

AN3380NK

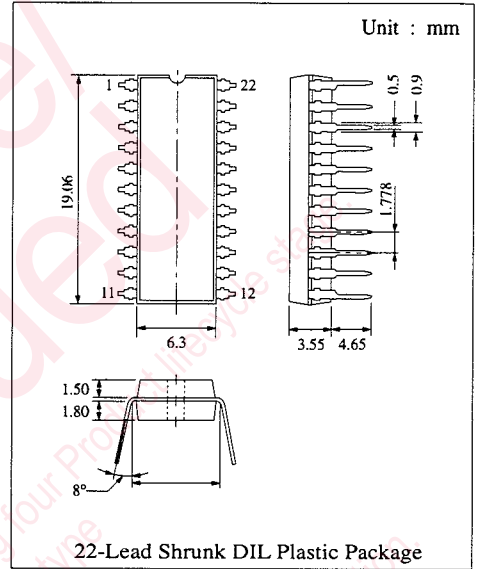
Head Recording Amplifier Circuit for VCR (2-Head Type)

■ Description

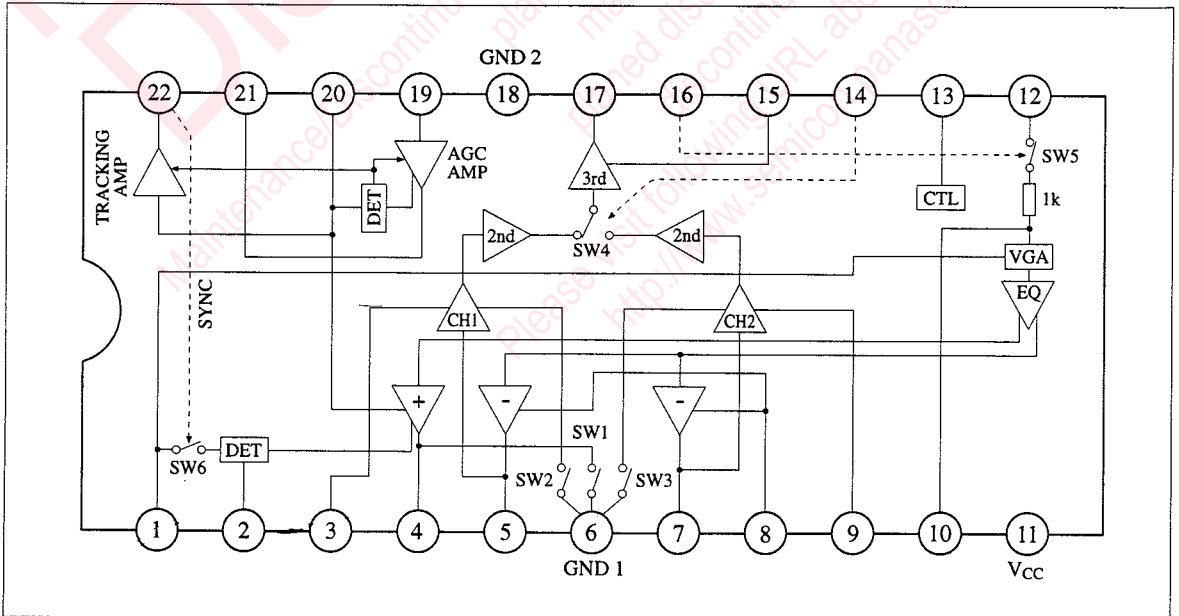
The AN3380NK is an integrated circuit designed for Head REC Amplifier circuit for VCR (2-Head Type).

