DESCRIPTION

The μPC1490 and μPC1491 are bipolar integrated circuit intended for application in infrared remote controls.

The μPC1490 and μPC1491 contain a high-gain amplifier, a limiter amplifier, a band-pass filter, a detector and a pulse shaper.

The μPC1490's output polarity is active "Low" and the μPC1491's output polarity is active "High".

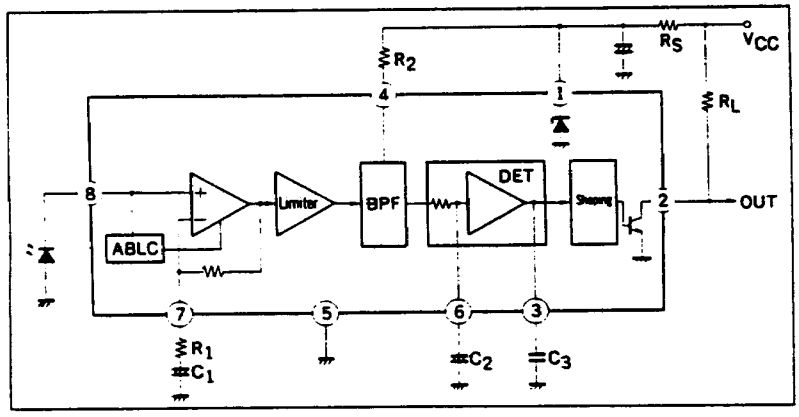
FEATURES

- 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
μPC1490HA	8 pin PLASTIC slim SIP	active "L"
μPC1490G	8 pin PLASTIC SOP	
μPC1491HA	8 pin PLASTIC slim SIP	active "H"
μPC1491G	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 °C)

Supply Voltage	V_{CC}	5.6*	V	*R_s = 0 Ω
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	°C	
Storage Temperature	T_{stg}	−40 to +125	°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 Ω
Power Supply Voltage	V_{CC}'	11	12	13	V	R_s = 1.5 kΩ
Operating Frequency	f_0	30		60	kHz	

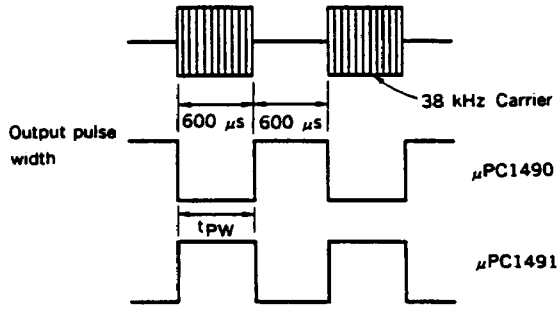
ELECTRICAL CHARACTERISTICS (T_a = 25 °C, V_{CC} = 5.0 V)

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}	μPC1490
			1.9	2.8	mA	1, 7	V_{CC}	μPC1491
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 μA
Voltage Gain	A_v	74	86	89	dB	2, 4, 6	6	38 kHz CW, v_i = 30 μV_{p-p}
Frequency Response	A_{vQ}	4.0	10		dB	2, 4, 6	6	28, 35, 41, 48 kHz CW v_i = 30 μV_{p-p}, Note 1
Input Impedance	r_{in}	27	40	55	kΩ	2, 7	8	38 kHz CW, Note 2 v_i = 0.2 V_{p-p}
Output Pulse Width 1	t_{PW1}	440		770	μs	2,4,7,9	2	38 kHz Burst, v_i = 60 μV_{p-p}, Note 3
Output Pulse Width 2	t_{PW2}	440		770	μs	2,4,7,9	2	V_{CC} = 4 V, 38 kHz Burst, v_i = 50 mV_{p-p}, Note 3
Output Voltage	V_{OL}		0.2	0.4	V	1, 5, 9	2	μPC1490HA: E_1 = 1.0 V μPC1491HA: E_1 = 2.5 V
Output Leak Current	I_{OH}			2.0	μA	1, 5, 8	2	E_2 = 15 V, μPC1490: E_1 = 2.5 V μPC1491: E_1 = 1.0 V

