

# AN3986FBP, AN3986FHP

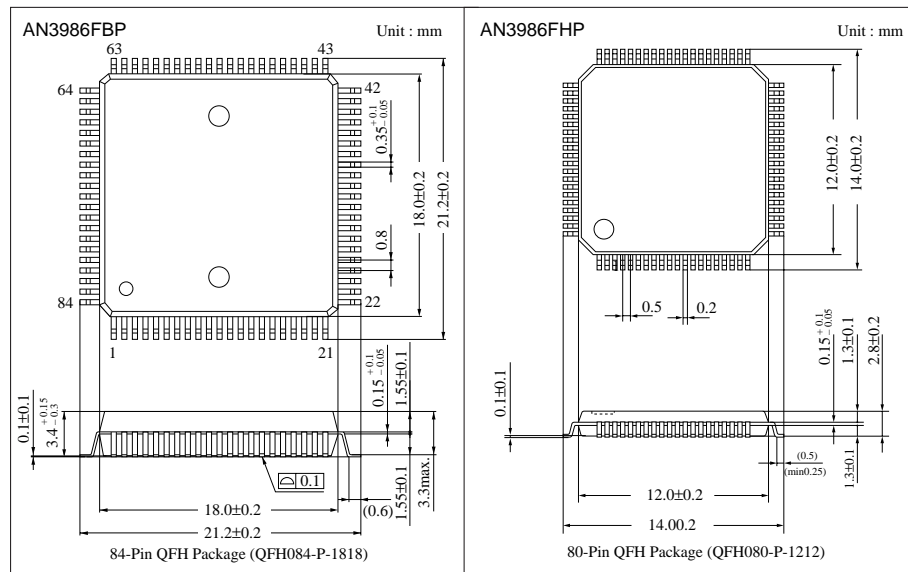
## Stereo Audio Signal Processor ICs for 8-mm Camcorder

### ■ Overview

The AN3986FBP and the AN3986FHP are stereo audio signal processor ICs for 8-mm camcorder. It incorporates all the functions needed for stereo-audio signal processing in 8mm camcorder.

### ■ Features

- Built-in headphone amplifiers
- Built-in matrix signal processing



### ■ Absolute Maximum Ratings

#### AN3986FBP

Parameter	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	$V_{CC1}=6 / V_{CC2}=9.5$	V
Power dissipation <sup>Note 2)</sup>	$P_D$	474	mW
Operating ambient temperature <sup>Note 1)</sup>	$T_{opr}$	-20 to +70	°C
Storage temperature <sup>Note 1)</sup>	$T_{stg}$	-55 to +125	°C

#### AN3986FHP

Parameter	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	$V_{CC1}=6 / V_{CC2}=9.5$	V
Power dissipation <sup>Note 2)</sup>	$P_D$	392	mW
Operating ambient temperature <sup>Note 1)</sup>	$T_{opr}$	-20 to +70	°C
Storage temperature <sup>Note 1)</sup>	$T_{stg}$	-55 to +125	°C

Note 1)  $T_a=25^{\circ}\text{C}$  except operating ambient temperature and storage temperature unless otherwise specified.  
 Note 2) Allowable power dissipation of the package at  $T_a=70^{\circ}\text{C}$ .



### ■ Pin Descriptions

Pin No.		Pin name	Pin No.		Pin name
AN3986FHP	AN3986FBP		AN3986FHP	AN3986FBP	
1	1	NR input/output (L)	41	43	GND
2	2	GND	42	44	SP/EP mode switching
3	3	Dev. adjustment 1 (L)	43	45	Output switching control
4	4	Dev. adjustment 2 (L)	44	46	Matrix control
5	5	LP emphasis (L)	45	47	NR emphasis (R)
6	6	Level sensor timing C1 (L)	46	48	FM emphasis (R)
7	7	Level sensor timing C2 (L)	47	49	Buffer input (R)
8	8	Level sensor input (L)	48	50	CCA input (R)
9	9	GND	49	51	CCA output (R)
10	10	LPF output (L)	50	52	CCA amp. input (R)
11	12	CCA amp. input (L)	51	54	LPF output (R)
12	13	CCA output (L)	52	55	GND
13	14	CCA input (L)	53	56	Level sensor input (R)
14	15	Buffer output (L)	54	57	Level sensor timing C2 (R)
15	16	FM emphasis (L)	55	58	Level sensor timing C1 (R)
16	17	NR emphasis (L)	56	59	LP emphasis (R)
17	18	Mode discriminator output	57	60	Dev. adjustment 2 (R)
18	19	Mute control	58	61	Dev. adjustment 1 (R)
19	20	Input change switch	59	62	GND
20	21	GND	60	63	NR input/output (R)
21	22	Input 3 (L)	61	64	VCO frequency adjustment (R)
22	23	Rec/PB switching (L)	62	65	FM modulator output (R)
23	24	Input 2 (L)	63	66	FM demodulator input (R)
24	25	AGC time-constant	64	67	FM detector input (R)
25	26	Input 1 (L)	65	68	FM input AGC detection
26	27	V <sub>REF</sub>	66	69	ST/MON time-constant
27	28	Headphone output (L)	67	70	HOLD 2
28	29	Headphone GND (L)	68	71	HOLD 1
29	30	Line output (L)	69	72	ST/MON detection
30	31	V <sub>REF</sub> H	70	73	Bilingual timing generation
31	33	V <sub>CC2</sub>	71	75	V <sub>CC1</sub> (FM)
32	34	Line output (R)	72	76	Mono/multi time-constant
33	35	Headphone GND (R)	73	77	GND (PG)
34	36	Headphone output (R)	74	78	PG input
35	37	V <sub>CC1</sub>	75	79	MUTE time-constant
36	38	Input 1 (R)	76	80	MUTE detection
37	39	Fade control	77	81	FM detection input (L)
38	40	Input 2 (R)	78	82	FM demodulator input (L)
39	41	Headphone volume control	79	83	FM modulator output (L)
40	42	Input 3 (R)	80	84	VCO frequency adjustment (L)

Note) Pins 11, 32, 53, and 74 of the AN3986FBP are to be left open.

