

Panasonic

New

Low power drive · Mini package

Audio Interface IC AN12906A

Overview

The AN12906A is an input/output interface IC that has built-in audio capability. This IC integrates in a single chip configuration a speaker amplifier, headphone amplifier, microphone amplifier, AGC, microphone voltage supply and LPF. Power supply voltage for Speaker-drive can drive low-voltage of 1.8 voltage. AN12906A has the power-save function for each amplifier's.

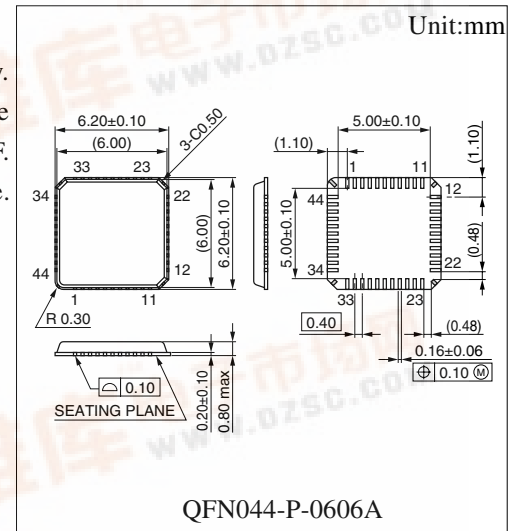
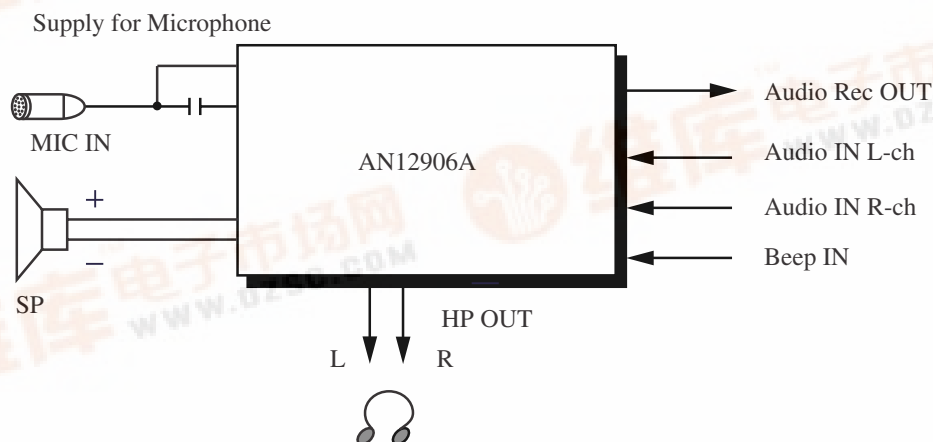
Features

- Built-in Amplifier's.
Speaker/BTL (mono), Headphone (stereo), Microphone (mono), LPF
- Built-in Power-save function.
Speaker-Amp., Headphone-Amp., Microphone-Amp., All-Standby
- Beep-input, Input-Gain change High & Low, Mute, AGC ON/OFF
- Power supply voltage: $V_{CC} = 2.7\text{ V}$ to 4.2 V , $V_{CC_SP} = 1.8\text{ V}$ to 4.2 V
- Speaker absolute maximum rating: 270 mW (typ)
- Package: QFN44-pin

