

# 2-channel PRE / REC amplifier with auto-tracking interface

## BA7182AS

The BA7182AS is a PRE / REC amplifier developed for use in video cassette recorders. It has been designed for use in two-head decks and features built-in FB damping, two preamplifiers, a chroma output amplifier, an FM output amplifier (with AGC), an envelope detector, a constant-current BTL-drive REC amplifier (with AGC) and built-in channel and REC / PB switches on a single monolithic IC.

### ●Applications

VCRs

### ●Features

- 1) The playback amplifier has a total gain of 59dB (Typ.), and has a low-noise preamplifier. Designed for VHS-band operation with low external parts count. The IC has 2 circuits for 2-head VCR applications.
- 2) Two playback output systems (through output and AGC output). The AGC output level is 270mV<sub>P-P</sub> (Typ.) ; suitable for FM brightness signal output.
- 3) Auto-tracking interface for automated tracking adjustment. An integrate and hold detector is used to reduce the load on the microcontroller.
- 4) The recording amplifier uses constant-current BLT drive that handles load variations (i.e. headimpedance) well, and gives stable recording characteristics. A single circuit is provided for 2-head VCR use.
- 5) Built-in recording level AGC means adjustment of FM recording current is not necessary.
- 6) Head switches for 2-channel PRE / REC system provided.
- 7) Operates off a single 5V power supply, with low power dissipation.

### ●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Applied voltage	V <sub>CC</sub>	7.0	V
Power dissipation	P <sub>d</sub>	1100*	mW
Operating temperature	T <sub>opr</sub>	- 20 ~ + 75	°C
Storage temperature	T <sub>stg</sub>	- 55 ~ + 125	°C

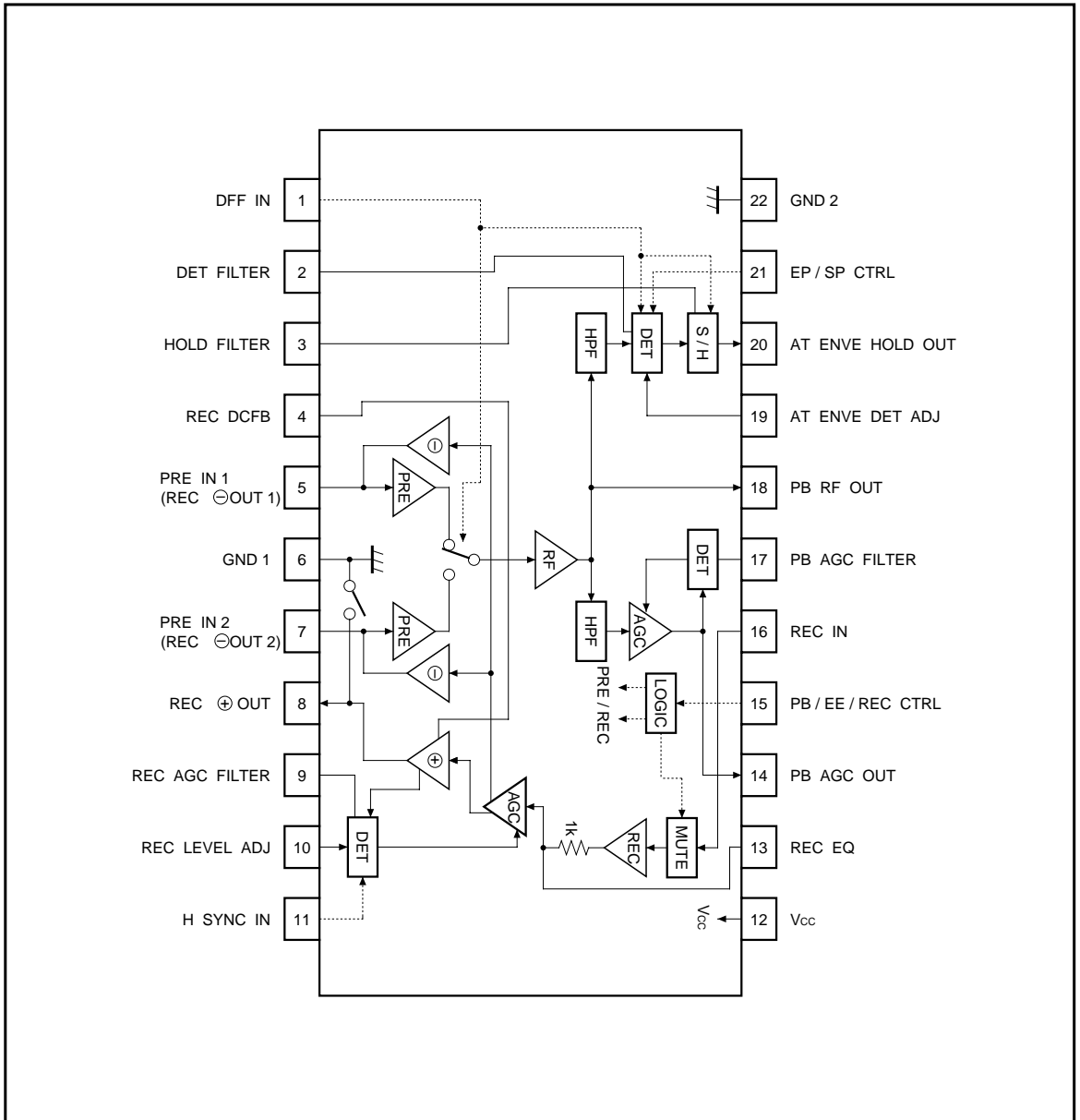
\* Reduced by 11mW for each increase in Ta of 1°C over 25°C (free air).