**■ Electrical Characteristics (cont.)** ( $V_{CC1}=4.75V$ ,  $V_{CC2}=8.2V$ ,  $T_a=25\pm 2^\circ C$ ) (AN3986FHP)

Parameter	Symbol	Condition	min	typ	max	Unit
Circuit current 1 at recording	$I_{R35}$	$V_{CC1}=4.75V$ , when no signal input	58	73	88	mA
Circuit current 2 at recording	$I_{R31}$	$V_{CC2}=8.20V$ , when no signal input	1.6	2.0	2.4	mA
Circuit current 1 at playing back	$I_{P35}$	$V_{CC1}=4.75V$ , when no signal input	61	77	93	mA
Circuit current 1 at playing back	$I_{R31}$	$V_{CC2}=8.20V$ , when no signal input	1.6	2.0	2.4	mA
Line AGC output level Lch, Rch	$V_{OALL}$ $V_{OALR}$	$V_{IN}=20dBs$ $f=400Hz$	-8	-7	-6	dBs
Line AGC output distortion factor Lch, Rch	$T_{HALL1}$ $T_{HALR1}$	$V_{IN}=20dBs$ $f=1kHz$ , THD 5th	—	0.02	0.1	%
AGC ON output level Lch, Rch	$V_{OALL2}$ $V_{OALR2}$	$V_{IN}=-2dBs$ $f=400Hz$	-4	-1	+2	dBs
AGC ON output distortion factor Lch, Rch	$T_{HALL2}$ $T_{HALR2}$	$V_{IN}=-2dBs$ $f=1kHz$ , THD 5th	—	0.2	0.4	%
Line AGC output noise Lch, Rch	$V_{NALL}$ $V_{NALR}$	No input A curve filter	—	-78	-74	dBs
Fade control maximum attenuation output Lch, Rch	$V_{FALL}$ $V_{FALR}$	$V_{IN}=-20dBs$ , 1kHz A curve filter	—	-80	-75	dBs
Line through monitor output level Lch, Rch	$V_{OILL}$ $V_{OILR}$	$V_{IN}=-20dBs$ , 400Hz	-8	-7	-6	dBs
Line through monitor output noise Lch, Rch	$V_{NLLL}$ $V_{NLLR}$	No input A curve filter	—	-81	-77	dBs
Between inputs between channels crosstalk	$V_{CTIN}$	$V_{IN}=-14dBs$ , 1kHz A curve filter	—	-78	-74	dB
E-E monitor output frequency characteristics Lch, Rch	$V_{OLFL}$ $V_{OLFR}$	$V_{IN}=-20dBs$ ratio of 40kHz/40Hz	—	-5.5	-2.5	dBs
HP output level $V_{OL}=\text{CENTER}$ Lch, Rch	$V_{HC8L}$ $V_{HC8R}$	$V_{IN}=-20dBs$ , 400Hz 8 $\Omega$ load	-28	-26	-24	dBs
HP output distortion factor $V_{OL}=\text{CENTER}$ Lch, Rch	$T_{HHC8L}$ $T_{HHC8R}$	$V_{IN}=-20dBs$ , 1kHz 8 $\Omega$ load, THD 5th	—	0.05	0.5	%
HP output level $V_{OL}=\text{MAX}$ Lch, Rch	$V_{HH8L}$ $V_{HH8R}$	$V_{IN}=-20dBs$ , 400Hz 8 $\Omega$ load	-18	-16	-14	dBs
HP output level $V_{OL}=\text{MIN}$ Lch, Rch	$V_{HL8L}$ $V_{HL8R}$	$V_{IN}=-20dBs$ , 400Hz 8 $\Omega$ load	—	-96	-92	dBs
HP output noise voltage $V_{OL}=\text{MIN}$ Lch, Rch	$V_{NHCOL}$ $V_{NHCOR}$	No input A curve filter	—	-96	-92	dBs
HP maximum output level $V_{OL}=\text{CENTER}$ Lch, Rch	$V_{MH8L}$ $V_{MH8R}$	1kHz, at 1% distortion, 8 $\Omega$ load THD 5th	-18	—	—	dBs
Encode output level Lch, Rch	$V_{ORLL}$ $V_{ORLR}$	$V_{IN}=-20dBs$ , 400Hz BIL mode	-18	-15	-12	dBs
Encode output distortion factor Lch, Rch	$T_{HORLL}$ $T_{HORLR}$	$V_{IN}=-20dBs$ , 1kHz to THD 5th	—	0.2	0.4	%
Encode linearity Lch, Rch	$V_{OXLL}$ $V_{OXLR}$	$V_{IN}=-11.2/-51.2BS$ $f=400Hz$	-21	-20	-19	dB
SP encode f characteristics Lch, Rch	$V_{FORLL}$ $V_{FORLR}$	$V_{IN}=-20dBs$ $f=10kHz/400Hz$	3.8	4.8	5.8	dB
LP encode f characteristics Lch, Rch	$V_{FLRLL}$ $V_{FLRLR}$	$V_{IN}=-20dBs$ , 10kHz ratio of LP/SP	2.0	3.0	4.0	dB
Encode output noise Lch, Rch	$V_{NRLL}$ $V_{NRRR}$	No input A curve filter	—	-55	-51	dB
ST/BIL level difference L + R Lch	$V_{BSRLL}$	$V_{IN}=-20dBs$ , 400Hz	-0.5	0	+0.5	dB
ST/BIL level difference L - R Lch	$V_{BSRLR}$	$V_{IN}=-20dBs$ , 400Hz 30kHz LPF	—	-30	-17.5	dB
MON/BIL level difference Lch	$V_{BMRLL}$	$V_{IN}=-20dBs$ , 400Hz	-0.5	0	+0.5	dB
Decode reference output level Lch, Rch	$V_{OLPL}$ $V_{OLPR}$	$V_{OLL}$ , input $V_{ORLR}$	-9.5	-7	-4.5	dB

