

AN2601

Head Amplifier Circuit for VHD Video Disc Player

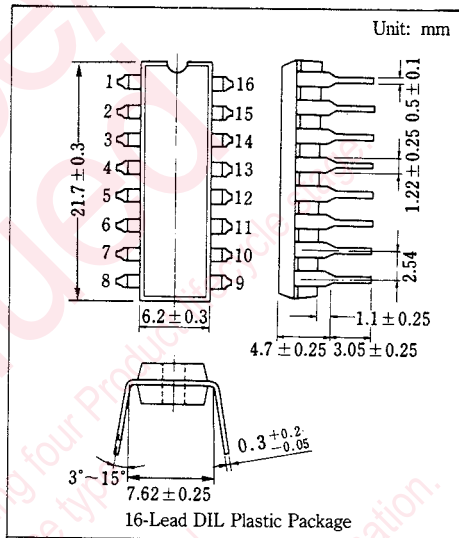
■ Outline

The AN2601 is an integrated circuit with a built-in AGC circuit which amplifies up to 65 dB.

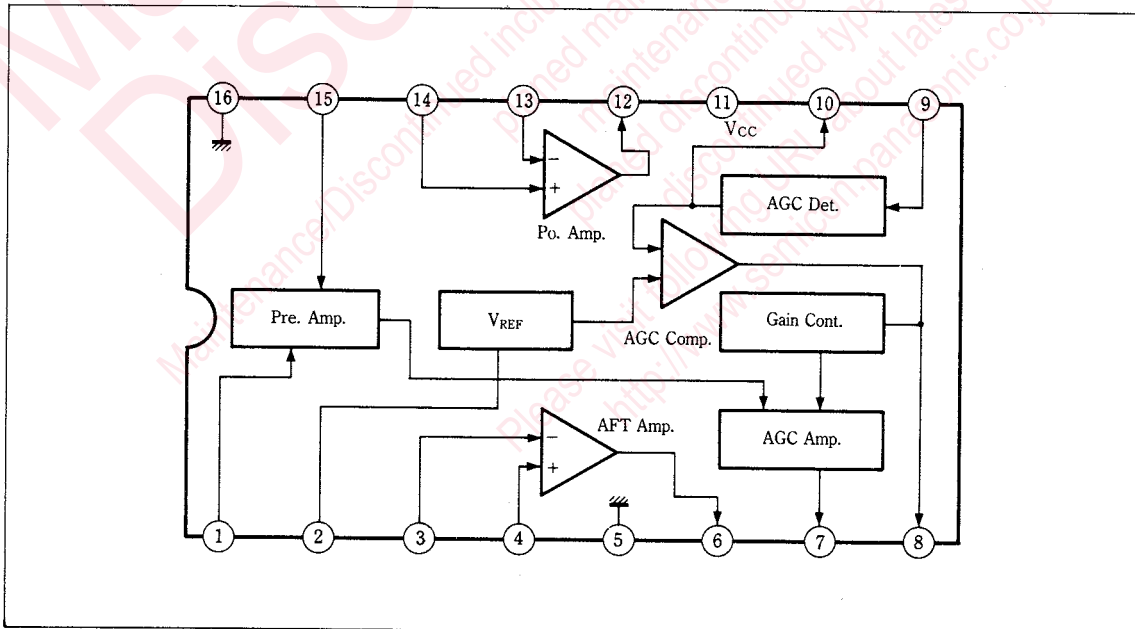
It also has two operation amplifiers; AFT amplifier and operation amplifier.

■ Features

- Head amplifier with 10MHz band width
- -58dB noise level
- 5.5V regulated DC voltage supply



■ Block Diagram



■ Pin

Pin No.	Pin Name	Pin No.	Pin Name
1	Input Pre Amplifier	9	Output AGC Detector
2	Output 5.5V Regulated	10	Input AGC Detector
3	Input AFT Amplifier (-)	11	V _{cc} 12V
4	Input AFT Amplifier (+)	12	Output P _O Amplifier
5	GND 1	13	Input P _O Amplifier (-)
6	Output AFT Amplifier	14	Input P _O Amplifier (+)
7	Output Pre Amplifier	15	Input Bias Voltage of Pre Amplifier
8	Output AGC Level	16	GND 2

■ Absolute Maximum Ratings(T_a = 25°C)

Item	Symbol	Rating	Unit
Supply voltage	V _{CC}	14.4	V
Supply current	I _{CC}	40	mA
Power dissipation	P _D	580	mW
Operating ambient temperature	T _{opr}	-20~+70	°C
Storage temperature	T _{stg}	-55~+150	°C