### ●Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Playback / recording	V <sub>CC</sub>	4.5	5.0	5.5	V	12pin

○Not designed for radiation resistance.

●Block diagram



●Electrical characteristics (unless otherwise noted, Ta = 25°C, Vcc = 5.0V and f = 4.0MHz)

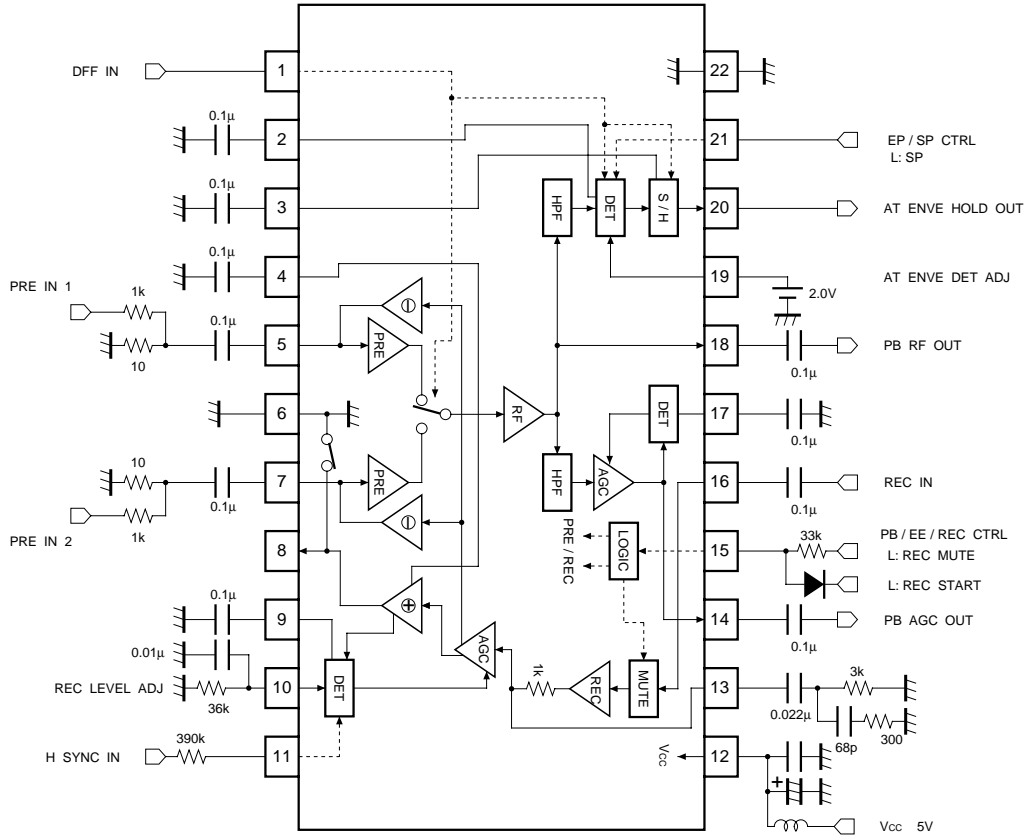
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Measurement circuit
〈Playback system〉 (Pin 15: H)							
Quiescent current	I <sub>q (P)</sub>	—	26	42	mA	No signal	Fig.1
Voltage gain ch-1	G <sub>VP1</sub>	56.5	59	61.5	dB	Pin 5 input = 0.3mV <sub>P-P</sub> , pin 1: L, pin 18 output measurement	Fig.1
Voltage gain ch-2	G <sub>VP2</sub>	56.5	59	61.5	dB	Pin 7 input = 0.3mV <sub>P-P</sub> , pin 1: H, pin 18 output measurement	Fig.1
Voltage gain differential	ΔG <sub>VP</sub>	-1	0	1	dB	ΔG <sub>VP</sub> = G <sub>VP1</sub> - G <sub>VP2</sub>	Fig.1
Frequency characteristic	ΔG <sub>VF</sub>	-6	-3	-1	dB	Difference in pin 18 output level for f = 8.0 / 1.0MHz, V <sub>IN</sub> = 0.3mV <sub>P-P</sub>	Fig.1
2nd harmonic distortion	2HDP	—	-45	-35	dBc	V <sub>IN</sub> = 0.3mV <sub>P-P</sub> , 8.0MHz spurious	Fig.1
3rd harmonic distortion	3HDP	—	-50	-35	dBc	V <sub>IN</sub> = 0.3mV <sub>P-P</sub> , 12.0MHz spurious, guaranteed design value.	Fig.1
Maximum output level	V <sub>OMP</sub>	1.0	1.5	—	V <sub>P-P</sub>	When pin 18 output 2nd harmonic distortion is -30dBc	Fig.1
Crosstalk	CT <sub>P</sub>	—	-38	-33	dBc	Difference in pin 18 output level for pin 1: H / L.	Fig.1
Output DC offset	ΔV <sub>ODC</sub>	-150	0	150	mV <sub>P-P</sub>	Pin 18 output DC offset for pin 1: H / L.	Fig.1