**■ Electrical Characteristics (cont.)** ( $V_{CC1}=4.75V$ ,  $V_{CC2}=8.2V$ ,  $T_a=25\pm 2^\circ C$ ) (AN3986FHP)

Parameter	Symbol	Condition	min	typ	max	Unit
Decode reference output distortion factor Lch, Rch	$T_{HOLPL}$ $T_{HOLPR}$	$V_{ORLL}$ , input $V_{ORLR}$	—	0.12	0.3	%
Decode linearity Lch, Rch	$V_{OXPL}$ $V_{OXPR}$	$V_{IN} = -11.6 / -41.6dBs$ $f = 400Hz$	-63	-60	-57	dB
Decode output noise Lch, Rch	$V_{NLPL}$ $V_{NLPR}$	No input A curve filter	—	-87	-79	dBs
Crosstalk Lch, Rch, at playback	$C_{ERL}$ $C_{ERR}$	$V_{IN} = -20dBs$ , 1kHz A curve filter	—	—	-79	dBs
Maximum output level Lch, Rch, at playback	$V_{OLML}$ $V_{OLMR}$	$V_{IN} = -10dBs$ , 1kHz THD 5th	—	0.4	1.0	%
Line mute attenuation quantity Lch, Rch	$V_{MLML}$ $V_{MLMR}$	$V_{IN} = -20dBs$ , 1kHz A curve filter	—	-92	-87	dBs
Encode channel crosstalk Lch, Rch	$S_{ERL}$ $S_{ERR}$	$V_{IN} = -14dBs$ , 1kHz A curve filter	—	-50	-47	dBs
E-E system monitor output channel balance	$B_{AL}$	$V_{OALR}/V_{OALL}$	-0.55	0	+0.55	dB
Encode output channel balance	$B_{RE}$	$V_{ORLR}/V_{ORLL}$	-2	0	+2	dB
Decode output channel balance	$B_{LP}$	$V_{OLPR}/V_{OLPL}$	-3	0	+3	dB
VCO free-run frequency Lch	$F_{OL}$	$R = 8.2k\Omega$	1.35	1.50	1.65	MHz
VCO free-run frequency Rch	$F_{OR}$	$R = 6.8k\Omega$	1.55	1.70	1.85	kHz
VCO output amplitude voltage Lch	$V_{79}$	when $f = 1.5MHz$	456	500	548	mV <sub>P-P</sub>
VCO output amplitude voltage Rch	$V_{62}$	when $f = 1.7MHz$	410	450	493	mV <sub>P-P</sub>
VCO 2nd harmonics output Lch	$V_{79-2}$	fundamental wave as 0dB	—	-50	-35	dB
VCO 2nd harmonics output Rch	$V_{62-2}$	fundamental wave as 0dB	—	-50	-35	dB
VCO reference frequency deviation Lch	$V_{79-3}$	fundamental wave as 0dB	—	-50	-40	dB
VCO reference frequency deviation Rch	$V_{62-3}$	fundamental wave as 0dB	—	-50	-40	dB
VCO reference frequency deviation Lch	$F_{DOL}$	$\Delta V = \pm 195.2mV$ (-15dBs equivalent)	90	120	150	kHz
VCO reference frequency deviation Rch	$F_{DOR}$	$\Delta V = \pm 195.2mV$ (-15dBs equivalent)	45	60	75	kHz
Maximum frequency deviation 1 Lch	$F_{DLMX1}$	input $\Delta V = -617mV$ (-5dBs equivalent)	96	110	128	kHz
Maximum frequency deviation 2 Lch	$F_{DLMX2}$	input $\Delta V = +617mV$ (-5dBs equivalent)	-128	-110	-96	kHz
Maximum frequency deviation 1 Rch	$F_{DRMX1}$	input $\Delta V = -617mV$ (-5dBs equivalent)	48	55	64	kHz
Maximum frequency deviation 2 Rch	$F_{DRMX2}$	input $\Delta V = +617mV$ (-5dBs equivalent)	-64	-55	-48	kHz
Boost start time Lch, Rch, at recording	$T_{BSL}$ $T_{BSR}$	time from PG input	—	—	200	$\mu s$
Boost level Lch, Rch	$V_{BSL}$ $V_{BSR}$	level difference due to gain-up	6	—	9	dB
Boost width Lch, Rch	$T_{BEL}$ $T_{BER}$	time of gain-up	1.1	1.3	1.5	ms
Reference FM modulation distortion factor Lch, Rch	$T_{HDL}$ $T_{HDR}$	$V_{IN} = -15dBs$ , $f = 1kHz$ THD 5th after demodulation	—	—	0.3	%
FM demodulation output Lch	$V_{DEL1}$	$DEV = \pm 60kHz$ $f_m = 400Hz$	-18	-15	-12	dBs
FM demodulation output Rch	$V_{DER1}$	$DEV = \pm 30kHz$ $f_m = 400Hz$	-18	-15	-12	dBs
FM demodulation output distortion ratio Lch	$T_{HDEL1}$	$DEV = \pm 60kHz$ $f_m = 1kHz$	—	—	0.3	%
FM demodulation output distortion ratio Rch	$T_{HDER1}$	$DEV = \pm 30kHz$ $f_m = 1kHz$	—	—	0.3	%
Dropout detection ON level	DODON	$V_{IN} = 30mV_{P-P}$ as 0dB $f = 1.5MHz$	-11	-14	-18	dB

