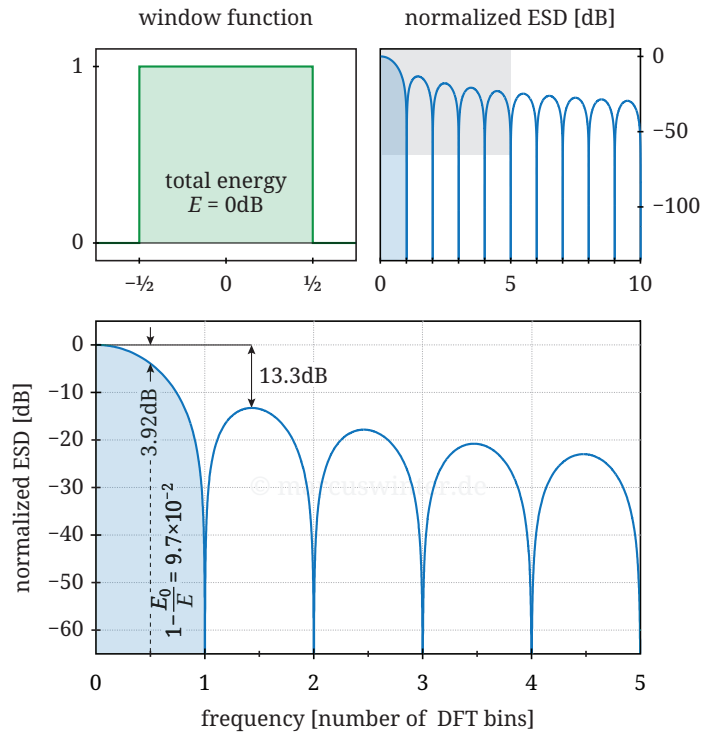
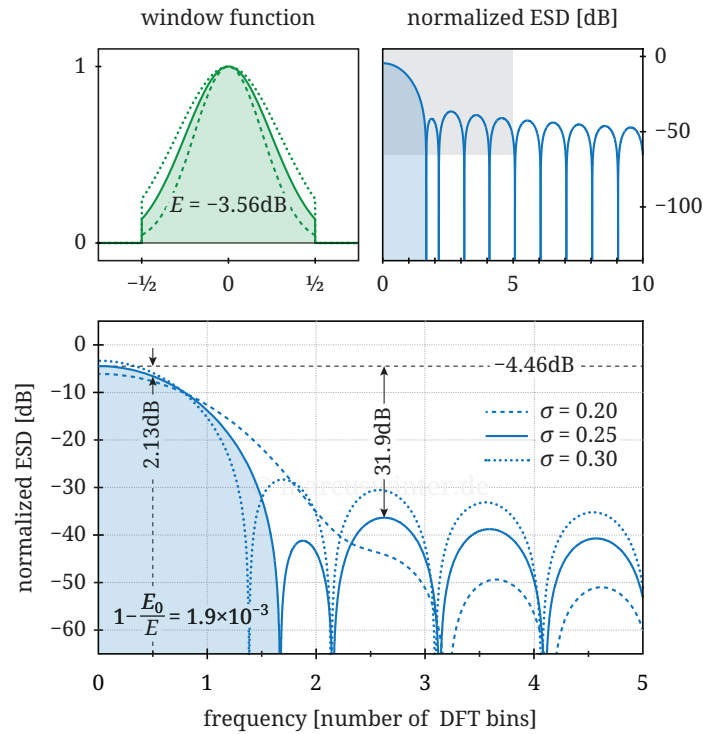


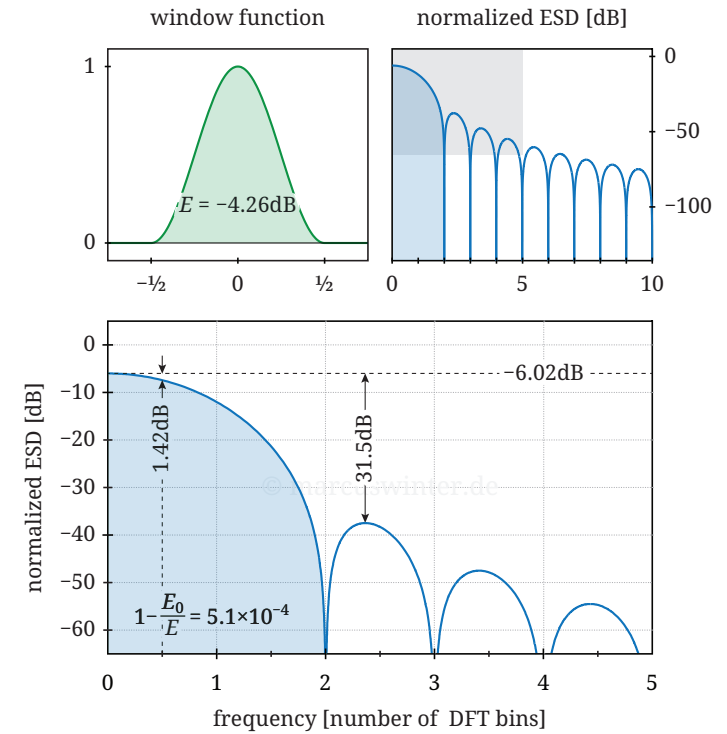
rectangular (box)