Input conversion noise	V <sub>NIN</sub>	—	0.25	1.0	μV <sub>rms</sub>	R <sub>g</sub> = 10Ω, input conversion of pin 18 output noise, guaranteed design value.	Fig.1
AGC output level	V <sub>AGC</sub>	220	270	320	mV <sub>P-P</sub>	V <sub>IN</sub> = 0.3mV <sub>P-P</sub> Pin 14 output measurement	Fig.1
AGC control sensitivity	ΔV <sub>AGC</sub>	—	0.3	2	dB	Pin 14 output level difference for V <sub>IN</sub> = 0.15 and 0.6mV <sub>P-P</sub>	Fig.1
AGC frequency characteristic	ΔG <sub>VAF</sub>	-2	0.5	2	dB	Difference in pin 14 output level for f = 8.0 / 1.0MHz V <sub>IN</sub> = 0.3mV <sub>P-P</sub> .	Fig.1
PB switch ON resistance	R <sub>ON8</sub>	—	5	10	Ω	Pin 8 impedance	Fig.1
PRE ch 2 holding voltage	V <sub>TH1H</sub>	3.5	—	V <sub>CC</sub>	V	Pin 1 DC voltage for ch 2 operation	Fig.1
PRE ch 1 holding voltage	V <sub>TH1L</sub>	0	—	1.2	V	Pin 1 DC voltage for ch 1 operation	Fig.1
ENVE output level SP-2	V <sub>EN-S2</sub>	1.4	2.2	3.0	V	Pin 20 output measurement when pin 21 = L and pin 18 output = 250mV <sub>P-P</sub>	Fig.1
ENVE sensitivity curve	P <sub>CRV</sub>	150	200	250	%	—	Fig.1
ENVE saturation voltage	V <sub>EN-MA</sub>	4.6	4.9	—	V	Pin 21 = L, Pin 20 output measurement for large signal	Fig.1
ENVE residual voltage	V <sub>EN-MI</sub>	—	0.1	0.4	V	Pin 21 = L, Pin 20 output measurement for no signal	Fig.1
EP mode holding voltage	V <sub>TH21H</sub>	3.5	—	V <sub>CC</sub>	V	Pin 21 DC voltage for EP mode	Fig.1
SP mode holding voltage	V <sub>TH21L</sub>	0	—	1.2	V	Pin 21 DC voltage for SP mode	Fig.1