**■ Electrical Characteristics (cont.)** ( $V_{CC1}=4.75V$ ,  $V_{CC2}=8.2V$ ,  $T_a=25\pm 2^\circ C$ ) (AN3986FHP)

Parameter	Symbol	Condition	min	typ	max	Unit
Dropout off hysteresis width	DODOFF	$V_{in}=30mV_{P-P}$ as 0dB	2	4	6	dB
MUTE change-over ON level	MUTON	$V_{in}=30mV_{P-P}$ as 0dB $f=1.5MHz$	-9	-12	-16	dB
MUTE OFF hysteresis	MUTOFF	$V_{in}=30mV_{P-P}$ as 0dB	1	3	5	dB
AUTO MONO detection level	$V_{ATMS}$	$V_{in}=30mV_{P-P}$ as 0dB $f=1.7MHz$	-9	-12	-16	dB
AUTO MONO OFF hysteresis	$V_{ATME}$	$V_{in}=30mV_{P-P}$ as 0dB	0.5	2.0	4	dB
Hold start time Lch	$T_{HOSL}$	time from PG input to hold start	1.0	1.5	2.0	$\mu s$
Hold start time Rch	$T_{HOSR}$		1.0	1.5	2.0	$\mu s$
Hold end time Lch	$T_{HOFL}$	time from PG input to hold end	8.5	10.0	11.5	$\mu s$
Hold end time Rch	$T_{HOFR}$		12.2	14.0	15.8	$\mu s$
Bilingual discrimination level	$V_{BIS1}$	Boost level	3	—	—	dB
Bilingual discrimination level hysteresis	$V_{BIE1}$		0.5	2	4	dB
Self recording playback level Lch	$V_{RPL}$	$V_{in}=-20dBs$ , $f=400Hz$ bilingual MODE	-9.5	-7.0	-4.5	dBs
Self recording playback level Rch	$V_{RPR}$		-8.5	-6.0	-3.5	dBs
Self recording playback level (R/L) channel balance	$B_{RPL}$	$V_{in}=-20dBs$ , $f=400Hz$ $V_{RPR}/V_{RPL}$	0	1.0	2.0	dB
Rec. holding voltage	$V_{22R}$		0	—	1.4	V
PB holding voltage	$V_{22P}$		3.4	—	4.75	V
Line mute ON voltage	$V_{18MN}$		3.4	—	4.75	V
Line mute OFF voltage	$V_{18MF}$		0	—	1.4	V
Input change-over selection voltage LINE 1	$V_{191}$		3.9	—	4.75	V
Input change-over selection voltage LINE 2	$V_{192}$		2.1	—	2.7	V
Input change-over selection voltage LINE 3	$V_{193}$		0	—	0.8	V
SP mode holding voltage	$V_{42S}$		3.4	—	4.75	V
LP mode holding voltage	$V_{42L}$		0	—	1.4	V
Output change-over selection voltage Lch	$V_{43H}$		3.9	—	4.75	V
Output change-over selection voltage Rch	$V_{43M}$		2.1	—	2.7	V
Output change-over selection voltage STE	$V_{43L}$		0	—	0.8	V
Matrix control holding voltage ON	$V_{44H}$		3.9	—	4.75	V
Matrix control holding voltage AUTO	$V_{44M}$		2.1	—	2.7	V
Matrix control holding voltage OFF	$V_{44L}$		0	—	0.8	V
PG input voltage high level	$V_{74H}$		3.4	—	4.75	V
PG input voltage low level	$V_{74L}$		0	—	1.4	V
Discrimination output voltage BIL	$V_{17H}$		3.4	—	4.75	V
Discrimination output voltage MON	$V_{17M}$		1.5	—	2.6	V
Discrimination output voltage STE	$V_{17L}$		0	—	0.8	V

**■ Electrical Characteristics ( $V_{CC1}=4.75V$ ,  $V_{CC2}=8.2V$ ,  $T_a=25\pm 2^\circ C$ ) (AN3986FBP)**

Parameter	Symbol	Condition	min	typ	max	Unit
Circuit current 1	$I_{R37}$	$V_{CC1} = 4.75V$ , at recording	58	73	88	mA
Circuit current 2	$I_{R33}$	$V_{CC2} = 8.20V$ , at recording	1.6	2.0	2.4	mA
Circuit current 1	$I_{P37}$	$V_{CC1} = 4.75V$ , at recording	61	77	93	mA
Circuit current 2	$I_{P33}$	$V_{CC2} = 8.20V$ , at recording	1.6	2.0	2.4	mA