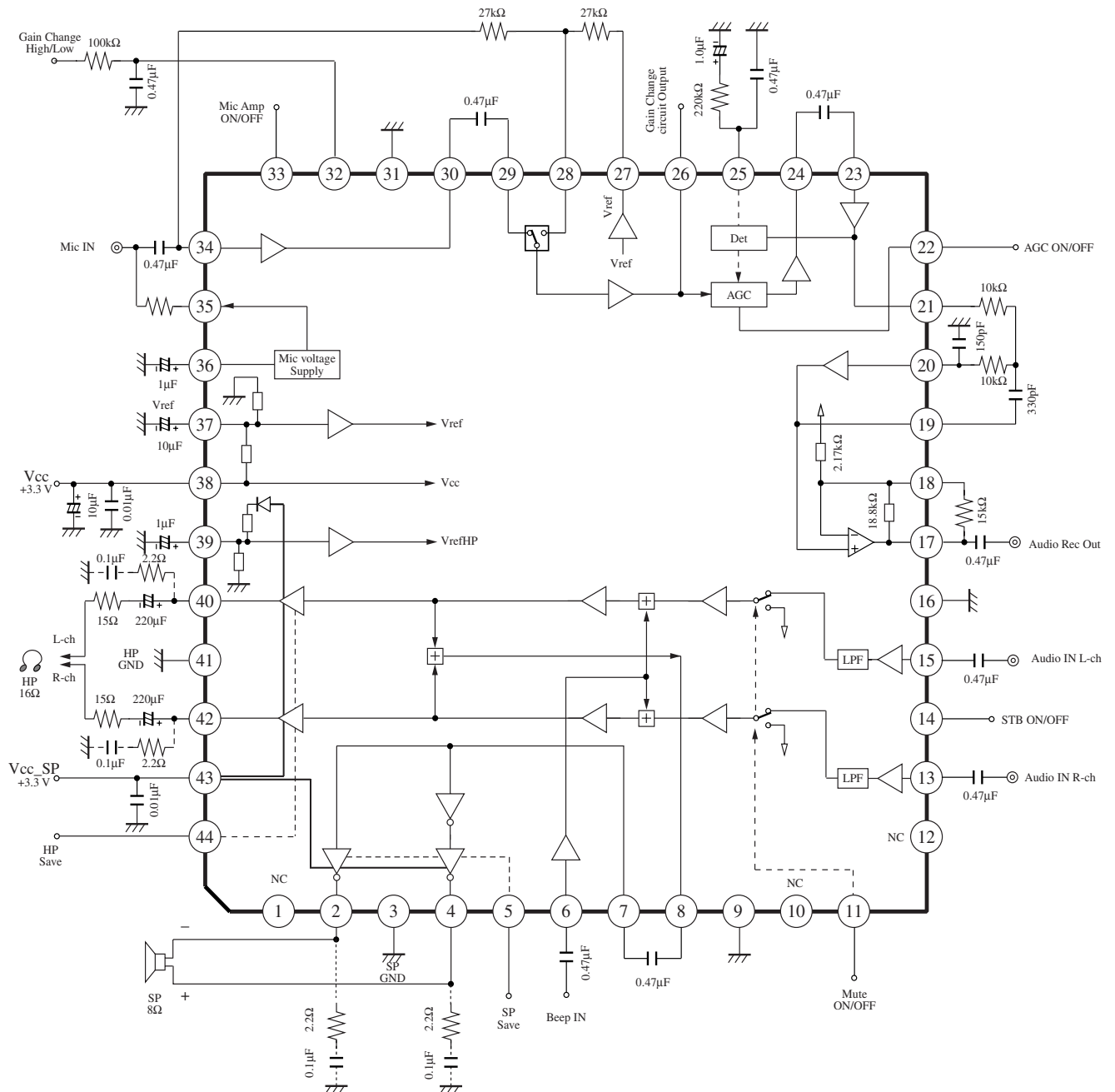
Applications

- IC-Recorder, PDA, DSC, etc.

Applications Circuit



■ Block Diagram



(Note) • Circui,circuit constant show an example and don't guarantee design of set.

- The condenser and the resistor for the osillation measure of Headphone output, speaker output is in need of install on the bord.
- Please you make use to 20-pin and 21-pin are short, and 19-pin is open , if you don't use a low pass filter is made up 19-pin,20-pin and 21-pin.

■ Pin Description

Pin No.	Function	Pin No.	Function
1	N.C	23	OP Amp. input
2	SP output (-)	24	AGC Output
3	GND (for SP)	25	AGC demodulation pin
4	SP output (+)	26	Gain change circuit output
5	SP Power save SW	27	Gain change bias output
6	Beep input	28	Gain change Low-input
7	SP amp. input	29	Gain change High-input
8	MIX amp. output	30	MIC amp. output
9	GND	31	GND
10	N.C	32	Gain change SW
11	Mute ON/OFF SW	33	MIC amp. power save SW
12	N.C	34	MIC amp. input
13	Playback input R-ch	35	MIC supply
14	Standby SW	36	MIC supply filter
15	Playback input L-ch	37	1/2 V _{CC} (V _{REF})
16	GND	38	V _{CC}
17	REC output	39	1/2 V _{CC_SP} (V _{REF_SP})
18	Feedback pin for Rec-out amp.	40	HP output L-ch
19	LPF2 OP Amp. output	41	GND (for HP)
20	LPF2 OP Amp. input	42	HP output R-ch
21	OP Amp. output	43	V _{CC_SP} (for SP drive)
22	AGC ON/OFF SW	44	HP power save SW

■ Absolute Maximum Ratings

Parameters	Symbol	Rating	Unit	Note
Storage temperature	T _{stg}	-55 to +125	°C	1
Operating ambient temperature	T _{opr}	-20 to +70	°C	1
Supply voltage	V _{CC} /V _{CC_SP}	4.5	V	2
Supply current	I _{CC}	-	mA	
Power dissipation	P _D	194.2	mW	3

Note1) All items are at T_a = 25°C, except for the operating ambient temperature and storage temperature parameters.