■ Features

- Single supply operation : $V_{cc} = 5V$ (typ.)
- Record Amp use BTL connection current drive
- Built-in AGC circuit, current control not needed



■ Block Diagram



■ Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Rating	Unit
Supply Voltage	V _{CC}	6	V
Supply Current	I _{CC}	150	mA
Power Dissipation	P _D	1000	mW
Operating Ambient Temperature	Topr	-20 ~ +75	°C
Storage Temperature	Tstg	-55 ~ +150	°C

■ Recommended Operating Range (Ta=25°C)

Item	Symbol	Range
Operating Supply Voltage Range	V _{CC}	4.2V ~ 5.5V

■ Electrical Characteristics (Ta=25°C)

Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Playback Voltage Gain 1-1	G _{V11}	1	f=4MHz, 0.5mVp-p CH1 input, Gain ADJ Hi	60.5	63	65.5	dB
Playback Voltage Gain 1-2	G _{V12}	1	f=4MHz, 0.5mVp-p CH2 input, Gain ADJ Hi	60.5	63	65.5	dB
CH Gain Difference	ΔG _V	1	f=4MHz, 0.5mVp-p input, Gain ADJ Hi	-1	0	1	dB
Playback Voltage Gain 2-1	G _{V21}	1	f=4MHz, 0.5mVp-p CH1 input, Gain ADJ Low	57.5	60	62.5	dB
Playback Voltage Gain 2-2	G _{V22}	1	f=4MHz, 0.5mVp-p CH2 input, Gain ADJ Low	57.5	60	62.5	dB
Cross Talk 1	CT ₁	1	f=4MHz, 0.5mVp-p CH1 input Head change-over SW, Low Hi output ratio			-35	dB
Cross Talk 2	CT ₂	1	f=4MHz, 0.5mVp-p CH2 input Head change-over SW, Low Hi output ratio			-35	dB
PB Output Secondary Distortion 1	HDP ₁	1	f=4MHz, 0.5mVp-p CH1 input, Ratio of output 8MHz component to 4MHz component			-40	dB
PB Output Secondary Distortion 2	HDP ₂	1	f=4MHz, 0.5mVp-p CH2 input, Ratio of output 8MHz component to 4MHz component			-40	dB
Input Conversion Noise 1	N ₁	1	R _g =10Ω, Head change-over SW, Low through 1MHz BPF, divide output by G _{V11}		0.6	1.0	μVrms
Input Conversion Noise 2	N ₂	1	R _g =10Ω, Head change-over SW, Hi through 1MHz BPF, divide output by G _{V12}		0.6	1.0	μVrms
Head SW DC Unbalance	ΔV ₁₇	1	R _g =10Ω, Head change-over SW Hi/Low output DC difference	-100	0	100	mV
AGC Level	V _{AGC}	2	AGC IN f=4MHz, 40mVp-p	255	320	390	mVp-p
AGC Control Characteristic	ΔV _{AGC}	2	AGC IN f=4MHz, 500mVp-p, Calculate 20log(V _{AGC} (40mVpp)/V _{AGC} (500mVpp)).	0	0.9	1.8	dB
AGC Output Distortion	HDA	2	AGC IN f=4MHz, 500mVp-p, Ratio of output 8MHz component to 4MHz component			-40	dB
Tracking Output 1	TR ₁	2	AGC IN f=4MHz, 50mVp-p Measure TRACKING OUT DC.	1.4	1.8	2.2	V
Tracking Output 2	TR ₂	2	AGC IN f=4MHz, 200mVp-p Measure TRACKING OUT DC.	2.75	3.2	3.65	V
Record Amp. Gain 1	I _{OR1}	3	REC IN f=4MHz, 20mVp-p, Calculate gain by output between Pin 4 and Pin 5.	300	415	535	mU
Record Amp. Gain 2	I _{OR2}	3	REC IN f=4MHz, 20mVp-p, Calculate gain by output between Pin 4 and Pin 7.	300	415	535	mU
REC AGC Level 1	I _{RAGC1}	3	REC IN f=4MHz, 125mVp-p, Output level between Pin 4 and Pin 5, R _{AGC} =33kΩ	16.5	19.6	23.2	mVp-p
REC AGC Control Characteristic	ΔI _{RAGC1}	3	REC IN f=4MHz, 250mVp-p, R _{AGC} =33kΩ, Calculate 20log(I _{RAGC1} (125mVpp)/I _{RAGC1} (250mVpp)).	0		1.0	dB
Record Current Secondary Distortion 1	HD ₂₁	3	REC IN f=4MHz, 125mVp-p, R _{AGC} =33kΩ 8MHz/4MHz ratio			-41	dB
Record Current Secondary Distortion 2	HD ₂₂	3	REC IN f=4MHz, 125mVp-p, R _{AGC} =33kΩ 8MHz/4MHz ratio			-41	dB