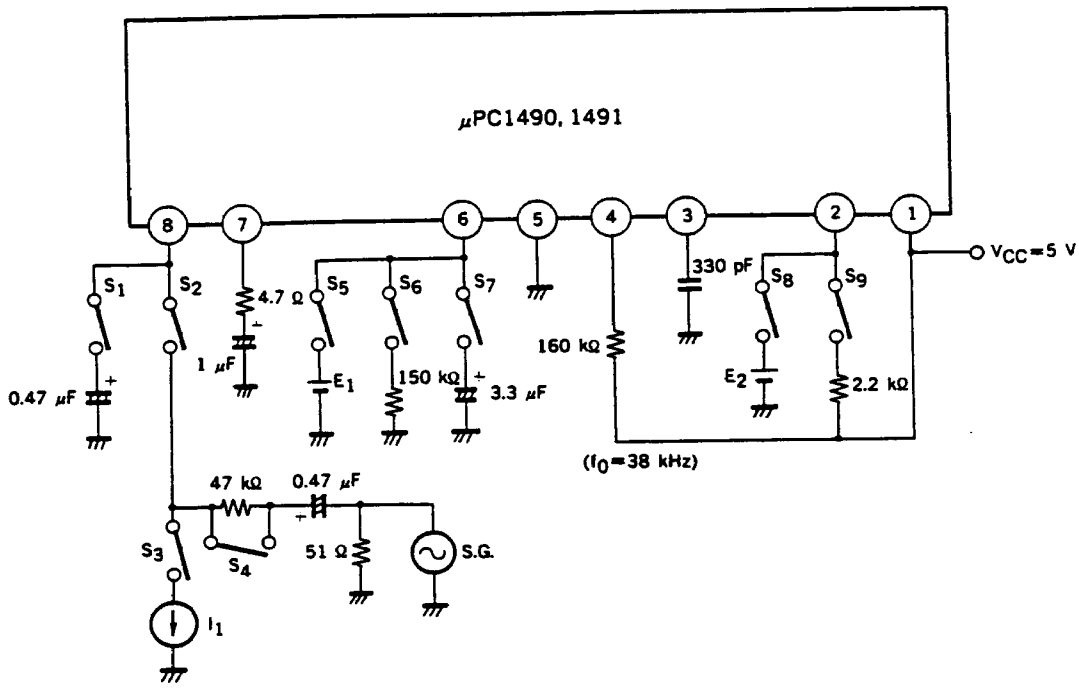
Note 1: Voltage gain difference $A_{vQ} = A_v$ (35 kHz) − A_v (28 kHz)
$A_{vQ} = A_v$ (41 kHz) − A_v (48 kHz)

Note 2: $r_{in} = \dfrac{47}{v_i/v_x - 1}$ (kΩ), 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 V ± 10 %.

  In case of using a 12 V ± 1 V power supply, insert a 1.5 kΩ ± 5 % series resister 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 kΩ 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_I:Pin3)

  The external capacitor C_3 at Pin 3 filters the carrier from the pulses.

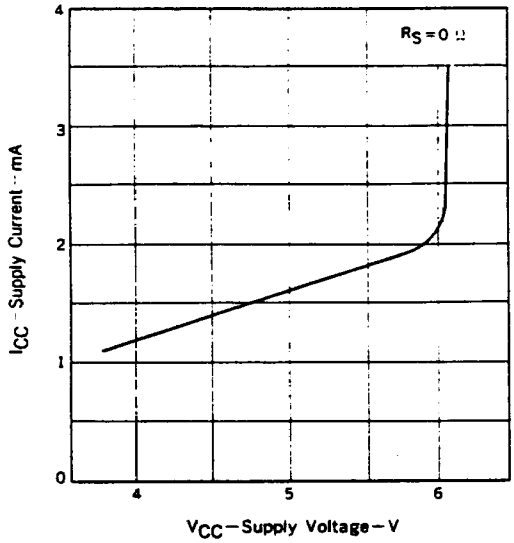
- Output (OUT:Pin2)

  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.