Gauss



Hann



$$A(t) = 1$$

$$I(f) = \text{sinc}(\pi f)$$

$$A(t) = \exp\left(-\frac{t^2}{2\sigma^2}\right)$$

$$I(f) = \sqrt{\frac{\pi}{2}} \sigma \exp(-2\pi^2 \sigma^2 f^2) \left[\text{erf}\left(\frac{1/2 - 2if\pi\sigma^2}{\sqrt{2}\sigma}\right) + \text{erf}\left(\frac{1/2 + 2if\pi\sigma^2}{\sqrt{2}\sigma}\right) \right]$$

$$A(t) = \cos^2(\pi t)$$

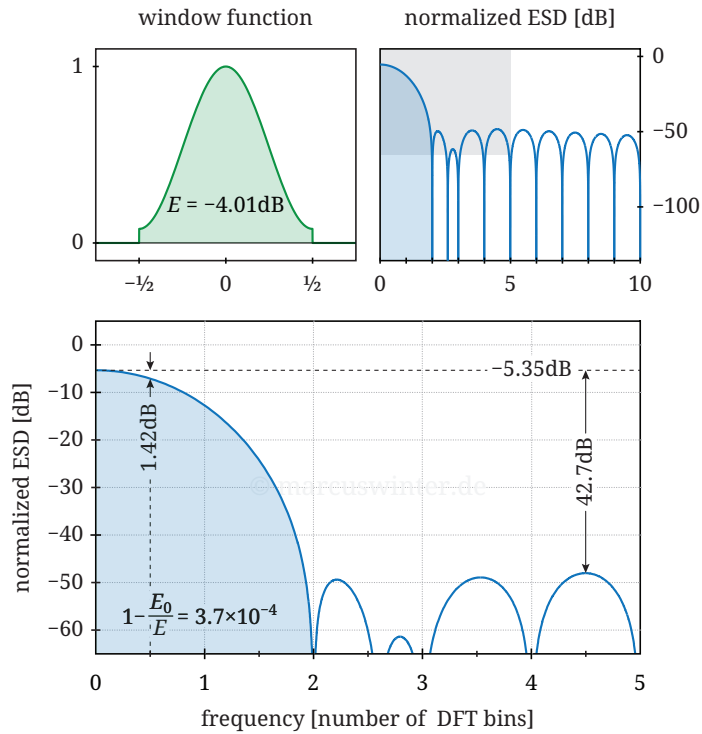
$$I(f) = \frac{1}{2} \frac{\text{sinc}(\pi f)}{1 - f^2}$$

		$\sigma = 0.20$	$\sigma = 0.25$	$\sigma = 0.30$		
0dB	window energy	-4.51dB	-3.56dB	-2.82dB	window energy	-4.26dB
0dB	main lobe height	-8.90dB	-4.46dB	-3.35dB	main lobe height	-6.02dB
$1\Delta f$ (0dB)	equivalent noise b/w	$2.75\Delta f$ (4.39dB)	$1.23\Delta f$ (0.90dB)	$1.13\Delta f$ (0.53dB)	equivalent noise b/w	$1.50\Delta f$ (1.76dB)
$0.884\Delta f$	main lobe FWHM	$1.89\Delta f$	$1.18\Delta f$	$1.08\Delta f$	main lobe FWHM	$1.44\Delta f$
$1\Delta f$	first zero of I	$3.20\Delta f$	$1.67\Delta f$	$1.38\Delta f$	first zero of I	$2\Delta f$
3.92dB	maximum scalloping	1.58dB	2.13dB	2.54dB	maximum scalloping	1.42dB
-13.3dB (1.43 Δf)	highest side lobe	-43.3dB (3.65 Δf)	-31.9dB (2.62 Δf)	-25.0dB (1.70 Δf)	highest side lobe	-31.5dB (2.36 Δf)
20dB/decade	side lobe slope		20dB/decade		side lobe slope	60dB/decade