(unless otherwise noted,  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 5.0\text{V}$ ,  $f = 4.0\text{MHz}$  and  $I_{OAR} = 36\text{mA}_{P-P}$ )

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Measuremen circuit
(Recording system) (Pin 15: L)							
Quiescent current	$I_q (R)$	—	72	108	mA	No signal	Fig.2
Recording AGC level	$I_{OAR}$	30	36	42	$\text{mA}_{P-P}$	Pin 16 input = 400mV <sub>P-P</sub> , pin 8 output measurement	Fig.2
AGC control sensitivity	$\Delta I_{OAR}$	—	0.15	2	dB	Pin 8 output level difference for $f = 4.0\text{MHz}$ , pin 16 input = 225mV <sub>P-P</sub> to 800mV <sub>P-P</sub> .	Fig.2
AGC frequency characteristic	$\Delta I_{OAF}$	-2	0	2	dB	Pin 8 output level difference for $f = 8.0 / 1.0\text{MHz}$ , pin 16 input = 400mV <sub>P-P</sub>	Fig.2
2nd harmonic distortion	2HDR	—	-41	-35	dBc	Pin 16 input = 400mV <sub>P-P</sub> , 8.0MHz spurious.	Fig.2
3rd harmonic distortion	3HDR	—	-50	-40	dBc	Pin 16 input = 400mV <sub>P-P</sub> , 12.0MHz spurious, guaranteed design value.	Fig.2
Cross modulation distortion	CMDR	—	-43	-38	dBc	4.0MHz $\pm$ 630kHz spurious, guaranteed design value.	Fig.2
Maximum output level	$I_{OMR}$	42	50	—	$\text{mA}_{P-P}$	When pin 8 output 2nd harmonic distortion is -30dB	Fig.2
Recording current load characteristic	$\Delta I_{ORL}$	-2	-0.35	—	dB	Pin 8 output level difference for load L: 8.2 ~ 12 $\mu$ H	Fig.2
Mute attenuation ratio	$MUR$	—	-44	-38	dBc	Pin 8 output level difference for pin 15: M / H.	Fig.2
Frequency characteristic	$\Delta I_{OEQ}$	-5.3	-7.8	-10.3	dB	Pin 8 output level difference for $f = 8.0 / 1.0\text{MHz}$ , AGC OFF	Fig.2
AGC mode holding voltage	$V_{TH11H}$	2.7	—	$V_{CC}$	V	Pin 11 DC voltage to maintain recording AGC operation	Fig.2
AGC mode holding voltage	$V_{TH11L}$	0	—	1.2	V	Pin 11 DC voltage to maintain recording AGC stopped	Fig.2
PB mode holding voltage	$V_{TH15H}$	3.8	—	$V_{CC}$	V	Pin 15 DC voltage for PB mode	Fig.2
EE mode holding voltage	$V_{TH15M}$	2.2	—	2.8	V	Pin 15 DC voltage for REC MUTE mode	Fig.2
REC mode holding voltage	$V_{TH15L}$	0	—	1.2	V	Pin 15 DC voltage for REC mode	Fig.2

\* Note: dBc: dB below carrier (used to express relative level from carrier reference for convenience sake)

●Measurement circuits  
(Playback system)



Units: R [Ω]  
C [F]  
L [H]

Fig. 1

(Recording system)