■ Electrical Characteristics (Ta=25°C) (Continue)

Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Muting Ratio	MR	3	REC IN f=4MHz, 125mVp-p, R _{AGC} =33kΩ MUTE ON/OFF ratio			-48	dB
REC AGC Level 2	I _{RAGC2}	3	REC IN f=2MHz, 190mVp-p, R _{AGC} =22kΩ	25.1	30	35.5	mAp-p
REC Quiescent Current	I _{RCQ}	3	REC mode, without signals I _{CC} ADJ R=15kΩ	60	80	100	mA
PB Quiescent Current	I _{PCQ}		PB mode, measure DC.	17.5	28.5	39.5	mA
PRE GAIN ADJ Hi Gain Holding Voltage	V _{PGAH}	2	Hi Gain	3.0		5.0	V
PRE GAIN ADJ Low Gain Holding Voltage	V _{PGAL}	2	Low Gain	0		2.0	V
Head SW FF CH1 ON Holding Voltage	V _{H51}	4	CH1 (Pin 5 input amp.)	0		2.0	V
Head SW FF CH2 ON Holding Voltage	V _{H52}	4	CH2 (Pin 7 input amp.)	3.0		5.0	V
SW1 ON Resistance	R ₁		PB mode, Pin 4 impedance	1.5	3.5	5.5	Ω
REC Mute Threshold Value	V _M	5	REC mode	2.0		3.0	V
REC AGC OFF Holding Voltage	V _{RAGC}	5	REC AGC OFF	4.0		5.0	V
REC SYNC AGC ON Holding Voltage	V _{SSYN}	5	REC AGC ON	2.5		5.0	V
REC SYNC AGC OFF Holding Voltage	V _{SSYF}	5	REC AGC OFF	0		1.5	V
REC Mode Holding Voltage	V _{SREC}	5	REC IN f=4MHz, 125mVp-p, R _{AGC} =33kΩ	0		1.0	V
EE Mode Holding Voltage	V _{SEE}	5	REC IN f=4MHz, 125mVp-p, REC MUTE	2.0		3.0	V
PB Mode Holding Voltage	V _{SPB}	5	f=4MHz, 0.5mVp-p, GAIN ADJ LOW	4.0		5.0	V