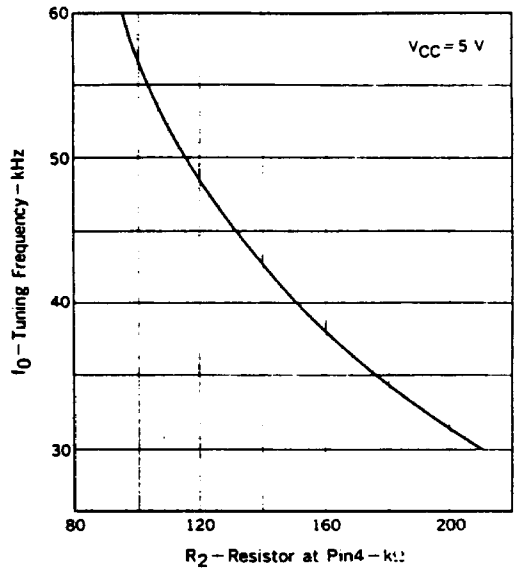
  The μPC1490 is active "Low" output. The μPC1491 is active "High" output.

TYPICAL CHARACTERISTICS (T_a = 25 °C)

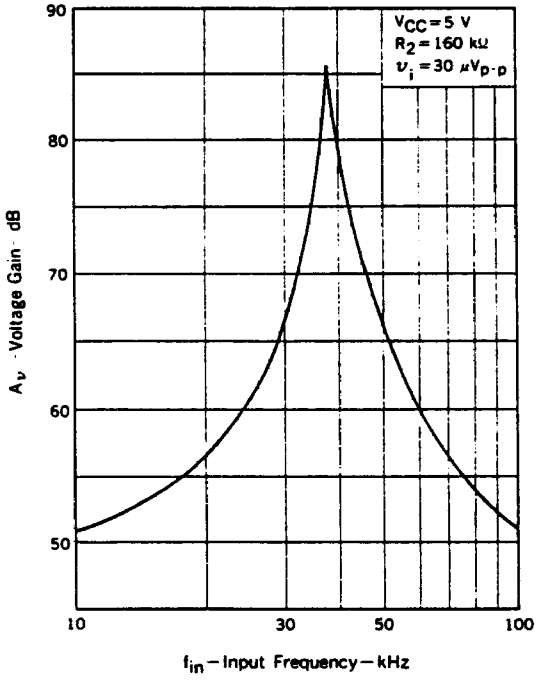
I_{CC} – V_{CC} CHARACTERISTICS



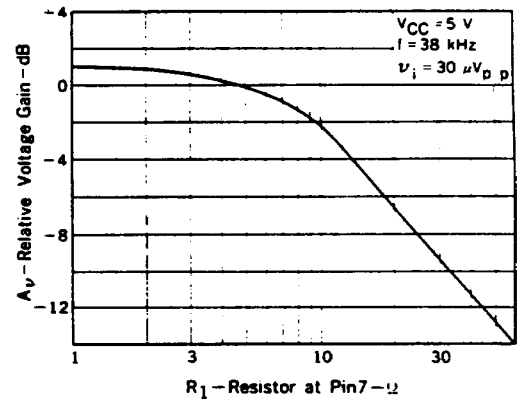
f_0 – R_2 CHARACTERISTICS



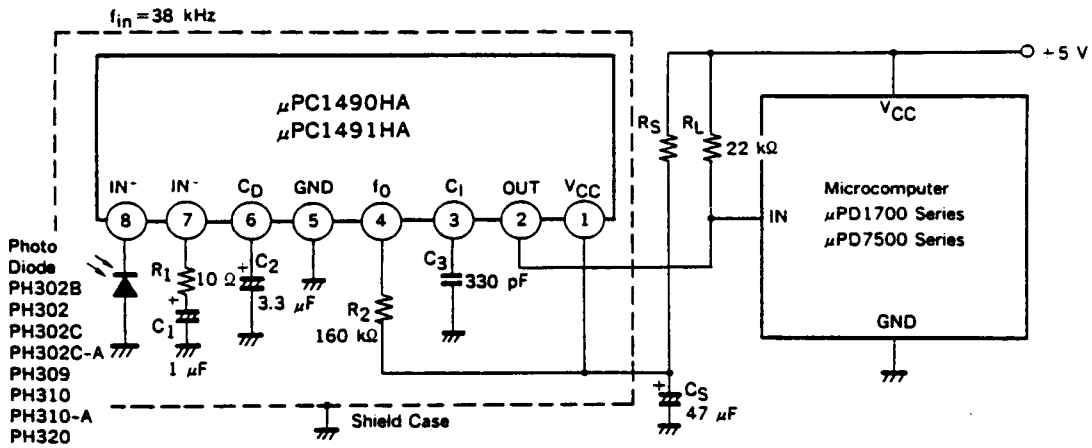
A_v – f_{in} CHARACTERISTICS



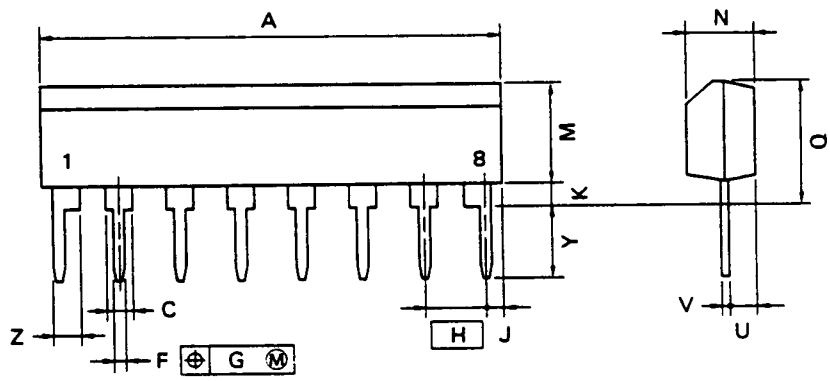
A_v – R_1 CHARACTERISTICS



APPLICATION



8 PIN PLASTIC SLIM SIP

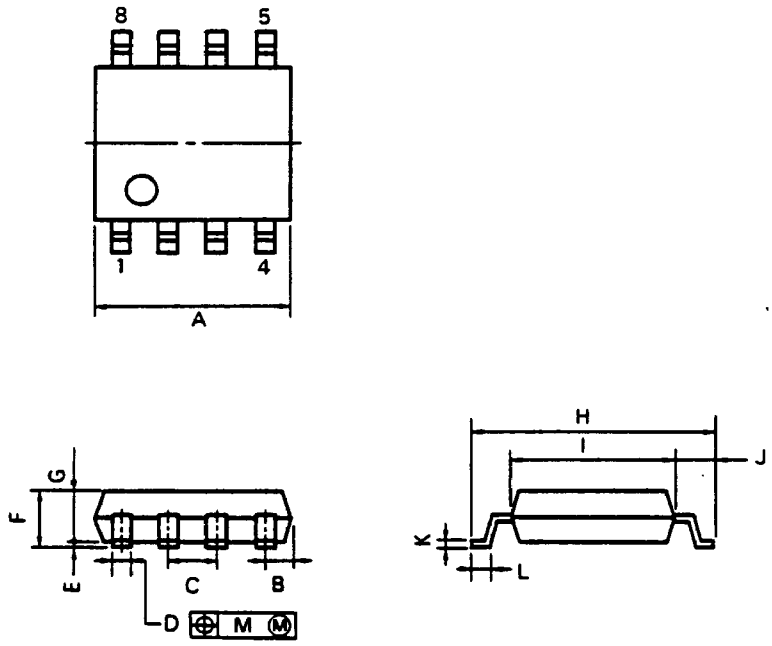


P8HA-2548

ITEM	MILLIMETERS	INCHES
A	20.32 MAX.	0.8 MAX.
C	1.1 MIN.	0.043 MIN.
F	$0.5^{+0.1}$	$0.02^{+0.004}_{-0.005}$
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	$0.25^{+0.10}_{-0.05}$	$0.01^{+0.004}_{-0.003}$
Y	$3.2^{+0.5}$	$0.126^{+0.020}$
Z	1.1 MIN.	0.043 MIN.

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

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	$0.40^{+0.10}_{-0.08}$	$0.016^{+0.004}_{-0.003}$
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	$0.15^{+0.10}_{-0.08}$	$0.006^{+0.004}_{-0.003}$
L	0.6 ± 0.2	$0.024^{+0.008}_{-0.009}$
M	0.12	0.005

IC-1808
March 1988M
Printed in Japan