Line AGC output level Lch, Rch	$V_{OALL}$ $V_{OALR}$	$V_{IN} = 20dBs$ $f = 400Hz$	-8	-7	-6	dBs
Line AGC output distortion rate Lch, Rch	$T_{HALL1}$ $T_{HALR1}$	$V_{IN} = 20dBs$ $f = 1kHz$ , THD 5th	—	0.02	0.1	%
AGC ON output level Lch, Rch	$V_{OALL2}$ $V_{OALR2}$	$V_{IN} = -20dBs$ $f = 400Hz$	-4	-1	+2	dBs
AGC ON output distortion rate Lch, Rch	$T_{HALL2}$ $T_{HALR2}$	$V_{IN} = -20dBs$ $f = 1kHz$ , THD 5th	—	0.2	0.4	%
Line AGC output noise Lch, Rch	$V_{NALL}$ $V_{NALR}$	No input A curve filter	—	-78	-74	dBs
Fade control maximum attenuation output Lch, Rch	$V_{FALL}$ $V_{FALR}$	$V_{IN} = -20dBs$ , 1kHz A curve filter	—	-80	-75	dBs
Line through monitor output level Lch, Rch	$V_{OILL}$ $V_{OILR}$	$V_{IN} = -20dBs$ , 400Hz	-8	-7	-6	dBs
Line through monitor output noise Lch, Rch	$V_{NLLL}$ $V_{NLLR}$	No input A curve filter	—	-81	-77	dBs
Between inputs between channels crosstalk	$V_{CTIN}$	$V_{IN} = -14dBs$ , 1kHz A curve filter	—	-78	-74	dBs
E-E monitor output frequency characteristics Lch, Rch	$V_{OLFL}$ $V_{OLFR}$	$V_{IN} = -20dBs$ ratio of 40kHz/400Hz	—	-5.5	-2.5	dB
HP output level $V_{OL} = CENTER$ Lch, Rch	$V_{HC8L}$ $V_{HC8R}$	$V_{IN} = -20dBs$ , 400Hz 8Ω load	-28	-26	-24	dBs
HP output distortion factor $V_{OL} = CENTER$ Lch, Rch	$T_{HHC8L}$ $T_{HHC8R}$	$V_{IN} = -20dBs$ , 1kHz 8Ω load, THD 5th	—	0.05	0.5	%
HP output level $V_{OL} = max.$ Lch, Rch	$V_{HH8L}$ $V_{HH8R}$	$V_{IN} = -20dBs$ , 400Hz 8Ω load	-18	-16	-14	dBs
HP output level $V_{OL} = min.$ Lch, Rch	$V_{HL8L}$ $V_{HL8R}$	$V_{IN} = -20dBs$ , 400Hz 8Ω load	—	-96	-92	dBs
HP output noise voltage $V_{OL} = CENTER$ Lch, Rch	$V_{NHCOL}$ $V_{NHCOR}$	No input A curve filter	—	-96	-92	dBs
HP maximum output level $V_{OL} = CENTER$ Lch, Rch	$V_{MH8L}$ $V_{MH8R}$	1kHz, at 1% distortion, 8Ω load THD 5th	-18	—	—	dBs
Encode output level Lch, Rch	$V_{ORLL}$ $V_{ORLR}$	$V_{IN} = -20dBs$ , 400Hz BIL mode	-18	-15	-12	dBs
Encode output distortion factor Lch, Rch	$T_{HORLL}$ $T_{HORLR}$	$V_{IN} = -20dBs$ , 1kHz to THD 5th	—	0.2	0.4	%
Encode linearity Lch, Rch	$V_{OXLL}$ $V_{OXLR}$	$V_{IN} = -11.2/-51.2dBs$ $f = 400Hz$	-21	-20	-19	dB
SP encode f characteristics Lch, Rch	$V_{FORLL}$ $V_{FORLR}$	$V_{IN} = -20dBs$ $f = 10kHz/400Hz$	3.8	4.8	5.8	dB
LP encode f characteristics Lch, Rch	$V_{FLRLL}$ $V_{FLRLR}$	$V_{IN} = -20dBs$ , 10kHz ratio of LP/SP	2.0	3.0	4.0	dB
Encode output noise Lch, Rch	$V_{NRLL}$ $V_{NRRR}$	No input A curve filter	—	-55	-51	dB
ST/BIL level difference L + R Lch	$V_{BSRLL}$	$V_{IN} = -20dBs$ , 400Hz	-0.5	0	+0.5	dB
ST/BIL level difference L - R Rch	$V_{BSRLR}$	$V_{IN} = -20dBs$ , 400Hz 30kHz LPF	—	-30	-17.5	dB
MON/BIL level difference Lch	$V_{BMRLR}$	$V_{IN} = -20dBs$ , 400Hz	-0.5	0	+0.5	dB
Decode reference output level Lch, Rch	$V_{OLPL}$ $V_{OLPR}$	$V_{OLL}$ , input $V_{ORLR}$	-9.5	-7	-4.5	dB

