

**Conception et réalisation d'un prototype
d'amplificateur différentiel
d'instrumentation dédié à la réception
ELF/VLF**

- bande 0,5 Hz à 90 KHz gain +6 dB
- Premiers essais à proximité d'une zone de perturbations électriques (habitation à moins de 3m)

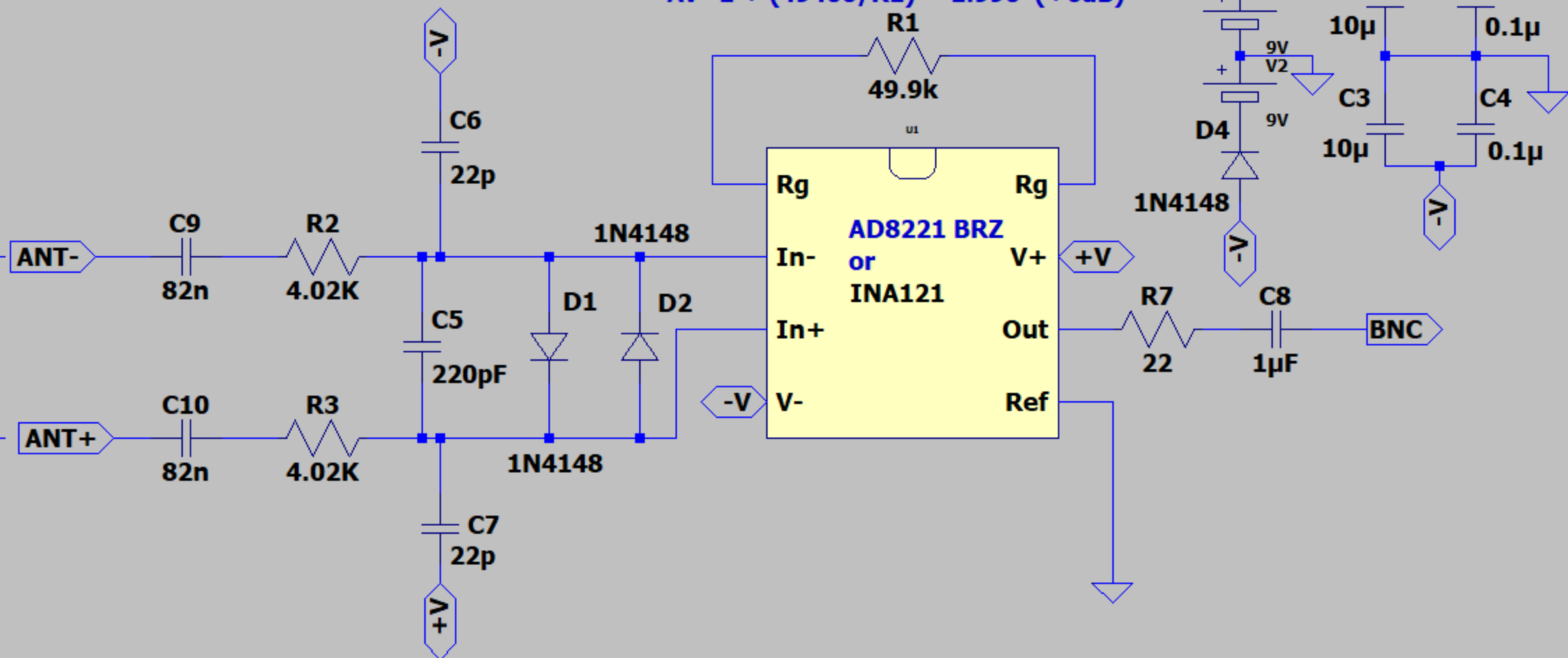
Franck DURAND (F4IEW), février 2023



1,2m vertical

1,2m vertical

$$A_v = 1 + (49400/R1) = 1.990 \text{ (+6dB)}$$



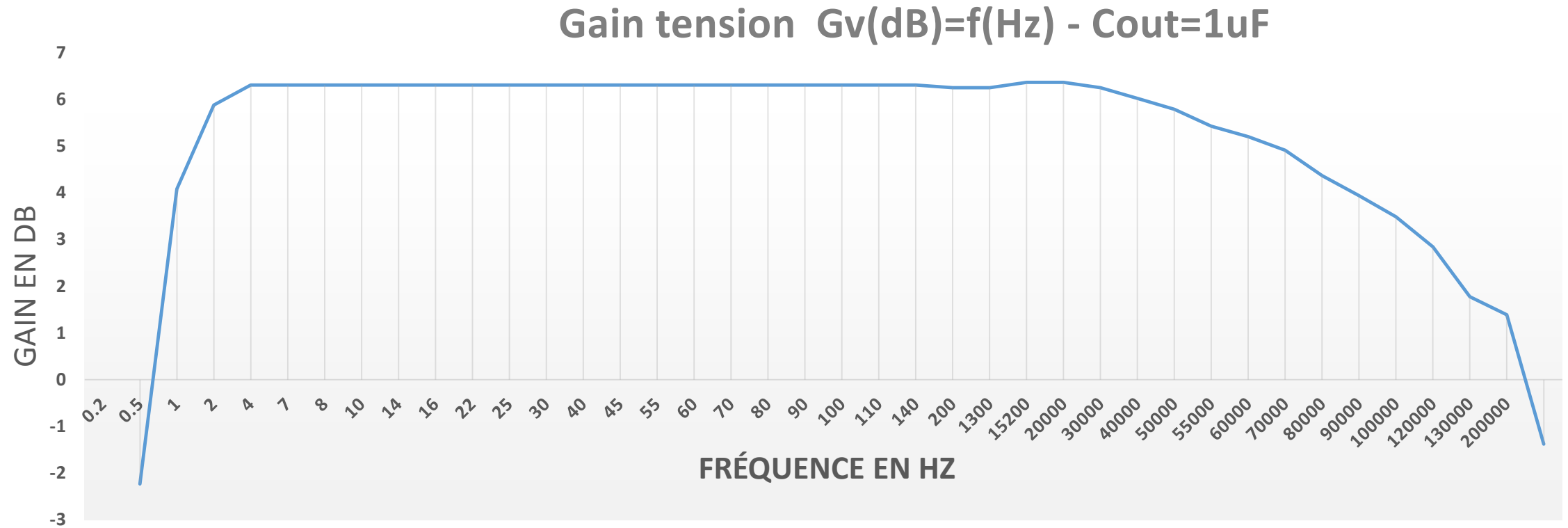
Mounted as closed as possible
from AD8221 V- and V+

