Level specifications for the AX24 A/D converter and microphone pre-amplifier

Introduction

The gain of the AX24 microphone pre-amplifiers can be set between –18 dBu and +72 dB. The gain circuit comprises an analog gain part and a digital gain part. The gain step from –18 dBu to 24 dBu is implemented using an analog gain circuit having steps of 3 dB. The 0,5 dB steps in-between is made digitally after the A/D conversion via the digital gain circuit. The total analog gain is 42 dB, where the first step is a –3dB attenuation. The gain steps from 24,5 dB to 72 dB is made digitally "on top" of the analog gain. The accuracy of all steps is better than +/- 0,25 dB.

General Specifications

Resolution	24 bit
Sample rates PCM	44.1, 48, 88.2, 96,176.4,192, 384 kHz
Sample rates DXD	352,8 kHz
Sample rates DSD	2.8224 & 5.6448 MHz (64 & 128 fs)
Dynamic range (A), PCM	> 119 dB
Dynamic range (A), DSD, DXD, 384kHz	> 118 dB
THD+N(A)	< -115 dBFS
Mic. pre equivalent Noise (A), +24dB gain	-130 dB
Cross talk	< -120 dB
Gain range	–18 dBu and +72 dB
Gain step tolerance	< +/- 0,25 dB
Input Impedance	> 15 kΩ
Gain	-18 to +72 dB
Freq. response deviation	< 0,05 dB
Connectors	XLR (pin 2 hot)

Gain step Specifications

The AX24 microphone pre-amplifier has been designed to give optimal performance with respect to the input overload level, and dynamic range. In table 1 the specifications are stated for different gain steps. In the following there is a short explanation to the individual specification.

Input overload level is the maximum input level before clipping in the analog input circuit

Output noise is the A-weighted RMS noise floor of the digital output of the A/D converter. The value is given in dBFS. 0 dBFS is full digital signal. The output noise floor also express the absolute dynamic range of the combined microphone pre-amplifier and A/D converter.

Equivalent. Input noise is the output noise calculated as an equivalent noise source on the input of the microphone pre-amplifier. The figure is given with a shorted input (source = 0?).

A/D level factor is the dB relation ship between the digital output signal in dBFS and the analog input signal in dBu. This means that Vout (dBFS) = Vin (dBu) – A/D level factor. E.g. At -18dB gain setting Vout = Vin – 22 dBu. If the input level is 22 dBu the output level is 0 dBFS. The A/D level factor thus states the input overload level up to 24 dB gain.

Gain step Table

Display gain (dB)	Analog gain (dB)	Digital gain (dB)	Input Overload level (dBu)	Output noise (dBFSA)	Eqv. Inp noise (source 0?) (dBuA)	A/D level factor (dB)
-18	-3	0	22	-119	-97	22
-15	-3	3	19	-113	-94	19
-12	3	0	16	-117	-101	16
-9	6	0	13	-119	-106	13
-6	9	0	10	-113	-103	10
-3	12	0	7	-117	-110	7
0	12	3	4	-114	-110	4
3	18	0	1	-117	-116	1
6	21	0	-2	-115	-117	-2
9	24	0	-5	-114	-119	-5
12	27	0	-8	-114	-122	-8
15	30	0	-11	-114	-125	-11
18	33	0	-14	-113	-127	-14
21	36	0	-17	-112	-129	-17
24	39	0	-20	-111	-131	-20
27	39	3	-20	-108	-131	-23
30	39	6	-20	-105	-131	-26
33	39	9	-20	-102	-131	-29
...	39	...	-20	....	-131	...

Table 1, Noise and dynamic range for the AX24 microphone pre-amplifier.