**■ Electrical Characteristics (cont.)** ( $V_{CC1}=4.75V$ ,  $V_{CC2}=8.2V$ ,  $T_a=25\pm 2^\circ C$ ) (AN3986FBP)


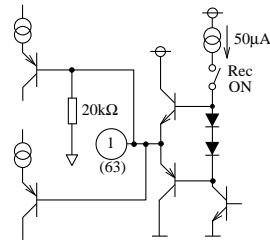

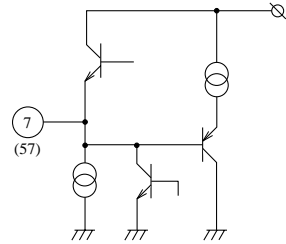

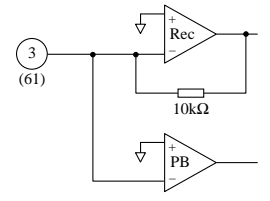

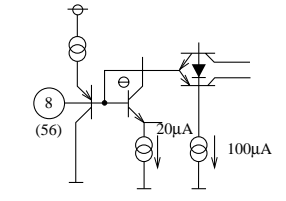

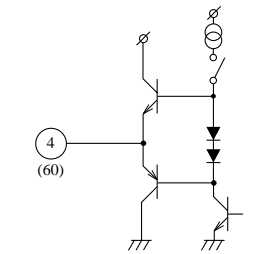

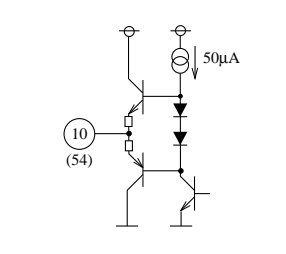

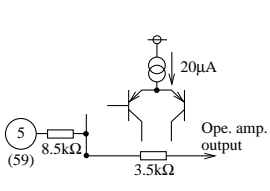

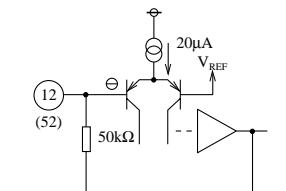

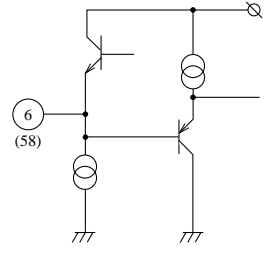

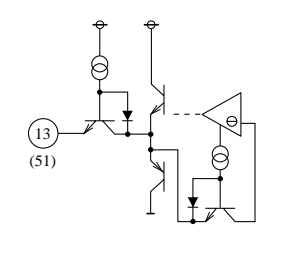
Parameter	Symbol	Condition	min	typ	max	Unit
Decode reference output distortion rate Lch, Rch	$T_{HOLPL}$ $T_{HOLPR}$	$V_{ORLL}$ , input $V_{ORLR}$	—	0.12	0.3	%
Decode linearity Lch, Rch	$V_{OXPL}$ $V_{OXPR}$	$V_{IN}=-11.6/-41.6dBs$ $f=400Hz$	-63	-60	-57	dB
Decode output noise Lch, Rch	$V_{NLPL}$ $V_{NLPR}$	No input A curve filter	—	-87	-79	dBs
Crosstalk Lch, Rch, at playback	$C_{ERL}$ $C_{ERR}$	$V_{IN}=-20dBs$ , 1kHz A curve filter	—	—	-79	dBs
Maximum output level Lch, Rch, at playback	$V_{OLML}$ $V_{OLMR}$	$V_{IN}=-10dBs$ , 1kHz THD 5th	—	0.4	1.0	%
Line mute attenuation quantity Lch, Rch	$V_{MLML}$ $V_{MLMR}$	$V_{IN}=-20dBs$ , 1kHz A curve filter	—	-92	-87	dBs
Encode channel crosstalk Lch, Rch	$S_{ERL}$ $S_{ERR}$	$V_{IN}=-14dBs$ , 1kHz A curve filter	—	-50	-47	dBs
E-E system monitor output channel balance	$B_{AL}$	$V_{OALR}/V_{OALL}$	-0.55	0	+0.55	dB
Encode output channel balance	$B_{RE}$	$V_{ORLR}/V_{ORLL}$	-2	0	+2	dB
Decode output channel balance	$B_{LP}$	$V_{OLPR}/V_{OLPL}$	-3	0	+3	dB
VCO free-run frequency Lch	$F_{OL}$	$R=8.2k\Omega$	1.35	1.50	1.65	MHz
VCO free-run frequency Rch	$F_{OR}$	$R=6.8k\Omega$	1.55	1.70	1.85	kHz
VCO output amplitude voltage Lch	$V_{83}$	when $f=1.5MHz$	456	500	548	mV <sub>P-P</sub>
VCO output amplitude voltage Rch	$V_{65}$	when $f=1.7MHz$	410	450	493	mV <sub>P-P</sub>
VCO 2nd harmonics output Lch	$V_{83-2}$	fundamental wave as 0dB	—	-50	-35	dB
VCO 2nd harmonics output Rch	$V_{65-2}$	fundamental wave as 0dB	—	-50	-35	dB
VCO 3rd harmonics output Lch	$V_{83-3}$	fundamental wave as 0dB	—	-50	-40	dB
VCO 3rd harmonics output Rch	$V_{65-3}$	fundamental wave as 0dB	—	-50	-40	dB
VCO reference frequency deviation Lch	$F_{DOL}$	$\Delta V=\pm 195.2mV$ (-15dBs equivalent)	90	120	150	kHz
VCO reference frequency deviation Rch	$F_{DOR}$	$\Delta V=\pm 195.2mV$ (-15dBs equivalent)	45	60	75	kHz
Maximum frequency deviation 1 Lch	$F_{DLMX1}$	input $\Delta V=-617mV$ (-5dBs equivalent)	96	110	128	kHz
Maximum frequency deviation 2 Lch	$F_{DLMX2}$	input $\Delta V=+617mV$ (-5dBs equivalent)	-128	-110	-96	kHz
Maximum frequency deviation 1 Rch	$F_{DRMX1}$	input $\Delta V=-617mV$ (-5dBs equivalent)	48	55	64	kHz
Maximum frequency deviation 2 Rch	$F_{DRMX2}$	input $\Delta V=+617mV$ (-5dBs equivalent)	-64	-55	-48	kHz
Boost start time Lch, Rch, at recording	$T_{BSL}$ $T_{BSR}$	time from PG input	—	—	200	$\mu s$
Boost level Lch, Rch	$V_{BSL}$ $V_{BSR}$	level difference due to gain-up	6	—	9	dB
Boost width Lch, Rch	$T_{BEL}$ $T_{BER}$	time of gain-up	1.1	1.3	1.5	ms
Reference FM modulation distortion ratio Lch, Rch	$T_{HDL}$ $T_{HDR}$	$V_{IN}=-15dBs$ , $f=1kHz$ THD 5th after demodulation	—	—	0.3	%
FM demodulation output voltage Lch	$V_{DEL1}$	$DEV=\pm 60kHz$ $f_m=400Hz$	-18	-15	-12	dBs
FM demodulation output voltage Rch	$V_{DER1}$	$DEV=\pm 30kHz$ $f_m=400Hz$	-18	-15	-12	dBs
FM demodulation output distortion ratio Lch	$T_{HDEL1}$	$DEV=\pm 60kHz$ $f_m=1kHz$	—	—	0.3	%
FM demodulation output distortion ratio Rch	$T_{HDER1}$	$DEV=\pm 30kHz$ $f_m=1kHz$	—	—	0.3	%
Dropout detection ON level	DODON	$V_{IN}=30mV_{P-P}$ as 0dB $f=1.5MHz$	-11	-14	-18	dB