$$\text{FilterFreq_Diff} = 1 / (2 * 3.14159 * R2 * (2 * C5 + C6))$$

$$= 85\,694 \text{ Hz}$$

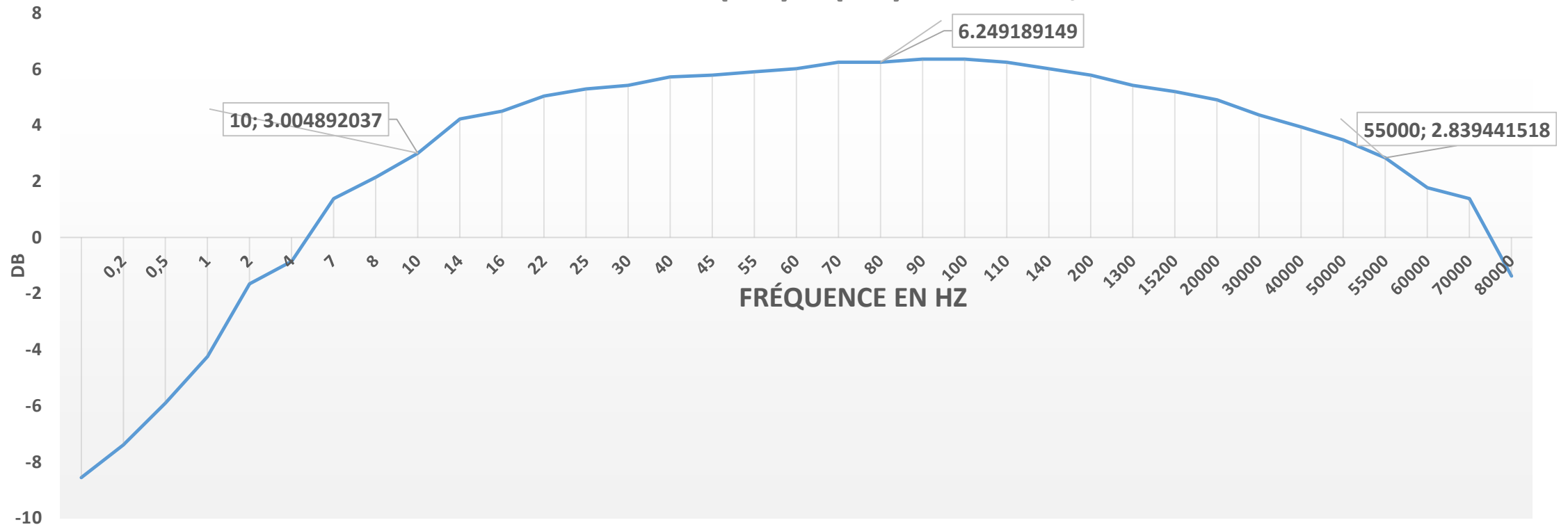
