

## Appendix

### A. Maximum filter length

The model filter length and the control filter length are restricted by both computational capacity and the maximum on-chip RAM of the hardware. For different Control strategies, users should be aware of the maximum filter length in case that the active noise control fails because of overflow of the computational or storage burden. The maximum filter length in some commonly used configurations is summarized as follows.

Table A Maximum filter taps

Sampling Rate (kHz)	Working channel number (Control channel number equal to Error channel number)	Filter length of both the model filter and the control filter
32	1	1496
$\leq 16$	1	3000

### B. TigerANC-Wifi-S specifications

#### *System Description*

TigerANC-Wifi-S is an active controller equipped with a visual interface. The controller communicates with the interface via Wi-Fi. All control parameters can be set through the interface where the control status also can be viewed. The hardware mainly includes a high-end float-point DSP, which is in charge of the core control algorithms and a computer with Wi-Fi, which supplies the interface. The controller also benefits from the ultra-low latency of AD/DA conversion, which makes it possible to realize a compact ANC system for many latency critical applications.

#### *Number of Channels*

- 2 analog input channels (reference and error input)
- 1 analog output channels

#### *Adaptive Algorithms*

Gradient descent feed-forward control using the FXLMS algorithm

#### *Control Filter Types*

FIR

#### *Maximum Tap Length for Control Filters*

Depends on the sampling rate used

#### *Adjustable Algorithm Parameters*

- Cancellation path transfer function taps
- Cancellation path identification signal strength
- Cancellation path identification stepsize
- Control filter taps

- Control filter stepsize
- Control filter leakage coefficient

### ***Cancellation Path System Identification***

Adaptive FIR model with random noise as the excitation signal

### ***Sampling Rates***

There are 10 choices of sampling rates varying from 125 Hz to 64 kHz, with optional anti-aliasing low-pass filter

### ***Analog Inputs***

- Signal maximum is 5Vpp
- AC coupled inputs

### ***Analog Outputs***

- Signal maximum is 5 Vpp
- AC coupled outputs

### ***Saving Data***

System data can be saved to “D:\DSPdata”

### ***Signal Display***

Software display

- Identification signal level
- Modeling error level
- Reference signal level
- Error signal level
- Cancellation path filters
- Control filters

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## ***Hardware***

### ***Digital Signal Processor***

- Main processor, Texas Instruments (TI) 456MHz TMS320C6748 float-point

### ***Analog Inputs***

- 2 analog inputs sampled simultaneously
- 5 Vpp input range
- 16 bit precision
- High input impedance
- Selectable analog low-pass filter for each port
- RCA front-panel connectors

***Analog Outputs***

- 1 analog outputs sampled simultaneously
- 5 V<sub>pp</sub> output range
- 16 bit precision
- Low output impedance for driving power amplifiers
- Selectable analog low-pass filter for each port
- RCA front-panel connectors

***Sampling Rate***

- There are 10 choices of sampling rates varying from 125 Hz to 64 kHz, with optional down-sampling low-pass filter

***Group Delay***

- Minimum of 187.5  $\mu$ s with analog low-pass filter @ 16 kHz sampling rate from AD input to DA output

***Host Communication***

- Visual interface developed by Labview.

***Power Supply***

- 12V DC power
- Less than 10 Watts power consumption
- IEC power cord connector