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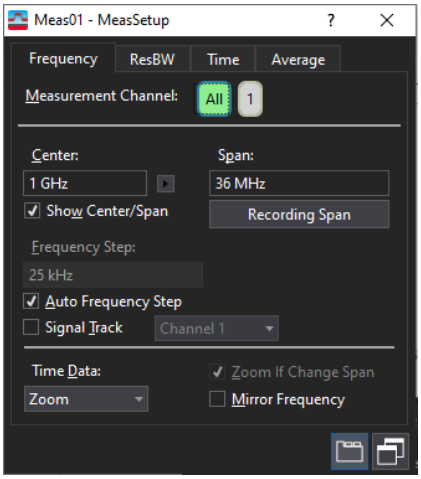
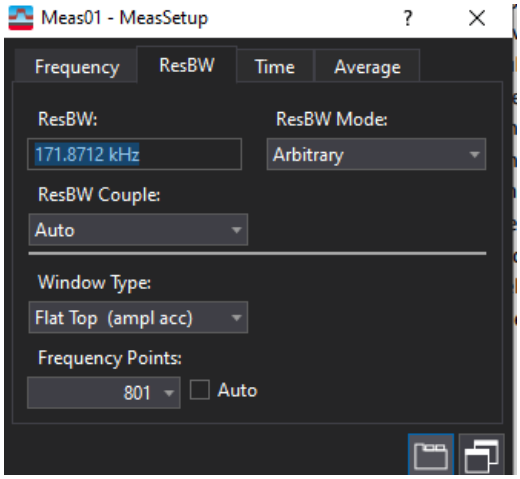
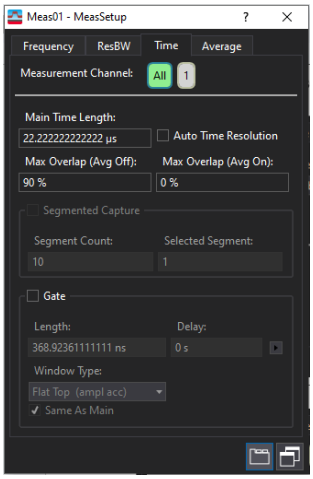
3.1:

Amplitud màxima: 20 dBm
10db/div
Freqüència central: 1GHz i span de 36MHz
Freqüència representada: (982 MHz - 1,018 GHz)







3.2:

P1 = 10dBm
A1= $\sqrt{10 * 10^{-3} * 100} = 1V$
f1 = 1,001 GHz

P2 = 3,985
A2 = $\sqrt{10^{3,985/10} * 10^{-3} * 100} \approx 0{,}5V$
f2= 1,005GHz

$\Delta f = 4MHz$, és major que RBW = 171,8kHz

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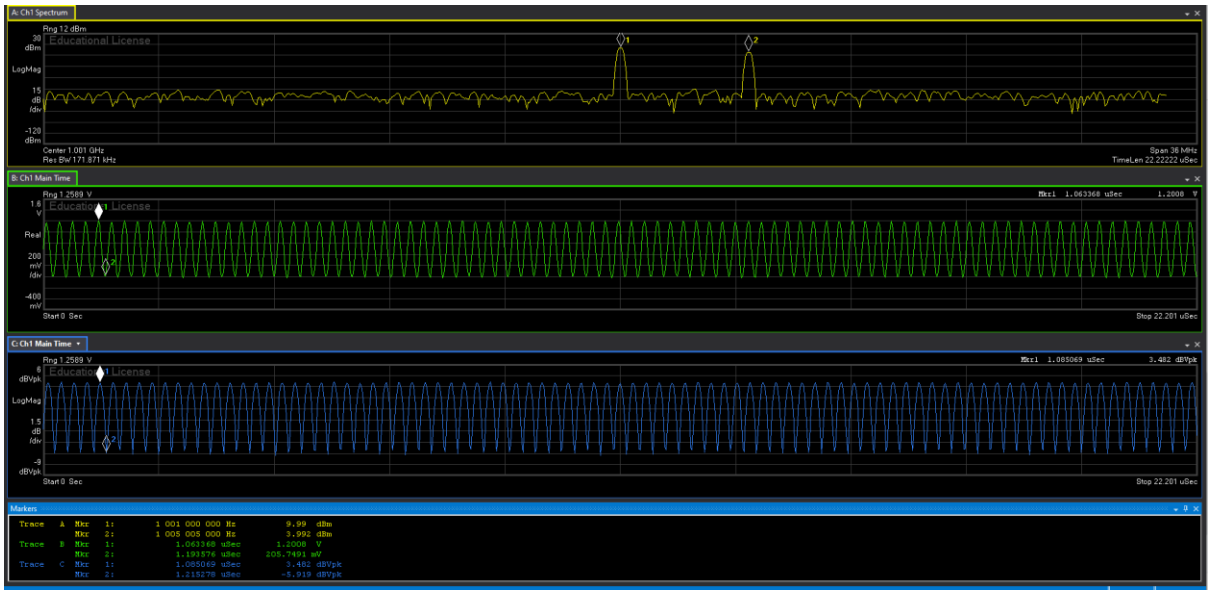
3.3:

Per centre = f1 = 1,001 GHz



Trace	A	Mkr	1:	1 001 000 000 Hz	9.99 dBm
		Mkr	2:	1 005 005 000 Hz	3.992 dBm
Trace	B	Mkr	1:	1.063368 uSec	1.2008 V
		Mkr	2:	1.193576 uSec	205.7491 mV
Trace	C	Mkr	1:	1.085069 uSec	3.482 dBVpk
		Mkr	2:	1.215278 uSec	-5.919 dBVpk

$T/2 = 139{,}2ns \longrightarrow T=260{,}4ns \longrightarrow f=3{,}84MHz$

$f = f2 - f1 \longrightarrow f2 = 1{,}0048GHz \approx 1{,}005GHz$

$A2 = 0{,}998 / 2 = 0{,}499$

$$A1 \cdot cos(\varphi 1) = 1{,}1951 - 0.998 / 2 = 0{,}696mV$$

$$A1 \cdot sin(\varphi 1) = 1{,}193 - 0.970 / 2 = 0{,}708mV$$

$$\varphi 1 = arctan(0{,}708 / 0{,}696) = arctan(695{,}1mV / 693mV) = 45{,}48 \approx \pi/4$$

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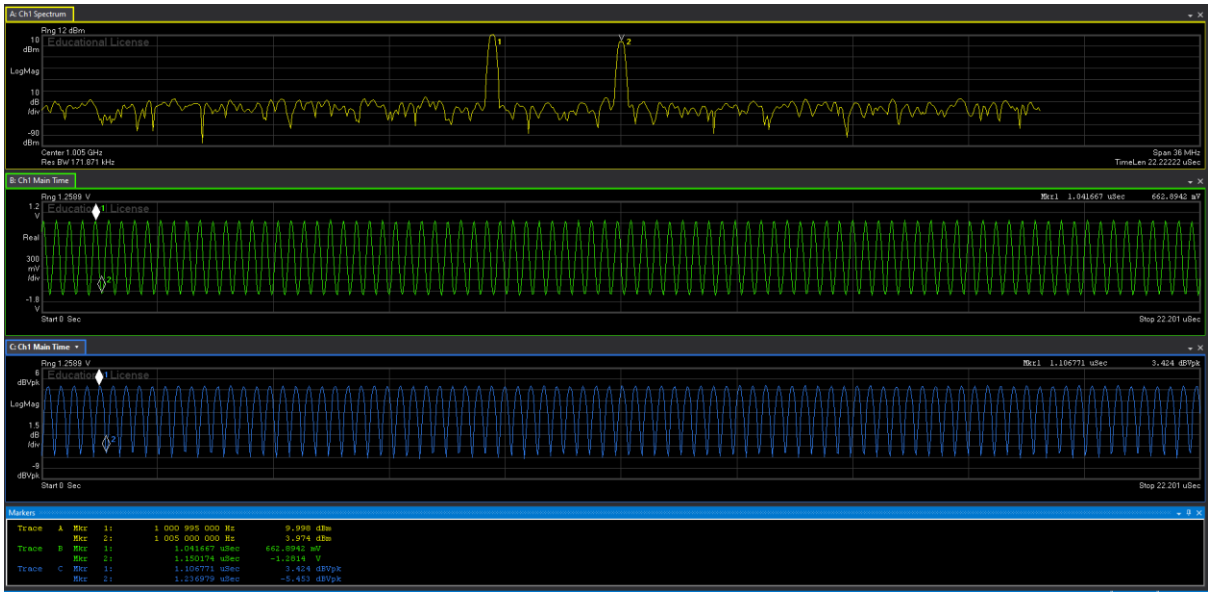
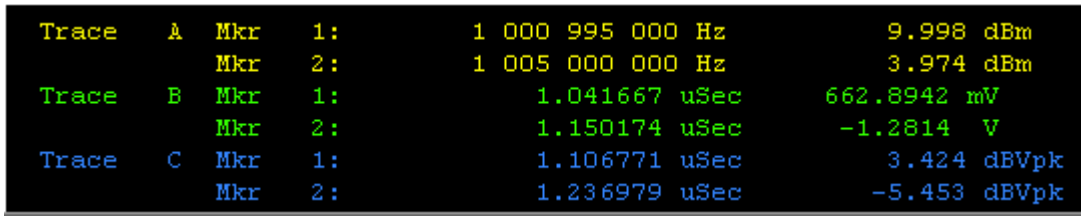
Per centre = f2 = 1,005GHz





$$A2 \cdot cos(\varphi 2) = 0{,}672 - 1.98 / 2 = 0{,}318mV$$
$$A2 \cdot sin(\varphi 2) = 0{,}604 - 1{,}9869 / 2 = 0{,}389mV$$
$$\varphi 2 = arctan(-0{,}389 / 0{,}318) = 50{,}73$$