Note2) The range under Absolute Maximum Ratings, Power dissipation.

Note3) Power dissipation shows the value of only package at Ta=70°C

■ Recommended Operating Range

Supply voltage	V _{CC}	2.7 V to 4.2 V	
	V _{CC_SP}	1.8 V to 4.2 V	(Note 2)

■ Electrical Characteristics at Ta = 25 °C ± 2 °C, V_{CC} = 3.0V , V_{CC_SP} = 2.5 V

Parameters	Symbol	Conditions	min	typ	max	Unit
Circuit current						
Circuit current without signal 1AH (V _{CC} -system, MIC Amp. ON)	I _{VCC} A1	V ₃₃ = 3 V , V ₅ = 0 V	4.3	6.3	8.3	mA
Circuit current without signal 2AH (V _{CC_SP} -system, MIC Amp. ON)	I _{VCC} A2	V ₃₃ = 3 V , V ₅ = 0 V	0.5	1.9	6.0	mA
Circuit current at SP,HP save mode 1B (V _{CC} -system, MIC Amp. ON)	I _{VCC} B1	Without signal V ₃₃ = 3 V , V ₅ = 0 V , V ₄₄ = 0 V	2.0	4.0	6.0	mA
Circuit current at SP,HP save mode 2B (V _{CC_SP} -system, MIC Amp. ON)	I _{VCC} B2	Without signal V ₃₃ = 3 V , V ₅ = 0 V , V ₄₄ = 0 V	–	0.1	0.5	mA
Circuit current at standby mode 1C (V _{CC} -system)	I _{VCC} C1	Without signal V ₁₄ = 0 V	–	10	20	μA
Circuit current at standby mode 2C (V _{CC_SP} -system)	I _{VCC} C2	Without signal V ₁₄ = 0 V	–	0.1	10	μA
Circuit current without signal 1DH (V _{CC} -system, MIC Amp. ON)	I _{VCC} D1	V ₃₃ = 0 V , V ₅ = 0 V	4.0	6.0	8.0	mA
Circuit current without signal 2DH (V _{CC_SP} -system, MIC Amp. OFF)	I _{VCC} D2	V ₃₃ = 0 V , V ₅ = 0 V	0.5	1.9	6.0	mA
Circuit current without signal 1ES (V _{CC} -system, MIC Amp. OFF)	I _{VCC} E1	V ₃₃ = 0 V , V ₄₄ = 0 V	3.0	5.0	7.0	mA
Circuit current without signal 2ES (V _{CC_SP} -system, MIC Amp. OFF)	I _{VCC} E2	V ₃₃ = 0 V , V ₄₄ = 0 V	1.0	5.0	8.0	mA
Circuit current at SP,HP save mode 1F (V _{CC} -system, MIC Amp. OFF)	I _{VCC} F1	Without signal V ₃₃ = 0 V , V ₅ = 0 V , V ₄₄ = 0 V	1.5	3.5	5.5	mA
Circuit current at SP,HP save mode 2F (V _{CC_SP} -system, MIC Amp. OFF)	I _{VCC} F2	Without signal V ₃₃ = 0 V , V ₅ = 0 V , V ₄₄ = 0 V	–	0.1	0.5	mA
Circuit current at V _{CC_SP} open mode 1G (V _{CC} -system, MIC Amp. ON)	I _{VCC} G	Without signal V ₃₃ = 3 V , V ₅ = 0 V , V ₄₄ = 0 V	2.6	4.6	6.6	mA
Circuit current at V _{CC_SP} open mode 1H (V _{CC} -system, MIC Amp. OFF)	I _{VCC} H	Without signal V ₃₃ = 0 V , V ₅ = 0 V , V ₄₄ = 0 V	2.0	4.0	6.0	mA
Circuit current at V _{CC_SP} open mode 1I (V _{CC} -system, Standby)	I _{VCC} I	Without signal V ₁₄ = 0 V	–	10	20	μA

