Goertzel Algorithm

Start

Clear Y₀, Y₁, and Y₂

Load the Sample Counter

Clear the Hamming Window Index

Turn Timer1 OFF

Copy Y₁ to Y₂
Copy Y₀ to Y₁

Load Timer with Value for Sample Delay, and turn Timer1 ON

Take Sample From A/D. This Value is \( X_{\text{sample}} \)

Look up Hamming Window Value \( W_n \)

Increment the Hamming Window Index

Multiply \( X_{\text{sample}} \) by the Hamming Window Value \( W_n \) to get \( X_n \)

Calculation of \( Y₀ \):
\[
Y₀ = X_n + Y₁ \cos(2\pi f_{\text{target}}/f_{\text{sample}}) \cdot Y₂
\]

Multiply \( Y₁ \) by the Cosine Coefficient \( \cos(2\pi f_{\text{target}}/f_{\text{sample}}) \)
Multiply the result by 2
Subtract \( Y₂ \) from the result
Add \( X_n \) to the result.
Store the Result in \( Y₀ \)

Compute the Real Part of the Result
\[
\text{Real} = Y₁ - Y₂ \cos(2\pi f_{\text{target}}/f_{\text{sample}})
\]
Multiply \( Y₂ \) by the Cosine Coefficient
Subtract the result from \( Y₁ \)
Store the Result

Compute the Imaginary Part of the Result
\[
\text{Imaginary} = Y₂ \sin(2\pi f_{\text{target}}/f_{\text{sample}})
\]
Multiply \( Y₂ \) by the Sine Coefficient
Store the Result

Compute the Magnitude of the Result Using Approximation
Approximate Magnitude = \( \max(|\text{Real}|, |\text{Imaginary}|) + \frac{1}{4} (\min(|\text{Real}|, |\text{Imaginary}|) \)
Store the Result

End

Has Timer1 overflowed?

NO

Decrement Sample Counter

NO

Sample Counter = 0?