Franck DURAND, 2023

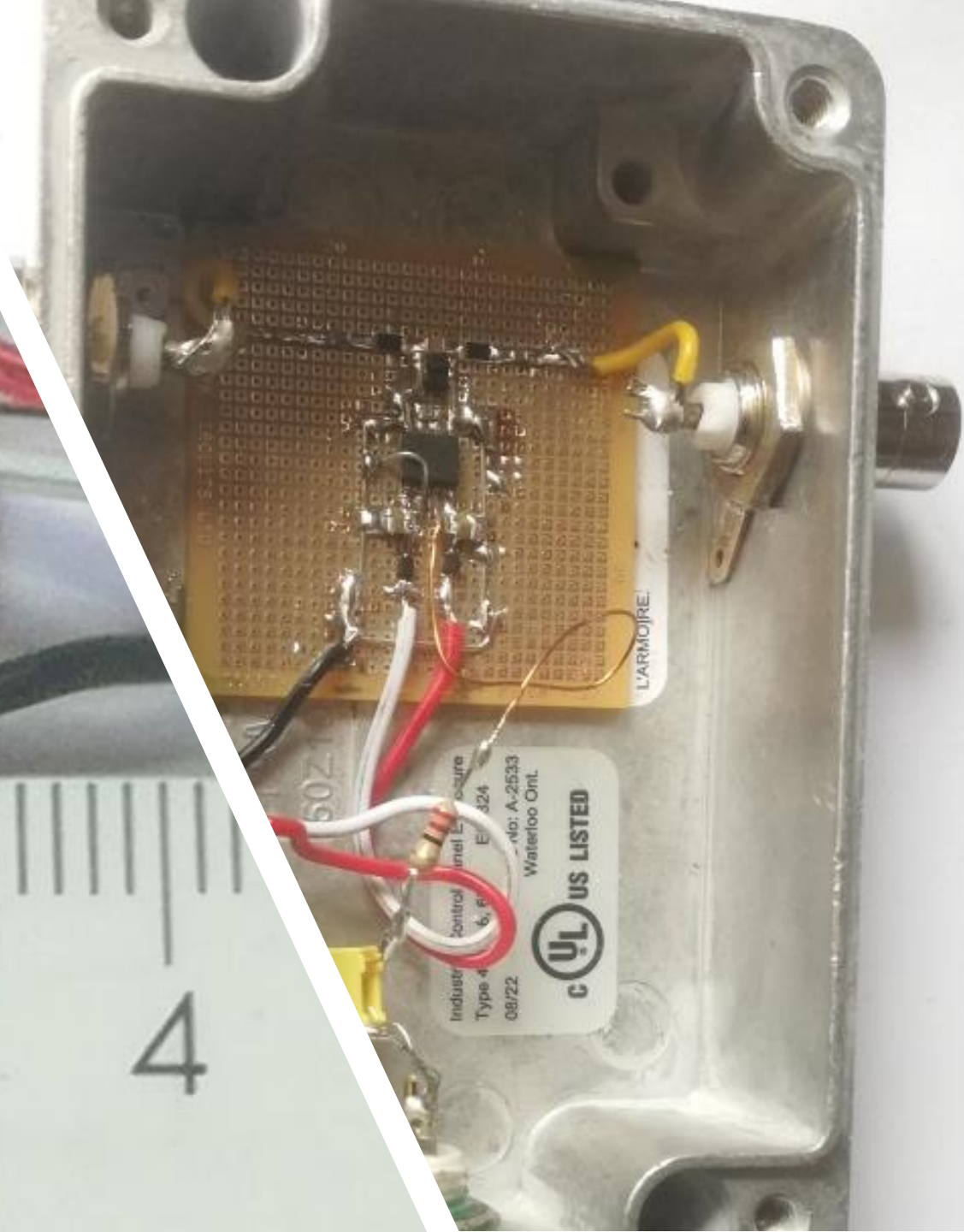
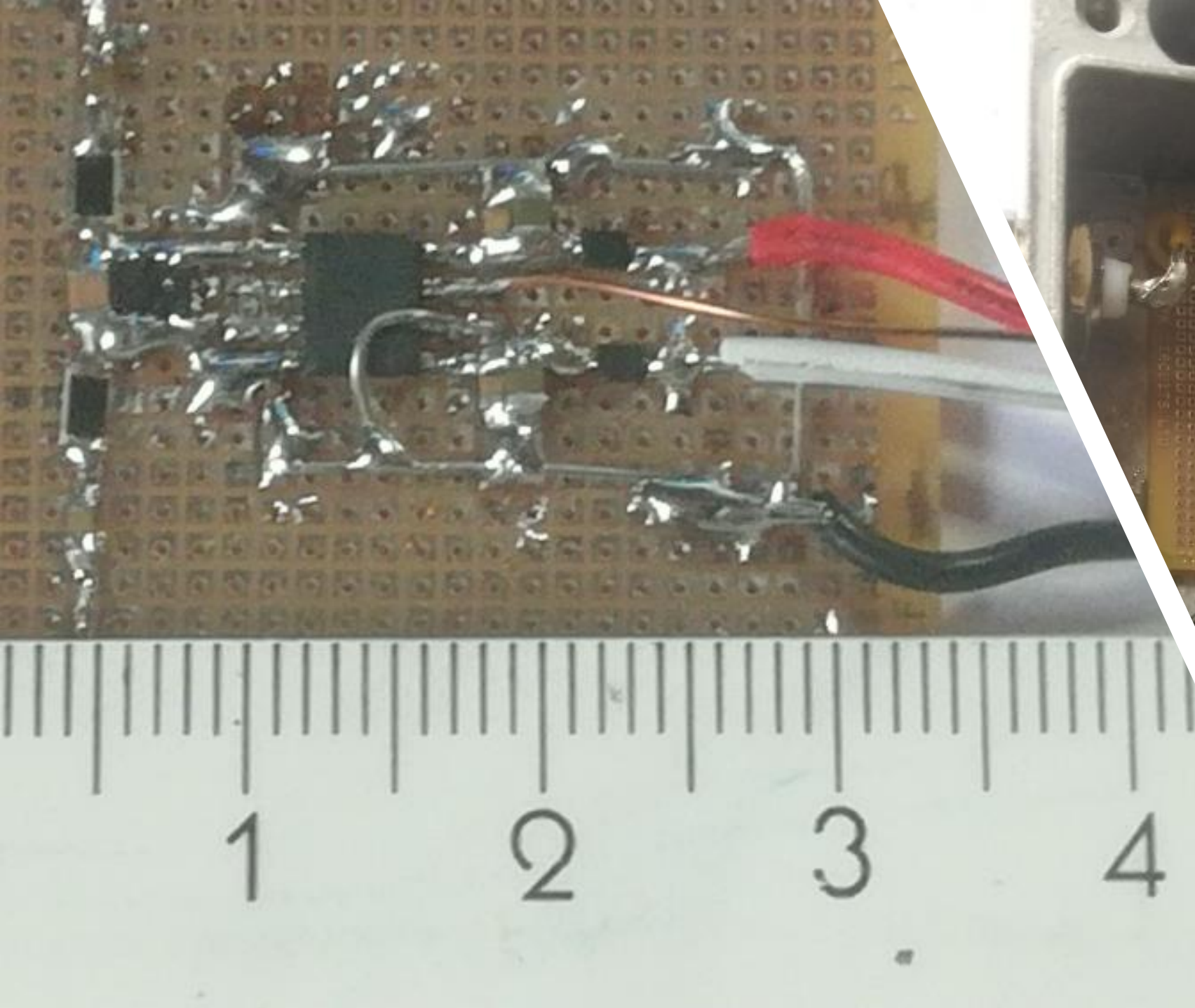
Réponse en fréquence mesurée avec C8=1 uF