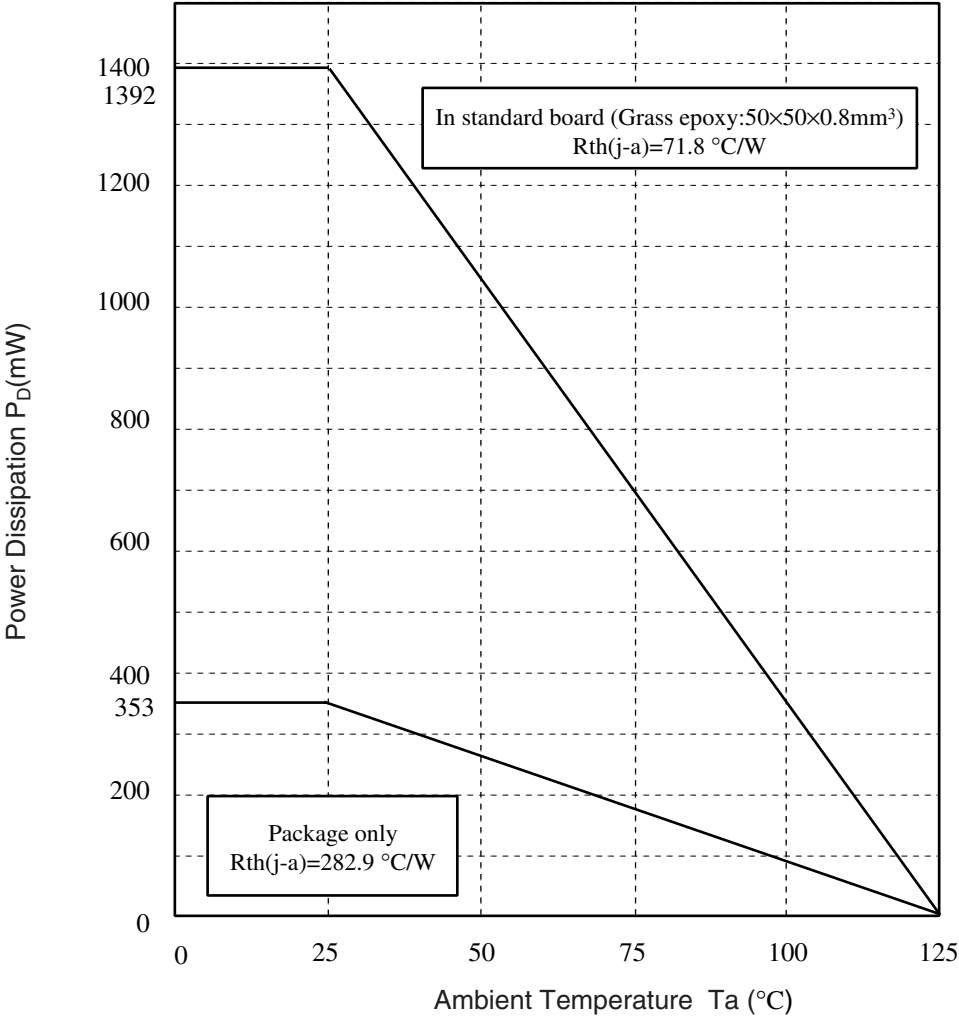
■ Electrical Characteristics at Ta = 25 °C ± 2 °C, V_{CC} = 3.0 V, V_{CC_SP} = 2.5 V