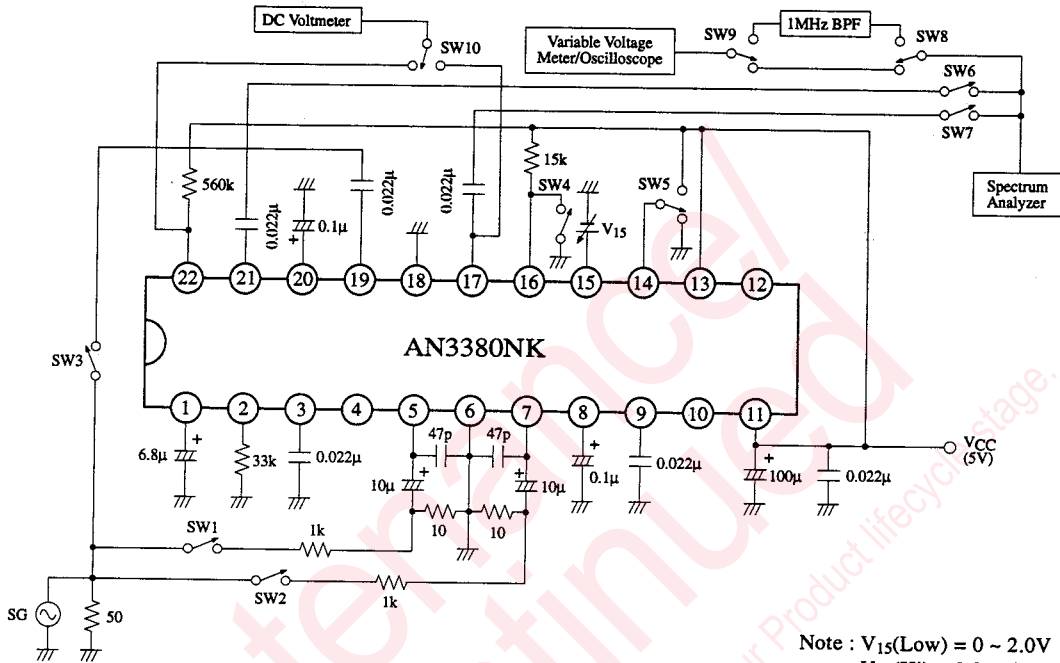
■ Supplementary Explanation

● Electrical Characteristics Design Reference Values (Ta=25°C)

Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Record Current Tertiary Distortion	HD ₃	6	REC IN f=4MHz, 125mVp-p, R _{AGC} =33kΩ 12MHz/4MHz ratio			-40	dB
Record Current Cross Modulation (±fc)	CM1	6	f _r =4MHz, 20mAp-p out, f _c =630kHz -14dB down			-50	dB
Record Current Cross Modulation (±2fc)	CM2	6	f _r =4MHz, 20mAp-p out, f _c =630kHz -14dB down			-50	dB
Record Amp. f Characteristic	ΔG _{If}	6	REC IN f=4MHz, 20mVp-p with EQ 4MHz/1MHz level ratio	-5.5	-4.5	-3.5	dB
Playback Amp. f Characteristic 1	ΔG _{Vf1}	7	Specify L and f ₀ =5MHz 5MHz/1MHz level ratio	-8			dB
Playback Amp. f Characteristic 2	ΔG _{Vf2}	4	10MHz/1MHz level ratio	-4	-2.5	-1	dB

Note) The above characteristic is a design reference value, not a guarantee value.

Test Circuit 2

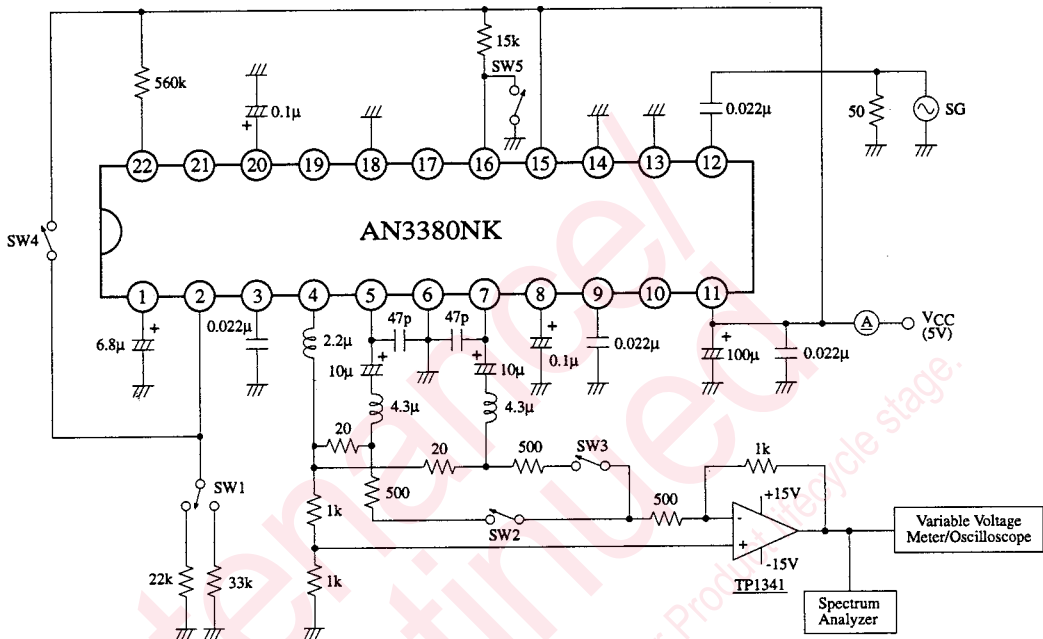


Note : $V_{15}(\text{Low}) = 0 \sim 2.0\text{V}$
 $V_{15}(\text{Hi}) = 3.0 \sim 5.0\text{V}$

