

Recording/Playback Amplifier IC for FM-Audio/2-Head VCR

The AN3380NK is a recording/playback amplifier IC for FM-audio or 2-heads VCR.

- Single power supply : $V_{CC}=5V$ typ.
- BTL current-drive recording amplifier
- Built-in AGC circuit for recording current control

[illegible]

■ Pin Descriptions

Pin No.	Pin name	Pin No.	Pin name
1	Rec. AGC detection	12	Rec. input
2	Rec. AGC level adjustment	13	Mode switching control
3	Ch1 damping adjustment	14	Head switching control
4	Playback common and rec. $\oplus$ amp. output	15	Playback gain control
5	Playback ch1 input and rec. $\ominus$ amp. output	16	I _{cc} adjustment and muting control
6	GND	17	Playback output
7	Playback ch2 input and rec. $\ominus$ amp. output	18	GND
8	Rec. $\ominus$ amp. DC feedback	19	AGC amp. input
9	Ch2 damping adjustment	20	AGC detection and rec. $\oplus$ amp. DC feedback
10	Rec. equalizer	21	AGC amp. output
11	V _{cc} supply input	22	Tracking output and Sync. input

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V _{cc}	6.0	V
Supply current	I _{cc}	150	mA
Power dissipation	P _D	1,000	mW
Operating ambient temperature ^{Note)}	T _{opr}	-20 to +75	°C
Storage temperature ^{Note)}	T _{stg}	-55 to +150	°C

Note) T_a = 25°C except Operating ambient temperature and storage temperatures.

■ Recommended Operating Range (T_a = 25°C)

Parameter	Symbol	Range
Operating supply voltage range	V _{cc}	4.2V to 5.5V

■ Electrical Characteristics (T_a = 25 ± 2°C)

Parameter	Symbol	Condition	min	typ	max	Unit
PB voltage gain 1-1	G _{V11}	f = 4MHz, 0.5mV _{P-P} CH1 input Gain ADJ Hi	60.5	63	65.5	dB
PB voltage gain 1-2	G _{V12}	f = 4MHz, 0.5mV _{P-P} CH2 input Gain ADJ Hi	60.5	63	65.5	dB
Between CHs gain difference input	ΔG _V	f = 4MHz, 0.5mV _{P-P} input Gain ADJ Hi	-1	0	1	dB
PB voltage gain 2-1	G _{V21}	f = 4MHz, 0.5mV _{P-P} CH1 input Gain ADJ Low	57.5	60	62.5	dB
PB voltage gain 2-2	G _{V22}	f = 4MHz, 0.5mV _{P-P} CH2 input Gain ADJ Low	57.5	60	62.5	dB
Crosstalk 1	CT1	f = 4MHz, 0.5mV _{P-P} CH1 input, head change-over, output ratio	—	—	-35	dB
Crosstalk 2	CT2	f = 4MHz, 0.5mV _{P-P} CH2 input, head change-over, output ratio	—	—	-35	dB
PB output 2nd harmonics distortion 1	HDP1	f = 4MHz, 0.5mV _{P-P} CH1 input, output, component, component ratio	—	—	-40	dB
PB output 2nd harmonics distortion 2	HDP2	f = 4MHz, 0.5mV _{P-P} CH2 input, output, component, component ratio	—	—	-40	dB
Input conversion noise 1	N1	head change-over SWLow 1MHz through BPF, divide output by G _{V1}	—	0.6	1.0	μVrms

Electrical Characteristics (cont.) ($T_a = 25 \pm 2^\circ\text{C}$)