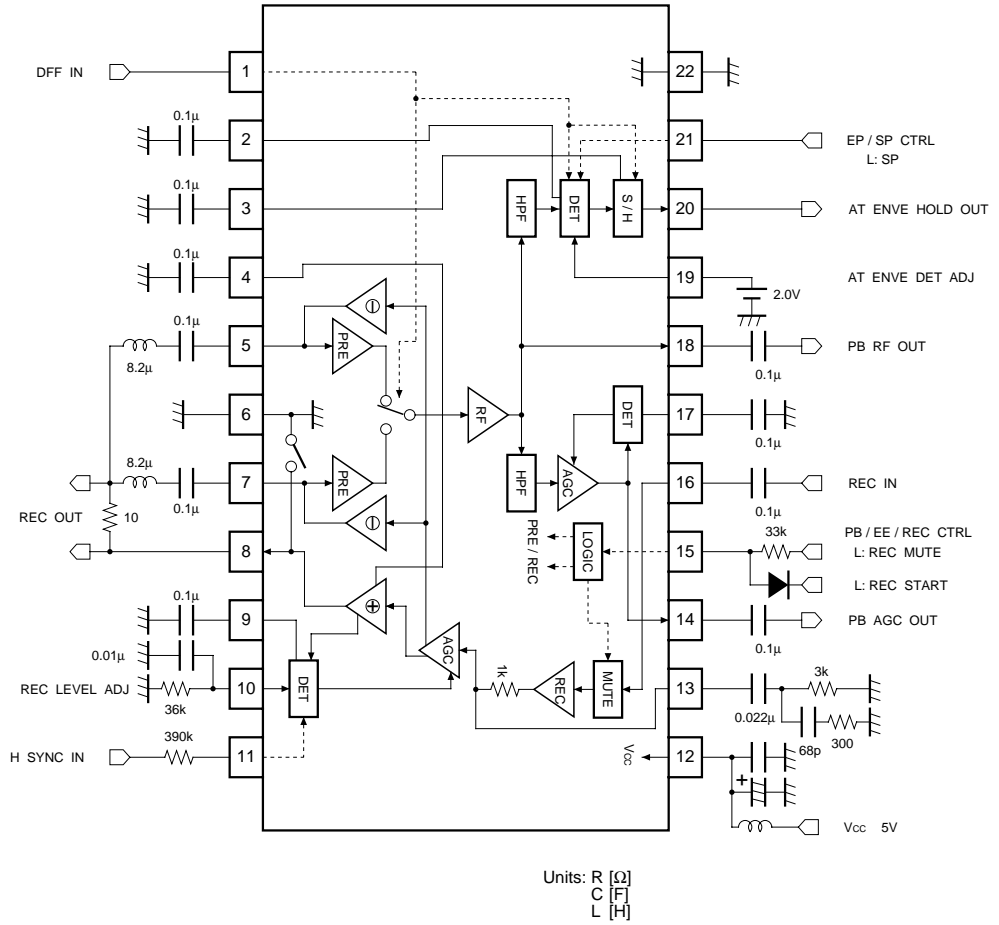


Fig. 2

## ●Control mode tables

## (1) DFF IN (pin 1)

- Playback input selection (head switching)
- Playback output envelope detection timing control (integrate and hold one frame)

Control pin	Function		Control voltage $V_{CTRL1}$ [V]
	Selected playback input	Envelope detect	
DFF IN			
H	Ch2 (PRE IN2 7pin)	Reset on rising edge	3.5 ~ $V_{CC}$
L	Ch1 (PRE IN1 5pin)	—	0.0 ~ 1.2

## (2) H SYNC IN (pin 11)

- Controls recording AGC detector block operation.

Control pin	Function	Control voltage $V_{CTRL11}$ [V]
H SYNC	AGC detect	
H	ON	2.7 ~ $V_{CC}$
L	OFF	0.0 ~ 1.2

## (3) PB / EE / REC CTRL (pin 15)

- Playback / recording mute / recording mode switching

Control pin	Mode	Function				Control voltage $V_{CTRL15}$ [V]
		PRE AMP	AT ENVE	REC MUTE	REC AMP	
PB/EE/REC						
H	PB	ON	ON	OFF	OFF	3.8 ~ $V_{CC}$
M	REC MUTE	OFF	OFF	ON	ON	2.2 ~ 2.8
L	REC	OFF	OFF	OFF	ON	0.0 ~ 1.2

\* Pin 15 is pulled up to  $V_{CC}$  via a 33k $\Omega$  resistor.

## (4) EP / SP CTRL (pin 21)

- Switching for the detector gain of the playback envelope detector.

Control pin	Function	Control voltage $V_{CTRL21}$ [V]
EP / SP	AT ENVE gain	
H	Typ. + 6dB	3.5 ~ $V_{CC}$
L	Typ.	0.0 ~ 1.2

\* Pin 21 is pulled up to  $V_{CC}$  via a 50k $\Omega$  resistor.