**■ Electrical Characteristics (cont.)** ( $V_{CC1}=4.75V$ ,  $V_{CC2}=8.2V$ ,  $T_a=25\pm 2^\circ C$ ) (AN3986FBP)

Parameter	Symbol	Condition	min	typ	max	Unit
Dropout off hysteresis width	DODOFF	$V_{in}=30mV_{P-P}$ as 0dB	2	4	6	dB
MUTE change-over ON level	MUTON	$V_{in}=30mV_{P-P}$ as 0dB $f=1.5MHz$	-9	-12	-16	dB
MUTE OFF hysteresis	MUTOFF	$V_{in}=30mV_{P-P}$ as 0dB	1	3	5	dB
AUTO MONO detection level	$V_{ATMS}$	$V_{in}=30mV_{P-P}$ as 0dB $f=1.7MHz$	-9	-12	-16	dB
AUTO MONO OFF hysteresis	$V_{ATME}$	$V_{in}=30mV_{P-P}$ as 0dB	0.5	2.0	4	dB
Hold start time Lch	$T_{HOSL}$	time from PG input to hold start	1.0	1.5	2.0	$\mu s$
Hold start time Rch	$T_{HOSR}$		1.0	1.5	2.0	$\mu s$
Hold end time Lch	$T_{HOFL}$	time from PG input to hold end	8.5	10.0	11.5	$\mu s$
Hold end time Rch	$T_{HOFR}$		12.2	14.0	15.8	$\mu s$
Bilingual discrimination level	$V_{BIS1}$	Boost level	3	—	—	dB
Bilingual discrimination level hysteresis	$V_{BIE1}$		0.5	2	4	dB
Self recording playback level Lch	$V_{RPL}$	$V_{in}=-20dBs$ , $f=400Hz$ bilingual MODE	-9.5	-7.0	-4.5	dBs
Self recording playback level Rch	$V_{RPR}$		-8.5	-6.0	-3.5	dBs
Self recording playback level (R/L) channel balance	$B_{RPL}$	$V_{in}=-20dBs$ , $f=400Hz$ $V_{RPR}/V_{RPL}$	0	1.0	2.0	dB
Rec holding voltage	$V_{23R}$		0	—	1.4	V
PB holding voltage	$V_{23P}$		3.4	—	4.75	V
Line MUTE ON voltage	$V_{19MN}$		3.4	—	4.75	V
Line MUTE OFF voltage	$V_{19MF}$		0	—	1.4	V
Input change-over selection voltage LINE 1	$V_{201}$		3.9	—	4.75	V
Input change-over selection voltage LINE 2	$V_{202}$		2.1	—	2.7	V
Input change-over selection voltage LINE 3	$V_{203}$		0	—	0.8	V
SP mode holding voltage	$V_{44S}$		3.4	—	4.75	V
LP mode holding voltage	$V_{44L}$		0	—	1.4	V
Output change-over selection voltage Lch	$V_{45H}$		3.9	—	4.75	V
Output change-over selection voltage Rch	$V_{45M}$		2.1	—	2.7	V
Output change-over selection voltage STE	$V_{45L}$		0	—	0.8	V
Matrix control holding voltage ON	$V_{46H}$		3.9	—	4.75	V
Matrix control holding voltage AUTO	$V_{46M}$		2.1	—	2.7	V
Matrix control holding voltage OFF	$V_{46L}$		0	—	0.8	V
PG input voltage high level	$V_{78H}$		3.4	—	4.75	V
PG input voltage low level	$V_{78L}$		0	—	1.4	V
Discrimination output voltage BIL	$V_{18H}$		3.4	—	4.75	V
Discrimination output voltage MON	$V_{18M}$		1.5	—	2.6	V
Discrimination output voltage STE	$V_{18L}$		0	—	0.8	V

■ Pin Descriptions (V<sub>CC</sub> or GND pins are not shown)

Pin No.	Waveform · Voltage	Equivalent circuit	Pin No.	Waveform · Voltage	Equivalent circuit
1 [1] · 63 [60]	 2.38 VDC, Rec NR output		7 [7] · 57 [54]		
3 [3] · 61 [58]	 DC 2.38V		8 [8] · 56 [53]	 DC 1.65V L.S IN	
4 [4] · 60 [57]	 DC 2.38V		10 [10] · 54 [51]	 DC 2.38V LPF OUT	
5 [5] · 59 [56]	 DC 2.38V LP EMPH		12 [11] · 52 [50]	 DC 2.38V CCA IN	
6 [6] · 58 [55]			13 [12] · 51 [49]	 DC 2.38V CCA OUT	


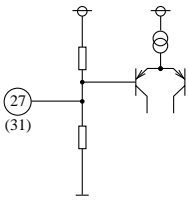

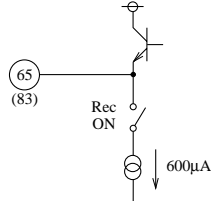

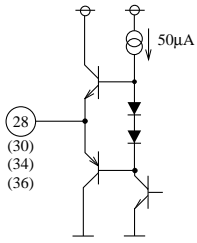
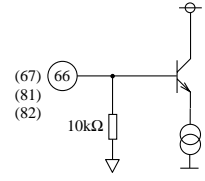

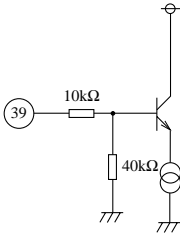

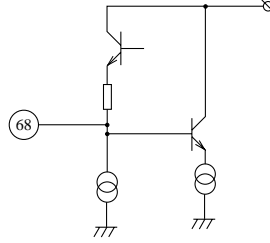

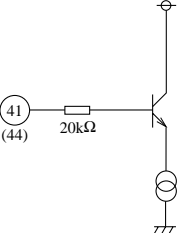
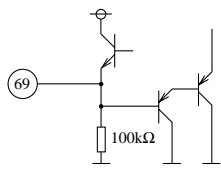

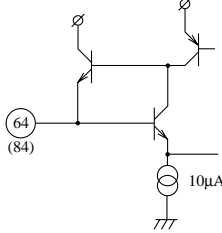

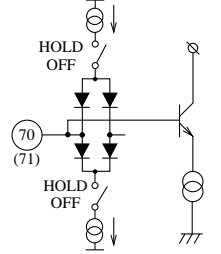
Note) The indicated values are typical ones, and may depend on operating conditions or individual IC.  
 V<sub>CC1</sub>= 4.75V, and V<sub>CC2</sub>= 8.2V  
 A number without a square denotes a pin No. of the AN3986FBP, while a number with a square denotes a pin No. of the AN3986FHP.

■ Pin Descriptions (cont.) ( $V_{CC}$  or GND pins are not shown)

Pin No.	Waveform · Voltage	Equivalent circuit	Pin No.	Waveform · Voltage	Equivalent circuit
14 13 50 48	~ DC 2.38V CCA IN		19 18	MUTE SW	
15 14 49 47	~ 2.38 VDC, Buffer OUT		20 19 45 43 46 44	—	
16 15 46	~ DC 2.38V		22 21 24 23 26 25 38 36 40 38 42 40	DC 2.38V	
17 16 45	~ DC 2.38V		23 22	R/P SW	
18 17	—		25 24	—	

Note) The indicated values are typical ones, and may depend on operating conditions or individual IC.  
 $V_{CC1}= 4.75V$ , and  $V_{CC2}= 8.2V$   
 A number without a square denotes a pin No. of the AN3986FBP, while a number with a square denotes a pin No. of the AN3986FHP.