Parameters	Symbol	Conditions	min	typ	max	Unit
Power supply for microphone						
Microphone power supply	V _{MIC}	with output current -5 mA	1.8	2.0	2.2	V
Microphone amp. characteristics Microphone amp. input→ Microphone amp. output						
Output level	V _{ROM}	V _{in} = -37 dBS, 1 kHz	-21	-20	-19	dBS
Output distortion	TH _{ROM1}	V _{in} = -37 dBS, 1 kHz, up to 5 th THD	—	0.02	0.10	%
Output noise	N _{ROM}	Without input signal, using A-curve filter	—	-101	-97	dBS
Maximum input level	TH _{ROM2}	V _{in} = -27 dBS, 1 kHz, up to 5 th THD, load = 22 kΩ	—	0.02	1.0	%
Rec. AGC characteristics AGC input→Rec. output REF = -50 dBS						
Rec. output level A (REF -3dB)	V _{ROA}	V _{in} = -53 dBS, 1 kHz	-16.3	-15.3	-14.3	dBS
Rec. output distortion 1A (REF -3dB)	TH _{ROA}	V _{in} = -53 dBS, 1 kHz, up to 5 th THD	—	0.02	0.10	%
Rec. output noise voltage A	VN _{ROA}	With out input signal, using A-curve filter	—	-71	-67	dBS
Microphone AGC characteristics 1 (REF +3 dB)	V _{AGCML1}	V _{in} = -47 dBS, 1 kHz	-14	-12	-10	dBS
Microphone AGC characteristics 2 (REF +20dB)	V _{AGCML2}	V _{in} = -30 dBS, 1 kHz	-14	-11	-8	dBS
Microphone AGC characteristics 3 (REF +30 dB)	V _{AGCML3}	V _{in} = -20 dBS, 1 kHz	-14	-11	-8	dBS
Microphone AGC characteristics 4 (REF +40 dB)	V _{AGCM4}	V _{in} = -10 dBS, 1 kHz	-12.5	-9.5	-6.5	dBS
Microphone AGC characteristics 4 distortion(REF +40 dB)	TH _{AGCM4}	V _{in} = -10 dBS, 1 kHz up to 5 th THD, load = 22 kΩ	—	0.2	1.0	%
HP output characteristics at playback PB input→HP output						
HP Reference output level	V _{LOPS}	V _{in} = -28.3 dBS, 1 kHz, load = 31 Ω	-18.3	-16.3	-14.3	dBS
HP Reference output distortion	TH _{LOPS}	V _{in} = -28.3 dBS, 1 kHz, up to 5 th THD load = 31 Ω	—	0.10	0.50	%
HP Reference output noise	VN _{OPS}	Without input signal, using A-curve filter load = 31 Ω	—	-87	-82	dBS
HP Maximum output level	V _{LMAPOS}	f = 1 kHz, load = 31 Ω input level THD = 1 % (up to 5 th)	-3.5	-1.5	—	dBS
Output noise at HP mute mode	V _{LMUPOS}	Without input signal, using A-curve filter load = 31 Ω, V _{II} =0 V	—	-89	-84	dBS
PB maximum output level	V _{LMAPIs}	f = 1 kHz, load = 31 Ω input level THD = 1 % (up to 5 th)	-15.5	-13.5	—	dBS
Output level at power save mode	V _{PHPPS}	V _{in} = -28.3 dBS, 1 kHz, Using A-curve filter, load = 31 Ω	—	-111	-110	dBS
Beep output level	V _{HPBEP}	V _{in} =2.7 dBS, 1 kHz, load = 31 Ω	-18.3	-16.3	-14.3	dBS

■ Electrical Characteristics at Ta = 25 °C ± 2 °C, V_{CC} = 3.0 V, V_{CC_SP} = 2.5 V

Parameters	Symbol	Conditions	min	typ	max	Unit
SP output characteristics						
SP reference output level at playback	V _{SPPS}	V _{in} = -28.3 dBS, 1 kHz load = 8 Ω,	-3.3	-1.3	+0.7	dBS
SP reference output distortion at playback	TH _{SPPS}	V _{in} = -28.3 dBS, 1 kHz load = 8 Ω, up to 5 th THD	—	0.2	0.9	%
SP reference output noise at playback	VN _{SPPS}	Without input signal, using A-curve filter load = 8 Ω	—	-76	-71	dBS
SP output noise at mute and playback	V _{SMPPOS}	Without input signal, using A-curve filter V _{I1} = 0 V, load = 8 Ω	—	-78	-73	dBS
SP maximum rating output at playback	V _{MSPPS}	f = 1 kHz R _{OUT} = 8 Ω, THD = 10 %	200	270	—	mW
SP output at power save and playback	V _{PSPPS}	V _{in} = -28.3 dBS, 1 kHz Using A-curve filter, load = 8 Ω	—	-111	-100	dBS
SP: beep output level at playback	V _{SPBEP}	V _{in} = -2.7 dBS, 1 kHz load = 8 Ω	-3.3	-1.3	+0.7	dBS
Mode selection hold voltage						
MIC amp. off hold voltage range	V _{33L}	—	0	—	0.5	V
MIC amp. on hold voltage range	V _{33H}	—	2.5	—	3.0	V
MIC amp. ON/OFF pin open voltage	V _{33MIC}	V _{CC} = 3.0 V, 33-pin open	0.0	0.05	0.5	V
Gain low hold voltage range	V _{32L}	—	0	—	0.5	V
Gain high hold voltage range	V _{32H}	—	2.5	—	3.0	V
AGC off hold voltage range	V _{22L}	—	0	—	0.5	V
AGC on hold voltage range	V _{22H}	—	2.5	—	3.0	V
Standby on hold voltage range	V _{14L}	—	0	—	0.5	V
Standby off hold voltage range	V _{14H}	—	2.5	—	3.0	V
SP output off hold voltage range	V _{5L}	—	0	—	0.5	V
SP output on hold voltage range	V _{5H}	—	2.5	—	3.0	V
HP output off hold voltage range	V _{44L}	—	0	—	0.5	V
HP output on hold voltage range	V _{44H}	—	2.5	—	3.0	V
Mute on hold voltage range	V _{11L}	—	0	—	0.5	V
Mute off hold voltage range	V _{11H}	—	2.5	—	3.0	V

■ Package Power Dissipation



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