■ Electrical Characteristics(V_{CC} = 12V, T_a = 25°C)

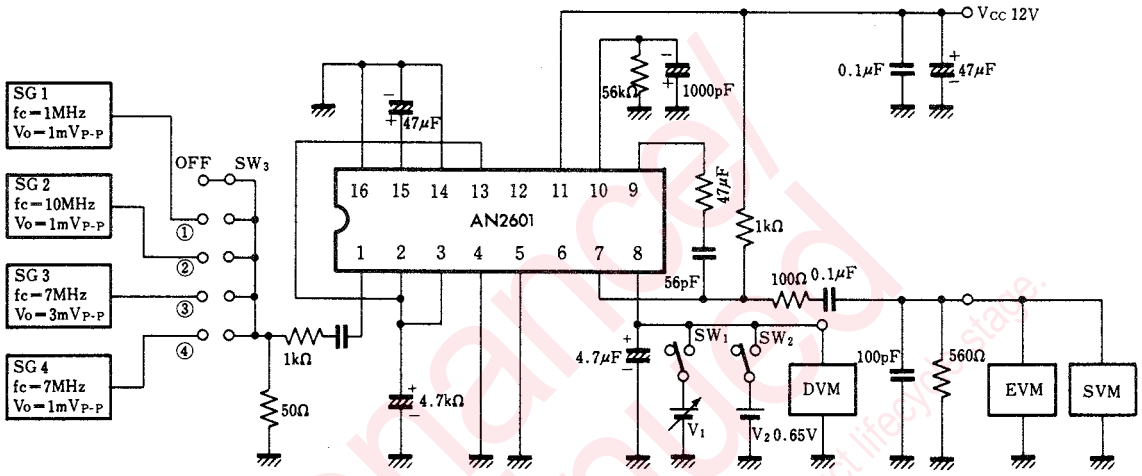
Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Total circuit current	I _{tot}		V ₃ , V ₁₄ =0.5V, V _{CC} =12V, V ₄ , V ₁₃ =0.6V	15	22	30	mA
Terminal voltage	V ₂₋₅		V ₃ , V ₁₄ =0.5V, V _{CC} =12V, V ₄ , V ₁₃ =0.6V	5.1	5.5	5.9	V
Frequency characteristic	f _c *1 (10MHz)	1	Pin① 10MHz 1mV _{P-P} , Pin⑧ 0.65V	-3	0	+3	dB
Output harmonic distortion	V _{O(2f)} *2	1	Pin① 7MHz 1mV _{P-P} , Pin⑧ Adj. V _O =400mV _{P-P}		-48	-30	dB
Allowable input distortion	V _{I0(2f)} *3	1	Pin① 7MHz 3mV _{P-P} , Pin⑧ Adj. V _O =200mV _{P-P}		-45	-30	dB
Control sensitivity	β	1	Int. AGC, Pin① 7MHz 1~3mV _{P-P}	13	18	21	mV/dB
AGC level	V _{OA}	1	Int. AGC, Pin① 7MHz 3mV _{P-P}	240	340	440	mV _{P-P}
Noise level	n _O	1	Pin⑧ 0.65V		-65	-58	dBm
AFT open circuit gain	G _{AFT}	2	Pin④ 1kHz, 200μV _{P-P}	80	85		dB
P _O open circuit gain	G _P	2	Pin④ 1kHz, 200μV _{P-P}	80	85		dB
P _O output current	I _{OP}		V ₁₄ =6V, R _L =300Ω	14	20	26	mA

*1 Output voltage ratio, assuming an output voltage as 0 dB in case of 1 MHz, 1 mV_{P-P} input signal 22.

*2 2nd harmonic voltage ratio, assuming 7 MHz, 400 mV_{P-P} output voltage as 0 dB.

*3 2nd harmonic voltage ratio, assuming 7 MHz, 200 mV_{P-P} output voltage as 0 dB.