DFT bin width $\Delta f = T^{-1}$

$$w(t) = \begin{cases} A(t) & -\frac{1}{2} \leq t \leq \frac{1}{2} \\ 0 & \text{else} \end{cases}$$

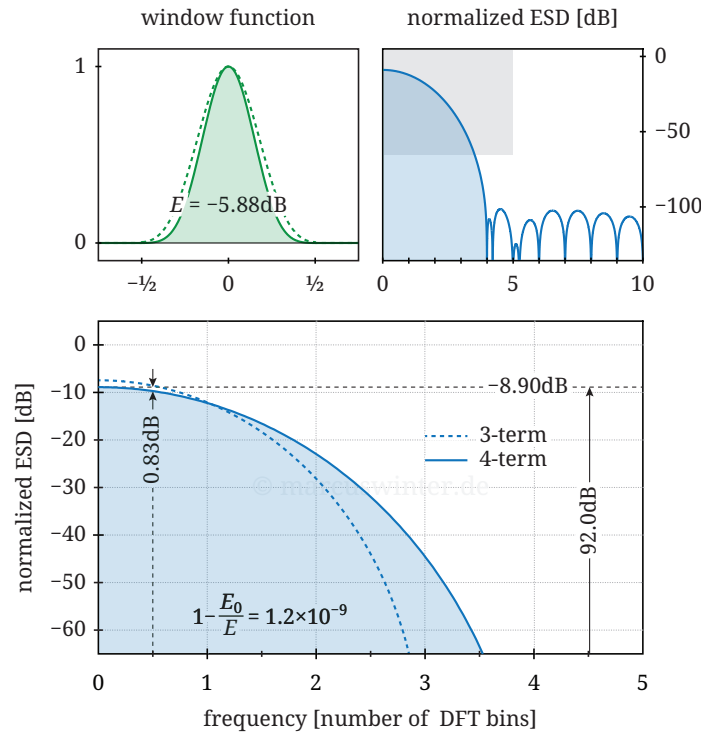
Hamming



$$A(t) = \frac{27}{50} + \frac{23}{50} \cos(2\pi t)$$

$$I(f) = \left(\frac{27}{50} - \frac{4}{50} f^2 \right) \frac{\text{sinc}(\pi f)}{1 - f^2}$$

Blackman-Harris

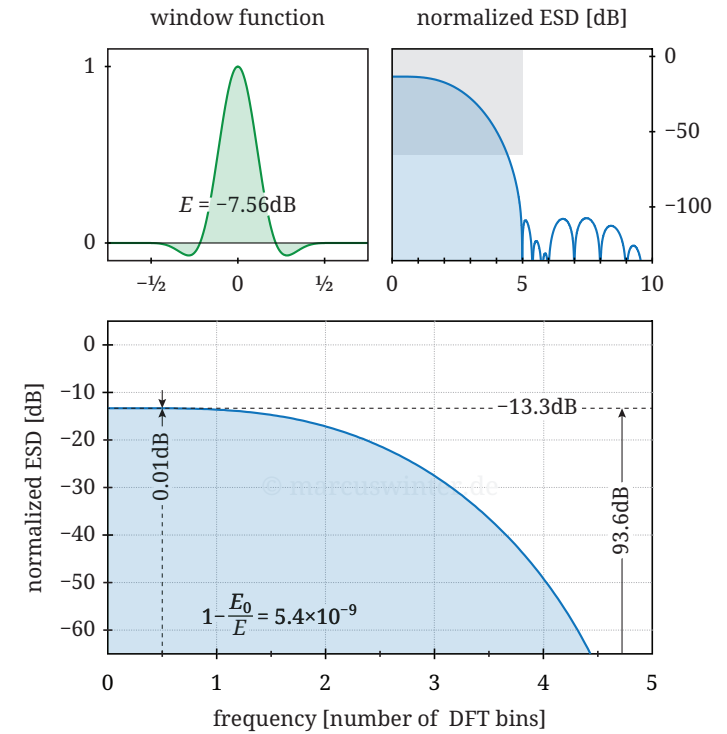


$$A(t) = \sum_{n=0}^3 a_n \cos(2n\pi t)$$

$$a_0 = 0.21557895 \quad a_1 = 0.4973406 \quad a_2 = 0.0782793 \quad a_3 = 0 \quad (3\text{-term})$$