Parameter	Symbol	Condition	min	typ	max	Unit
Input conversion noise 2	N2	head change-over SWLow 1MHz through BPF, divide output by G_{V2}	—	0.6	1.0	μV_{rms}
Head SW DC unbalance	ΔV_{17}	head change-over SW Hi/Low output DC difference	-100	0	100	mV
AGC level	V_{AGC}	AGC IN $f = 4\text{MHz}$, $40\text{mV}_{\text{P-P}}$	255	320	390	$\text{mV}_{\text{P-P}}$
AGC control characteristics	ΔV_{AGC}	AGC IN $f = 4\text{MHz}$, $500\text{mV}_{\text{P-P}}$ 20log (F14/F13) Calculation	0	0.9	1.8	dB
AGC output difference	HDA	AGC IN $f = 4\text{MHz}$, $500\text{mV}_{\text{P-P}}$ output, component, component ratio	—	—	-40	dB
Tracking output 1	TR1	AGC IN $f = 4\text{MHz}$, $50\text{mV}_{\text{P-P}}$ TRACKING OUT DC Measurement	1.4	1.8	2.2	V
Tracking output 2	TR2	AGC IN $f = 4\text{MHz}$, $200\text{mV}_{\text{P-P}}$ TRACKING OUT DC Measurement	2.75	3.2	3.65	V
Rec. amp. gain 1	I_{OR1}	Rec IN $f = 4\text{MHz}$, $20\text{mV}_{\text{P-P}}$ Compute gain from output between ④ to ⑤	300	415	535	mV
Rec. amp. gain 2	I_{OR2}	Rec IN $f = 4\text{MHz}$, $20\text{mV}_{\text{P-P}}$ Compute gain from output between ④ to ⑦	300	415	535	mV
Rec. AGC level 1	I_{RAGC1}	Rec IN $f = 4\text{MHz}$, $125\text{mV}_{\text{P-P}}$ Output level between ④ to ⑤ $R_{\text{AGC}} = 33\text{k}\Omega$	16.5	19.6	23.2	$\text{mA}_{\text{P-P}}$
Rec. AGC control characteristics	ΔI_{RAGC1}	Rec IN $f = 4\text{MHz}$, $250\text{mV}_{\text{P-P}}$ $R_{\text{AGC}} = 33\text{k}\Omega$, 20log $\left(\frac{F21}{F20}\right)$ Calculation	0	—	1.0	dB
Rec. current 2nd harmonics distortion 1	HD ₂₁	Rec IN $f = 4\text{MHz}$, $125\text{mV}_{\text{P-P}}$ $R_{\text{AGC}} = 33\text{k}\Omega$, 8MHz/4MHz ratio	—	—	-41	dB
Rec. current 2nd harmonics distortion 2	HD ₂₂	Rec IN $f = 4\text{MHz}$, $125\text{mV}_{\text{P-P}}$ $R_{\text{AGC}} = 33\text{k}\Omega$, 8MHz/4MHz ratio	—	—	-41	dB
Muting ratio	M_R	Rec IN $f = 4\text{MHz}$, $125\text{mV}_{\text{P-P}}$ $R_{\text{AGC}} = 33\text{k}\Omega$, MUTE ON/OFF ratio	—	—	-48	dB
Rec. AGC level 2	I_{RAGC2}	Rec IN $f = 2\text{MHz}$, $190\text{mV}_{\text{P-P}}$ $R_{\text{AGC}} = 22\text{k}\Omega$	25.1	30	35.5	$\text{mA}_{\text{P-P}}$
Rec. quiescent current	I_{RCQ}	Rec mode, In case of no signal $I_{\text{CC}} \text{ ADJ } R = 15\Omega$	60	80	100	mA
PB static circuit current	I_{PCQ}	PB mode DC measurement	17.5	28.5	39.5	mA
PRE GAIN ADJ Hi GAIN holding voltage	V_{PGAH}	Hi GAIN	3.0	—	5.0	V
PRE GAIN ADJ Low GAIN holding voltage	V_{PGAL}	Low GAIN	0	—	2.0	V
Head SW FF CH1 ON holding voltage	V_{HS1}	CH1 (Pin⑤ input amp.)	0	—	2.0	V
Head SW FF CH2 ON holding voltage	V_{HS2}	CH2 (Pin⑦ input amp.)	3.0	—	5.0	V
SW1 ON resistor	R_1	PB mode Pin④ impedance	1.5	3.5	5.5	Ω
Rec. mute threshold	V_M	Rec mode	2.0	—	3.0	V
Rec. AGC OFF holding voltage	V_{RAGC}	Rec AGC OFF	4.0	—	5.0	V
Rec. SYNC AGC ON holding voltage	V_{SSYN}	Rec AGC ON	2.5	—	5.0	V
Rec. SYNC AGC OFF holding voltage	V_{SSYF}	Rec AGC OFF	0	—	1.5	V
Rec. mode holding voltage	V_{SREC}	Rec IN $f = 4\text{MHz}$ $125\text{mV}_{\text{P-P}}$ $R_{\text{AGC}} = 33\text{k}\Omega$	0	—	1.0	V
EE mode holding voltage	V_{SEE}	Same as above Rec MUTE	2.0	—	3.0	V
PB mode holding voltage	V_{SPB}	$f = 4\text{MHz}$, $0.5\text{mV}_{\text{P-P}}$ GAIN ADJ Low	4.0	—	5.0	V

Electrical Characteristics [Reference value] ($T_a = 25 \pm 2^\circ\text{C}$)

Parameter	Symbol	Condition	min	typ	max	Unit
Rec. current tertiary distortion	HD_3	Rec IN $f = 4\text{MHz}$, 125mV_{P-P} $R_{AGC} = 33\text{k}\Omega$, $12\text{MHz}/4\text{MHz}$ ratio	—	—	(-40)	dB
Rec. current cross modulation ($\pm f_c$)	C_{M1}	$f_Y = 4\text{MHz}$, 20mA_{P-P} Out $f_c = 630\text{kHz}$, -14dB down	—	—	(-50)	dB
Rec. current cross modulation ($\pm 2f_c$)	C_{M2}	$f_Y = 4\text{MHz}$, 20mA_{P-P} Out $f_c = 630\text{kHz}$, -14dB down	—	—	(-50)	dB
Rec. amp. f characteristics	ΔG_{If}	Rec IN $f = 4\text{MHz}$, 20mV_{P-P} EQ exist $4\text{MHz}/1\text{MHz}$ level ratio	(-5.5)	(-4.5)	(-3.5)	dB
PB amp. f characteristics 1	ΔG_{Vf1}	As $f_o = 5\text{MHz}$, with L designated $5\text{MHz}/1\text{MHz}$ level ratio	(-8)	—	—	dB
PB amp. f characteristics 2	ΔG_{Vf2}	$10\text{MHz}/1\text{MHz}$ level ratio	(-4)	(-2.5)	(-1)	dB

Note) The characteristics value in parentheses is not a guaranteed value, but reference one on design.