Test Method

No.	Item	Input Signal	V_{15}	ON SW										Measuring Instrument & Others		
				1	2	3	4	5	6	7	8	9	10			
13	AGC Level	SG $f = 4\text{MHz}$ 40mVp-p	Hi				○			○					Oscilloscope	
14	AGC Control Characteristic	SG $f = 4\text{MHz}$ 500mVp-p					○			○						Oscilloscope (Divide the output level by No.13 result.)
15	AGC Output Distortion	SG $f = 4\text{MHz}$ 500mVp-p					○			○						Spectrum analyzer (Measure 8MHz component/4MHz component.)
16	Tracking Output 1	SG $f = 4\text{MHz}$ 50mVp-p					○									DC voltmeter
17	Tracking Output 2	SG $f = 4\text{MHz}$ 200mVp-p					○									
28	PRE GAIN ADJ Hi Gain Holding Voltage	SG $f = 4\text{MHz}$ 50mVp-p	3.0V	○										○	Oscilloscope/Variable voltage meter (Check No.1 and its gain.)	
29	PRE GAIN ADJ Low Gain Holding Voltage	SG $f = 4\text{MHz}$ 50mVp-p	2.0V	○										○	Oscilloscope/Variable voltage meter (After checking No.4 and its gain, calculate No.29-No.28 (dB). It should be in range of -4.2~-1.8dB.)	

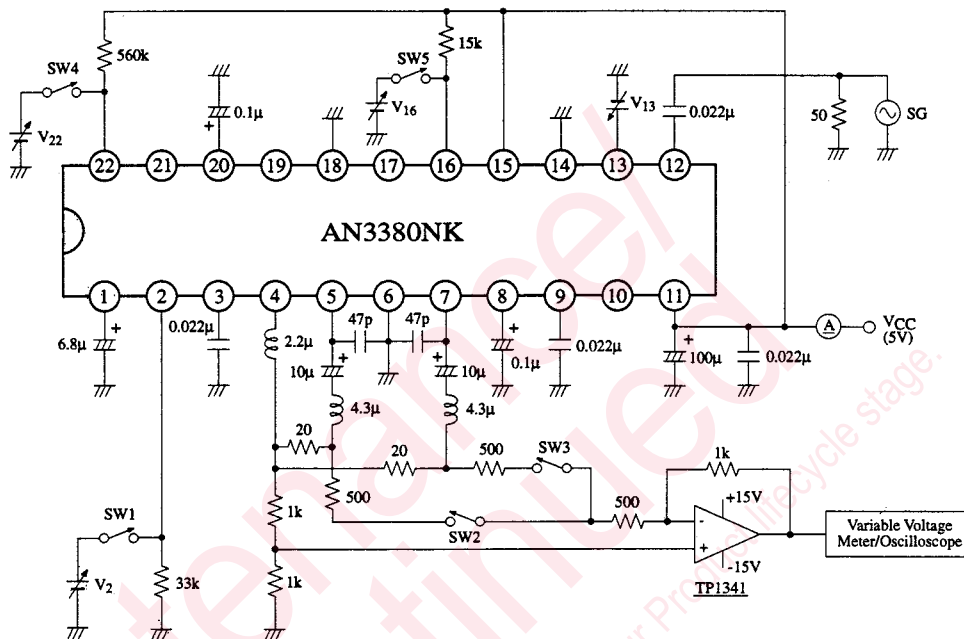
Test Circuit 3



Test Method

No.	Item	Input Signal	ON SW					Measuring Instrument & Others
			1	2	3	4	5	
18	Record Amp. Gain 1	SG f = 4MHz 20mVp-p		○		○		Oscilloscope (Calculate gain by the output level)
19	Record Amp. Gain 2				○	○		
20	REC AGC Level 1	SG f = 4MHz, 125mVp-p		○				Oscilloscope
21	REC AGC Control Characteristic	SG f = 4MHz, 250mVp-p		○				Oscilloscope (Divide the output level by No.20 result)
22	Record Current Secondary Distortion 1	SG f = 4MHz 125mVp-p		○				Spectrum analyzer (Measure 8MHz component/4MHz component)
23	Record Current Secondary Distortion 2				○			
24	Muting Ratio				○		○	
25	REC AGC Level 2	SG f = 2MHz, 190mVp-p	○	○				Oscilloscope
26	REC Quiescent Current	0mVp-p						Ammeter

