

TAS2505 – EQ Configuration Guide

Applications Engineering – Low Power Audio & Actuators

TAS2505 Biquad Filters

- TAS2505 and TAS2505-Q1 feature programmable biquad filters. The count of biquad filters depend on the processing block selected:

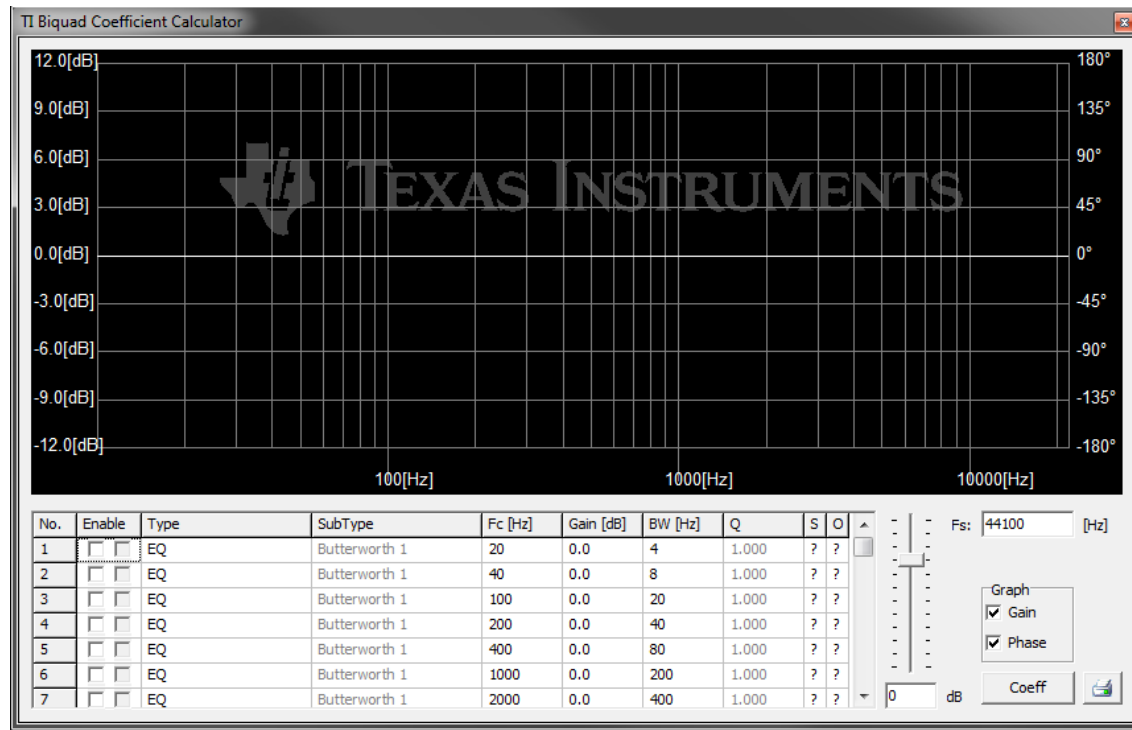
Processing Block No.	Interpolation Filter	Channel	First-Order IIR Available	Number of Biquads	Resource Class
PRB_P1	A	Mono	Yes	6	6
PRB_P2	A	Mono	No	3	4
PRB_P3	B	Mono	Yes	6	4

Biquad Configuration Registers

- Each biquad is defined by a transfer function that have five coefficients
- These coefficients are 24-bit long in TAS2505 and TAS2505-Q1
- Coefficient registers are located in page 44 starting at register 12
- Detailed information is available in [Application Reference Guide section 2.4.1.3.2](#)

Obtaining Biquad Coefficients - 1

- There is a TI tool that can be used to obtain the biquad coefficients, called [Coefficient Calculator](#)
- Once it is downloaded and executed, the following panel will be shown:



Obtaining Biquad Coefficients - 2

- Follow the below steps to obtain biquad coefficients:

TI Biquad Coefficient Calculator

Select the Type and Subtype of the filter

Enable the filters needed

Configure the filter as needed in terms of cutoff frequency, gain and bandwidth

Set the correct sample rate based on your configuration

Once the configuration is complete, click on **Coeff** button

No.	Enable	Type	SubType	Fc [Hz]	Gain [dB]	BW [Hz]	Q	S	O
1	<input checked="" type="checkbox"/>	EQ	Butterworth 1	1000	6.0	100	1.000	Y	Y
2	<input checked="" type="checkbox"/>	High Pass	Butterworth 2	40	0.0	8	0.707	Y	Y
3	<input type="checkbox"/>	EQ	Butterworth 1	100	0.0	20	1.000	?	?
4	<input type="checkbox"/>	EQ	Butterworth 1	200	0.0	40	1.000	?	?
5	<input type="checkbox"/>	EQ	Butterworth 1	400	0.0	80	1.000	?	?
6	<input type="checkbox"/>	EQ	Butterworth 1	1000	0.0	200	1.000	?	?
7	<input type="checkbox"/>	EQ	Butterworth 1	2000	0.0	400	1.000	?	?