A1 = 1,98 / 2 = 0,99

$$s(t) = 0{,}99cos(2\pi \cdot 1{,}001GHz \cdot t + \pi/4) + 0{,}499cos(2\pi \cdot 1{,}005GHz \cdot t + 50, + n(t)$$

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Estudi previ P3:

3.1:

a) $f_0 = f_1$:

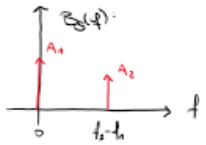
$$b_s(t) \xrightarrow{TF} B_s(f) = 2 \cdot S^+(f + f_0)$$

$$S(f) = A_1 \frac{1}{2}\left(\delta(f+f_1) + \delta(f-f_1)\right)e^{j\varphi_1} + A_2 \frac{1}{2}\left(\delta(f+f_2) + \delta(f-f_2)\right)e^{j\varphi_2}$$

$$S^+(f) = \frac{A_1}{2}\delta(f-f_1)e^{j\varphi_1} + \frac{A_2}{2}\delta(f-f_2)e^{j\varphi_2}$$

$$B_s(f) = 2 \cdot S^+(f+f_0) = A_1\delta(f)e^{j\varphi_1} + A_2\,\delta(f-f_2+f_1)e^{j\varphi_2}$$

$$b_s(t) = A_1\cos(\varphi_1) + A_2 \cdot \cos(2\pi(f_2-f_1)t + \varphi_2) + j \cdot A_1 \sin(\varphi_1) + j \cdot A_2 \cdot \sin(2\pi(f_2-f_1)t + \varphi_2)$$

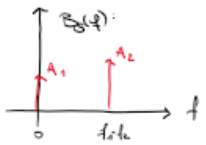


b) $f_0 = f_2$:

$$B_s(f) = A_1\delta(f-f_1+f_2)e^{j\varphi_1} + A_2\,\delta(f)e^{j\varphi_2}$$

$$b_s(t) = A_1 \cdot e^{j(2\pi(f_1-f_2)t+\varphi_1)} + A_2 \cdot e^{j\varphi_2} =$$

$$= A_1 \cdot \cos(2\pi(f_1-f_2)t + \varphi_1) + A_2 \cdot \cos(\varphi_2) + j \cdot A_1 \cdot \sin(2\pi(f_1-f_2)t + \varphi_1) + j \cdot A_2 \cdot \sin(\varphi_2)$$



c) $f_0 < f_1 < f_2$:

$$B_s(f) = A_1\,\delta(f-f_1+f_0)e^{j\varphi_1} + A_2 \cdot \delta(f-f_2+f_0)e^{j\varphi_2}$$

$$b_s(t) = A_1 \cdot e^{j(2\pi(f_1-f_0)t+\varphi_1)} + A_2 \cdot e^{j(2\pi(f_2-f_0)t+\varphi_2)} =$$

$$= A_1 \cdot \cos(2\pi(f_1-f_0)t + \varphi_1) + A_2 \cdot \cos(2\pi(f_2-f_0)t + \varphi_2) + jA_1\sin(f_1-f_0)t + \varphi_1) + jA_2\sin(2\pi(f_2-f_0)t + \varphi_2)$$

3.2:

a) Entre les etapes SAMPLE i RESAMPLE

b) RBW = 171 KHz :

Flat top windows → WS = 3,8

$$RBW = \frac{WS}{T} \longrightarrow T = \frac{WS}{RBW} = \frac{3,8}{171 \cdot 10^3} = 22,\hat{2}\ \mu s$$

c) SPAN = 36 MHz :

$$f_{SPAN} = 1,28 \cdot 36\,10^6 = 46,08\ MHz$$

d)

$$T = N \cdot \frac{1}{f_s} \longrightarrow 22,\hat{2} \cdot 10^{-6} = N \cdot \frac{1}{46,08 \cdot 10^6} \longrightarrow N \approx 1024\ \text{samples}$$

$$N = (M-1)\,1,28 \longrightarrow 1024 = (M-1)\,1,28 \longrightarrow M = 801\ \text{samples}$$