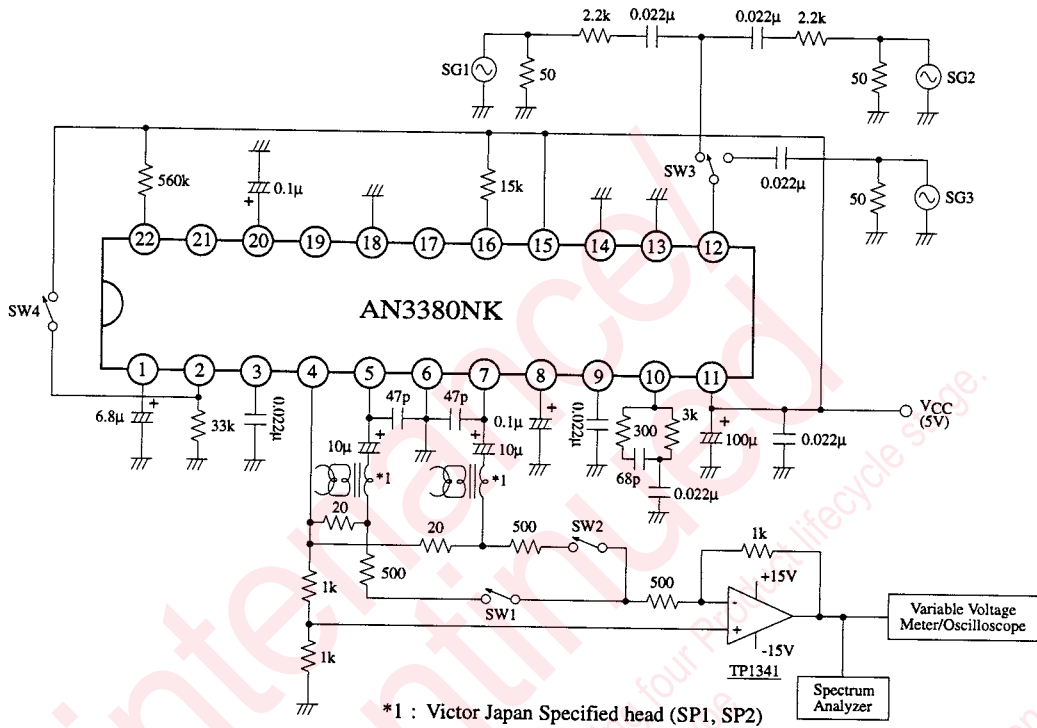
Test Circuit 5



Test Method

No.	Item	Input Signal	V ₂	V ₁₃	V ₁₆	V ₂₂	ON SW					Measuring Instrument & Others					
							1	2	3	4	5						
33	REC Mute Threshold Value	SG f = 4MHz 125mVp-p	/	0V	2V	/		○				○	Variable voltage meter (SW5 ON→OFF, the same as No.24)				
34	REC AGC OFF Holding Voltage						4V ↓ 5V				○	○					Oscilloscope (Higher in output level than No.20)
35	REC SYNC AGC ON Holding Voltage										2.5V ↓ 5.0V			○	○		Oscilloscope (The same output level as No.20)
36	REC SYNC AGC OFF Holding Voltage										0V ↓ 1.5V			○	○		Oscilloscope (Higher in output level than No.20)
37	REC Mode Holding Voltage							0V ↓ 1.0V			/			○			Oscilloscope (The same output level as No.20)
38	EE Mode Holding Voltage							2.0V ↓ 3.0V			/			○			Variable voltage meter (REC Mute)