■ Pin Descriptions (cont.) ( $V_{CC}$  or GND pins are not shown)

Pin No.	Waveform · Voltage	Equivalent circuit	Pin No.	Waveform · Voltage	Equivalent circuit
27 [26] · 31 [30]	 $V_{REF IN}$		65 [62] · 83 [79]	 DC $f=1.5\text{MHz}$ (1.7MHz) FM modulation output	
28 [27] · 30 [29] · 34 [32] · 36 [34]	 DC 2.38V 4.1V		66 [63] · 67 [64] · 81 [77] · 82 [78]	DC 2.38V RF IN	
39 [37]			68 [65]		
41 [39] · 44 [42]			69 [66]	4VDC when not active, and 0VDC when active	
64 [61] · 84 [80]	 DC 2.3V		70 [67] · 71 [68]		

Note) The indicated values are typical ones, and may depend on operating conditions or individual IC.  
 $V_{CC1}=4.75\text{V}$ , and  $V_{CC2}=8.2\text{V}$   
 A number without a square denotes a pin No. of the AN3986FBP, while a number with a square denotes a pin No. of the AN3986FHP.

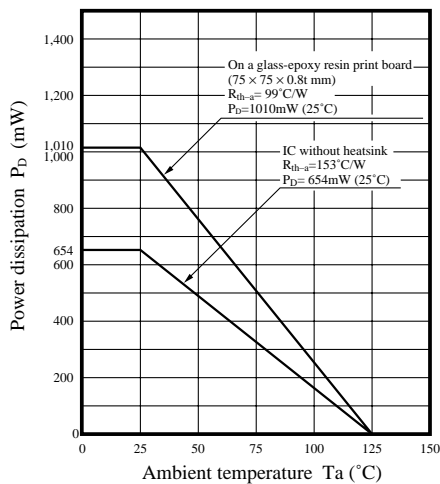
■ Pin Descriptions (cont.) ( $V_{CC}$  or GND pins are not shown)

Pin No.	Waveform · Voltage	Equivalent circuit	Pin No.	Waveform · Voltage	Equivalent circuit
73 70			72 69		
76 72			79 75		
78 74					

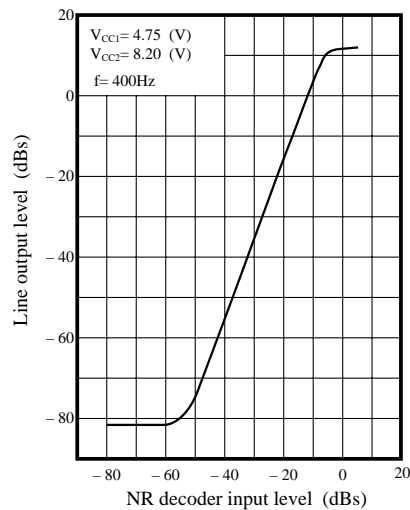
Note) The indicated values are typical ones, and may depend on operating conditions or individual IC.  
 $V_{CC1} = 4.75V$ , and  $V_{CC2} = 8.2V$   
 A number without a square denotes a pin No. of the AN3986FBP, while a number with a square denotes a pin No. of the AN3986FHP.

■ Reference

Power dissipation for the package  
AN3986FHP  $P_D - T_a$

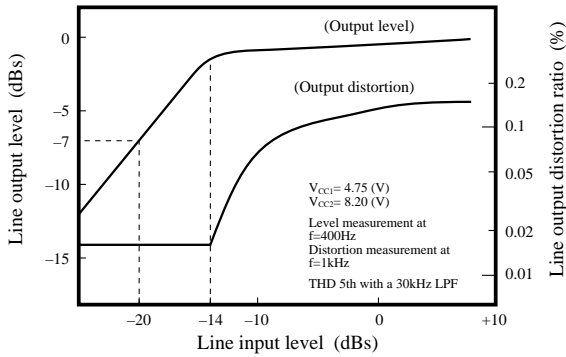


NR decoder linearity characteristics

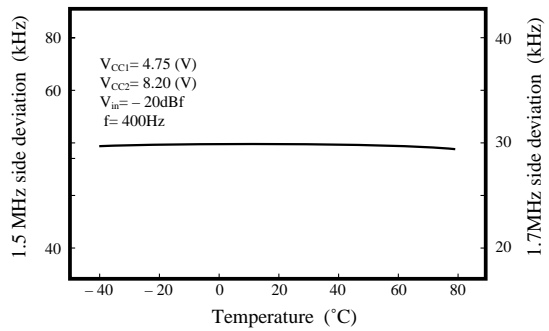


■ Reference (cont.)

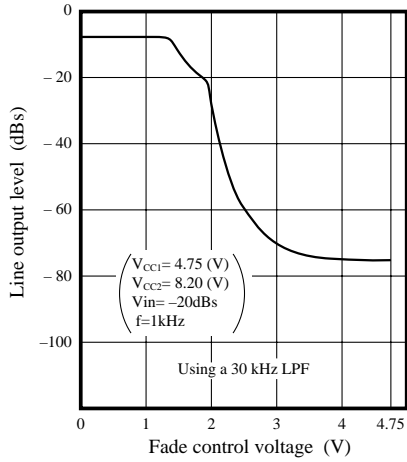
Line AGC input/output characteristics



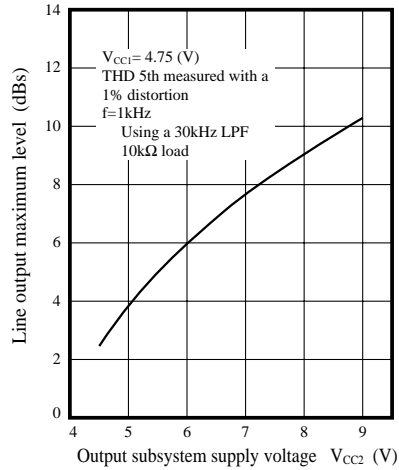
Temperature characteristics of FM record output deviation



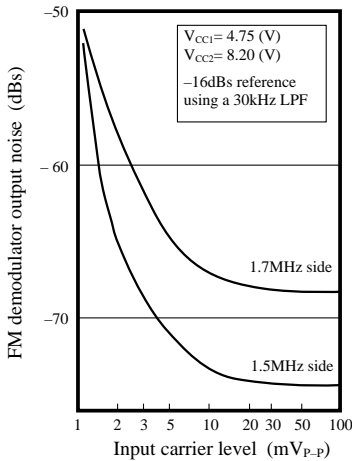
Fade control output characteristics



Line maximum output level



Carrier level vs. FM demodulator output noise



Headphone volume control output