Test Circuit 1 ($f_{C(10MHz)}$, $V_{O(2\theta)}$, $V_{IO(2\theta)}$, β , V_{OA} , n_O)



a) Setting of each device

SG1 $f_c = 1\text{MHz}$, $V_O = 1\text{mV}_{P-P}$

SG2 $f_c = 10\text{MHz}$, $V_O = 1\text{mV}_{P-P}$

SG3 $f_c = 7\text{MHz}$, $V_O = 3\text{mV}_{P-P}$

SG4 $f_c = 7\text{MHz}$, $V_O = 1\text{mV}_{P-P}$

$V_{CC} = 12\text{V}$

V_1 ...Variable DC supply voltage

$V_2 = 0.65\text{V}$

Switch Setting

No.	SW1	SW2	SW3	Output Pin
B3	OFF	ON	① and ②	⑦
B4	ON	OFF	4	⑦
B5	ON	OFF	3	⑦
B6	OFF	OFF	③ and ④	⑧
B7	OFF	OFF	④	⑦
B8	OFF	ON	OFF	⑦

b) Testing Methods

● $f_{C(10MHz)}$: Frequency characteristic

Assuming an output voltage as 0 dB when a 1 MHz input signal and a 1 mV_{p-p} signal voltage are applied, and measure an output voltage when setting the input signal and signal voltage to 10 MHz and 1 mV_{p-p}, respectively.

● $V_{O(2\theta)}$: Output harmonic distortion

Adjust V_1 so that an output voltage will be 400 mV_{p-p} when a 7 MHz input signal and 1 mV_{p-p} signal voltage are applied.

Assuming a 7 MHz, 400 mV_{p-p} output signal as 0 dB, measure a level of 14 MHz signal component.

● β : Control sensitivity

Measure a Pin ⑧ DC voltage when a 7 MHz input signal and a 1 mV_{p-p} signal voltage are applied, and when a 7 MHz input signal and a 3 mV_{p-p} signal voltage are applied.

$$\text{Control sensitivity } \beta = (V_1 - V_3) / 9.54$$

V_1 ...DC voltage in case of SG4

V_3 ...DC voltage in case of SG3

$$9.45(\text{dB}) = 20 \log \left[\frac{3(\text{mV}_{P-P})}{1(\text{mV}_{P-P})} \right]$$

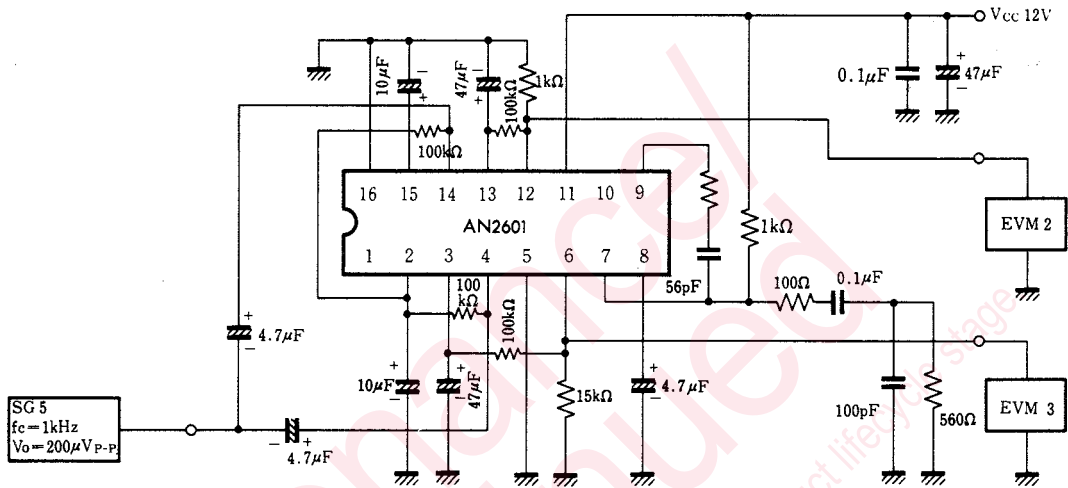
● V_{CA} : AGC level

Measure a Pin ⑦ output amplitude when a 7 MHz input signal and a 1 mV_{p-p} signal voltage are applied.

● n_O : Noise level

Measure a noise level up to a frequency band of 10 MHz in a no-input state.

Test Circuit 2 (G_{AFT} , G_P)



a) Setting of each device

SG5 $f_c = 1\text{kHz}$, $V_o = 200\mu\text{V}_{p-p}$

$V_{CC} = 12\text{V}$

EVM2...Electronic voltmeter

EVM3...Electronic voltmeter

b) Testing method

G_{AFT} : AFT open circuit gain

Measure the Pin ⑥ output voltage when a 1 kHz input signal and a $200\mu\text{V}_{p-p}$ signal voltage are applied.

G_P : P_o open circuit gain

Measure the Pin ⑫ output voltage when a 1 KHz and a $200\mu\text{V}_{p-p}$ signal voltage are applied.

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