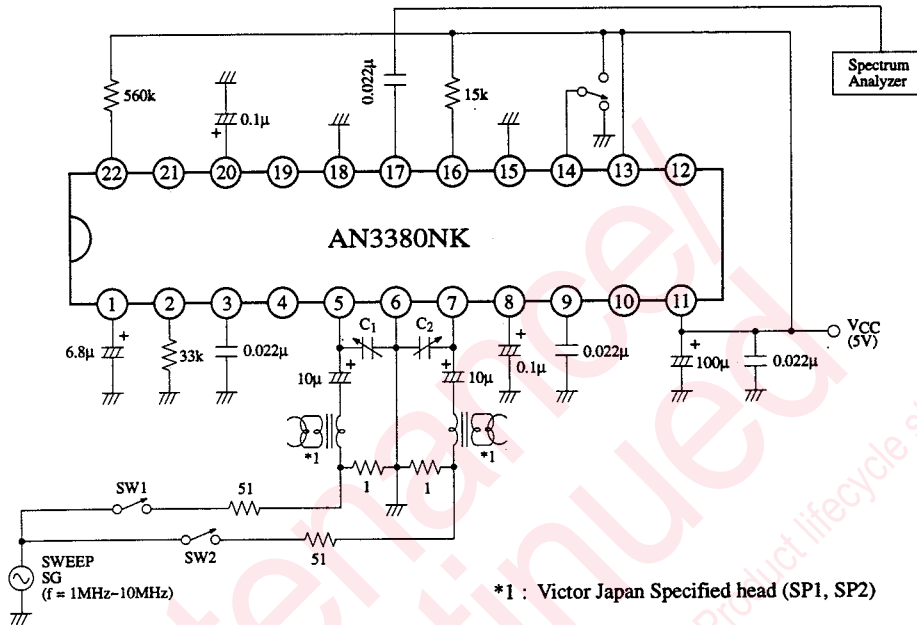
Test Circuit 6



Test Method

No.	Item	Input Signal 1	Input Signal 2	ON SW				Measuring Instrument & Others
				1	2	3	4	
40	Record Current Tertiary Distortion	<u>SG3</u> f = 4MHz 125mVp-p		<input type="radio"/>		<input type="radio"/>		Spectrum analyzer (12MHz component/4MHz component)
41	Record Current Cross Modulation ($\pm 2fc$)	<u>SG1</u> f = 4MHz Set the input level so that 4MHz output level will come to 400mVp-p (20mA _{p-p}).	<u>SG2</u> f = 630kHz Set the input level so that 630kHz output level will come to -14dB against 4MHz output level.	<input type="radio"/>			<input type="radio"/>	Spectrum analyzer (Ratio of the bigger one of 4.63MHz component and 3.37MHz component to 4MHz component)
42	Record Current Cross Modulation ($\pm 2fc$)			<input type="radio"/>			<input type="radio"/>	Spectrum analyzer (Ratio of the bigger one of 5.26MHz component and 2.74MHz component to 4MHz component)
43	Record Amp. f Characteristic	<u>SG3</u> 20mVp-p f = 1MHz→4MHz		<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	Spectrum analyzer (4MHz output level/1MHz output level)