Graph

☒ Gain

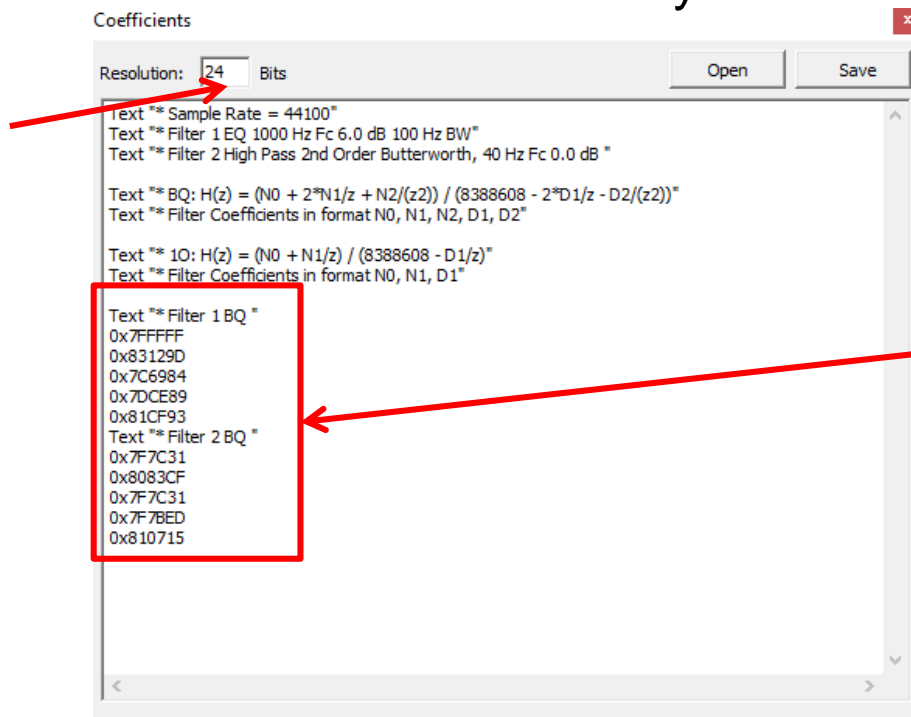
☒ Phase

Coeff

Obtaining Biquad Coefficients - 3

- Once Coeff button is pressed, a new window will show showing details of the configured biquad filters and at the bottom there will be the filter coefficients
- In this case, the first filter is EQ type so it needs all five coefficients, but the second filter is High Pass Butterworth 1st order so it only needs three coefficients

Set the correct bit length,
for TAS2505 and
TAS2505-Q1 it is 24bit



Filter coefficients

Write Biquad Coefficient Registers

- The coefficients obtained from the calculator must now be written to the device registers, take the coefficients into the correct syntax for GUI I2C control

Text "* Filter 1 BQ "

0x7FFFFFFF

0x83129D

0x7C6984

0x7DCE89

0x81CF93

Text "* Filter 2 BQ "

0x7F7C31

0x8083CF

0x7F7C31

0x7F7BED

0x810715



w 30 00 2C # Go to page 44

Begin BQ1 config

w 30 0C 7F FF FF

w 30 10 83 12 9D

w 30 14 7C 69 84

w 30 18 7D CE 89

w 30 1C 81 CF 93

Begin BQ2 config

w 30 20 7F 7C 31

w 30 24 80 83 CF

w 30 28 7F 7C 31

w 30 2C 7F 7B ED

w 30 30 81 07 15

Complete Biquad Filters Configuration

- TAS2505 and TAS2505-Q1 have two coefficient buffers, so that one can be modified while the other is being used. This feature must be enabled and after the coefficients are updated, the buffer must be swapped so it takes effect

```
w 30 00 2C      # Go to page 44
w 30 01 04      # Enable Adaptive Filtering
                # Begin BQ1 config
w 30 0C 7F FF FF
w 30 10 83 12 9D
w 30 14 7C 69 84
w 30 18 7D CE 89
w 30 1C 81 CF 93
                # Begin BQ2 config
w 30 20 7F 7C 31
w 30 24 80 83 CF
w 30 28 7F 7C 31
w 30 2C 7F 7B ED
w 30 30 81 07 15

w 30 01 05      # Swap coefficient buffers
```