$$a_0 = 0.35875 \quad a_1 = 0.48829 \quad a_2 = 0.14128 \quad a_3 = 0.01168 \quad (4\text{-term})$$

flat top



$$A(t) = \sum_{n=0}^4 b_n \cos(2n\pi t)$$

$$b_0 = 0.21557895 \quad b_1 = 0.41663158 \quad b_2 = 0.277263158$$

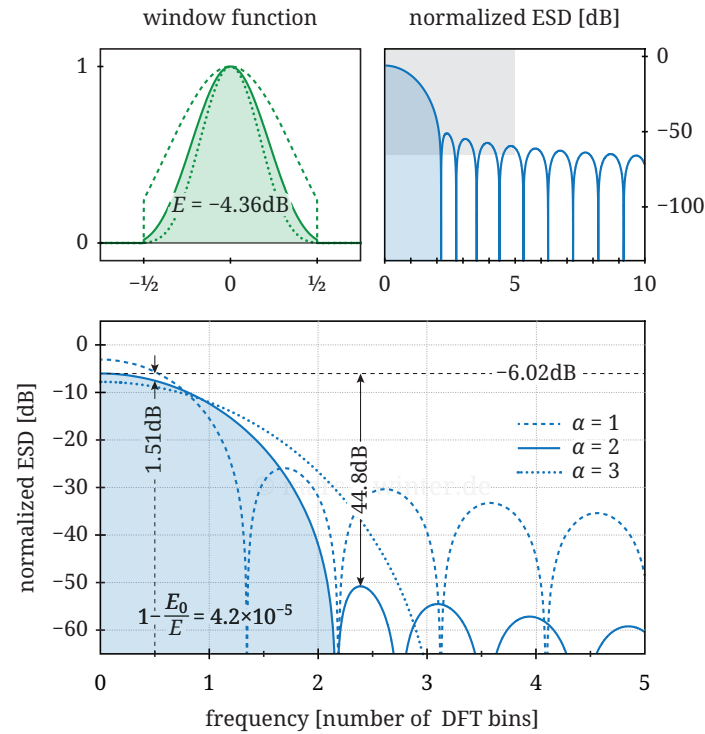
$$b_3 = 0.083578947 \quad b_4 = 0.006947368$$

		3-term	4-term		
-4.01dB	window energy	-5.13dB	-5.88dB	window energy	-7.56dB
-5.35dB	main lobe height	-7.44dB	-8.90dB	main lobe height	-13.3dB
1.36Δf (1.34dB)	equivalent noise b/w	1.70Δf (2.31dB)	2.00Δf (3.02dB)	equivalent noise b/w	3.75Δf (5.74dB)
1.30Δf	main lobe FWHM	1.62Δf	1.90Δf	main lobe FWHM	3.72Δf
2Δf	first zero of I	3Δf	4Δf	first zero of I	5Δf
1.75dB	maximum scalloping	1.14dB	0.826dB	maximum scalloping	0.00978dB
-42.7dB (4.50Δf)	highest side lobe	-71.5dB (3.64Δf)	-92.0dB (4.52Δf)	highest side lobe	-93.6dB (7Δf)
20dB/decade	side lobe slope	20dB/decade		side lobe slope	20dB/decade

DFT bin width $\Delta f = T^{-1}$

$$w(t) = \begin{cases} A(t) & -\frac{1}{2} \leq t \leq \frac{1}{2} \\ 0 & \text{else} \end{cases}$$

DPSS (Slepian)



```
window = dpss(seq_length, alpha, 1);
```

	$\alpha = 1$	$\alpha = 2$	$\alpha = 3$	
window energy	-2.61dB	-4.36dB	-5.30dB	window energy
main lobe height	-3.09dB	-6.02dB	-7.78dB	main lobe height
equivalent noise b/w	$1.12\Delta f$ (0.48dB)	$1.47\Delta f$ (1.66dB)	$1.7\Delta f$ (2.48dB)	equivalent noise b/w
main lobe FWHM	$1.07\Delta f$	$1.40\Delta f$	$1.68\Delta f$	main lobe FWHM
first zero of I	$1.35\Delta f$	$2.17\Delta f$	$3.11\Delta f$	first zero of I
maximum scalloping	2.59dB	1.51dB	1.05dB	maximum scalloping
highest side lobe	-22.9dB ($1.69\Delta f$)	-44.8dB ($2.39\Delta f$)	-69.7dB ($3.26\Delta f$)	highest side lobe
side lobe slope		20dB/decade		side lobe slope