Test Circuit 7



Test Method

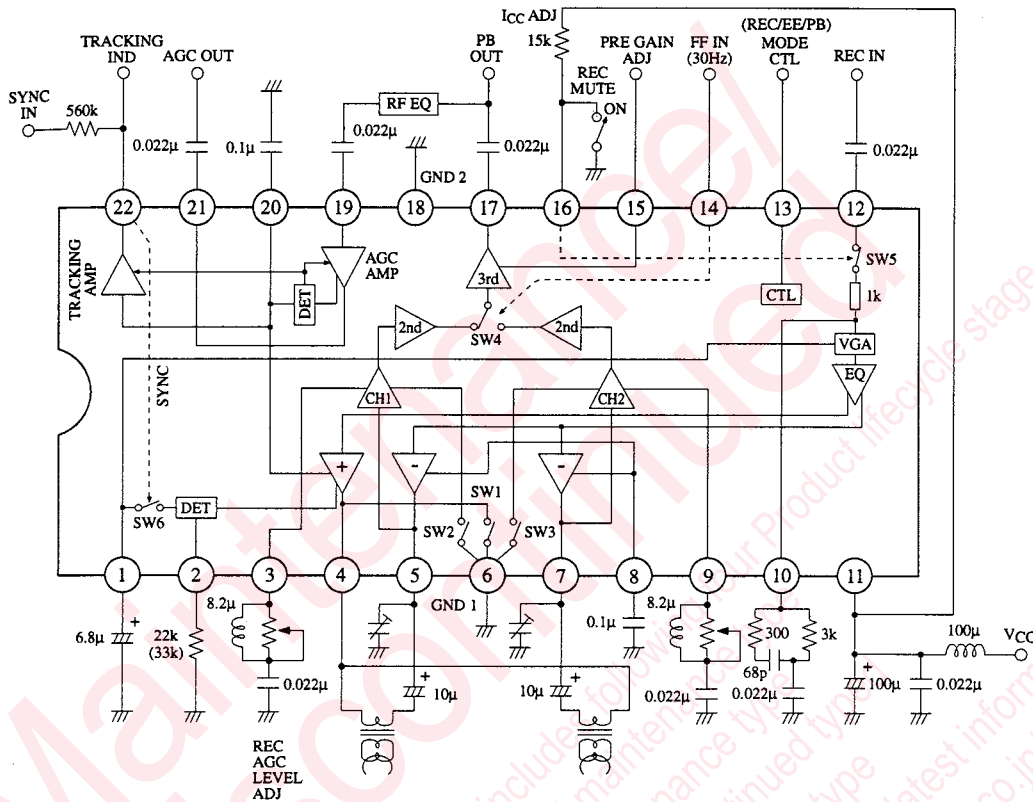
No.	Item	Input Signal	ON SW			Measuring Instrument & Others
			1	2	3	
44	Playback Amp. f Characteristic	SG f = 1MHz~10MHz 25mVp-p	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Spectrum analyzer (5MHz/1MHz level ratio at f ₀ =5MHz gotten by adjusting C1 or C2)

Test Method

No.	Item	Symbols	Measured Pin No.	Pin No.																												
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
27	PB Quiescent Current	IPCQ I11	11	33k 0V	33k 0V	0V 0V	0V 0V	0V 0V	0V 0V	0V 0V	0V 0V	0V 0V	5V	5V	5V	0V 0V	5V 0V	15k 5V	0V V	4.1 V	0V V	0V V										
32	SW1 ON Resistance	R1 V4-18	4	33k 0V	33k 0V	0 mA	0V 0V	0V 0V	0V 0V	0V 0V	0V 0V	0V 0V	5V	5V	5V	0V 0V	5V 0V	15k 5V	0V V	4.1 V	0V V	0V V										
32	SW1 ON Resistance	R1 ΔV4-18	4	33k 0V	33k 0V	30 mA	0V 0V	0V 0V	0V 0V	0V 0V	0V 0V	0V 0V	5V	5V	5V	0V 0V	5V 0V	15k 5V	0V V	4.1 V	0V V	0V V										

Note : Symbols on the upside are ones for the specification and symbols on the underside, for measured contents.

■ Application Circuit



■ Pin Descriptions

Pin No.	Pin Name	Pin No.	Pin Name
1	REC AGC DET	12	REC Input
2	REC AGC Level ADJ	13	Mode Change-over Control
3	CH1 Damping ADJ	14	Head Change-over Control
4	Common to PB/REC ⊕ Amp. Output	15	Playback Gain Change-over Control
5	PB CH1 Input/REC ⊖ Amp. Output	16	Icc ADJ/Muting Control
6	GND	17	PB Output
7	PB CH2 Input/REC ⊖ Amp. Output	18	GND
8	REC ⊖ Amp. DC Feedback	19	AGC Amp. Input
9	CH2 Damping ADJ	20	AGC DET/REC ⊕ Amp. DC Feedback
10	REC EQ	21	AGC Amp. Output
11	Vcc Supply	22	Tracking Output/Sync. Input

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