●Application example

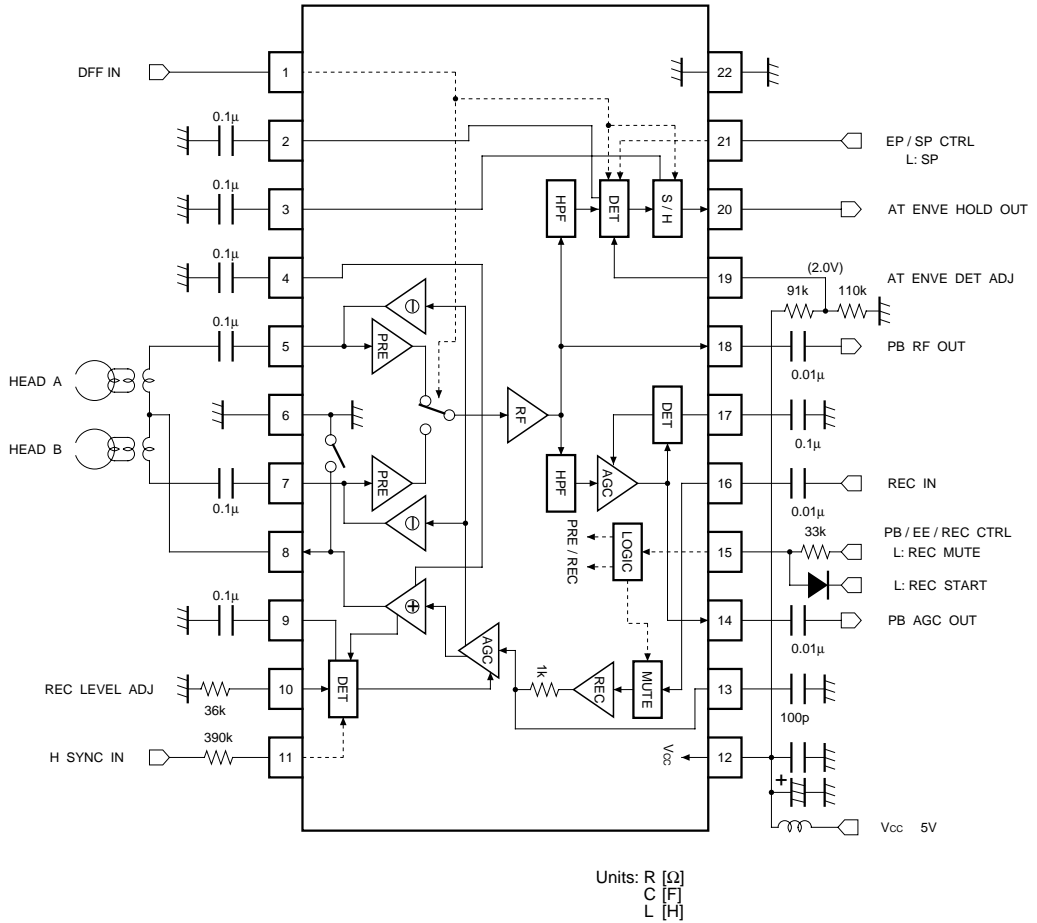
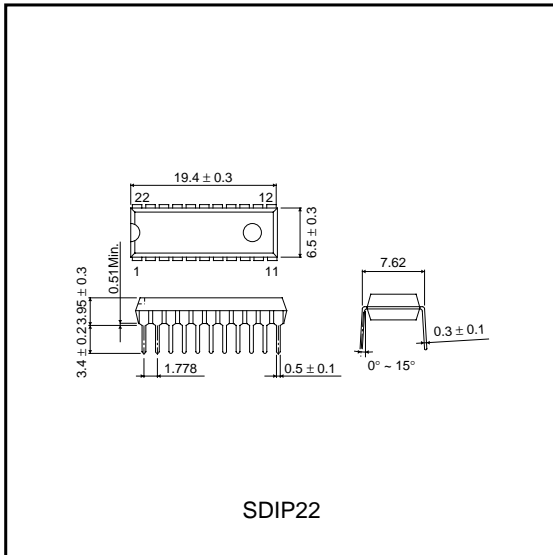


Fig. 3



## ● External dimensions (Units: mm)



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