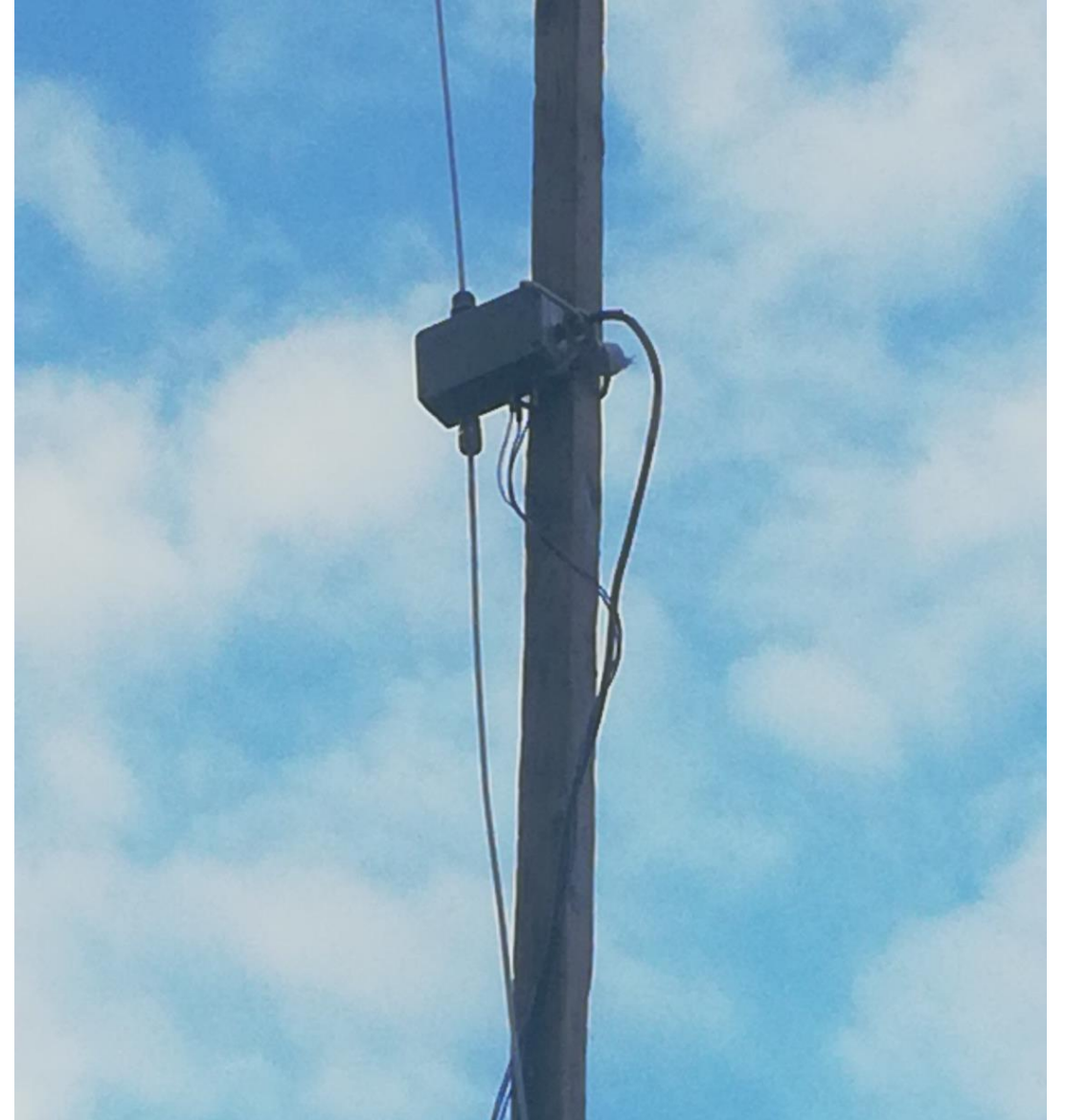
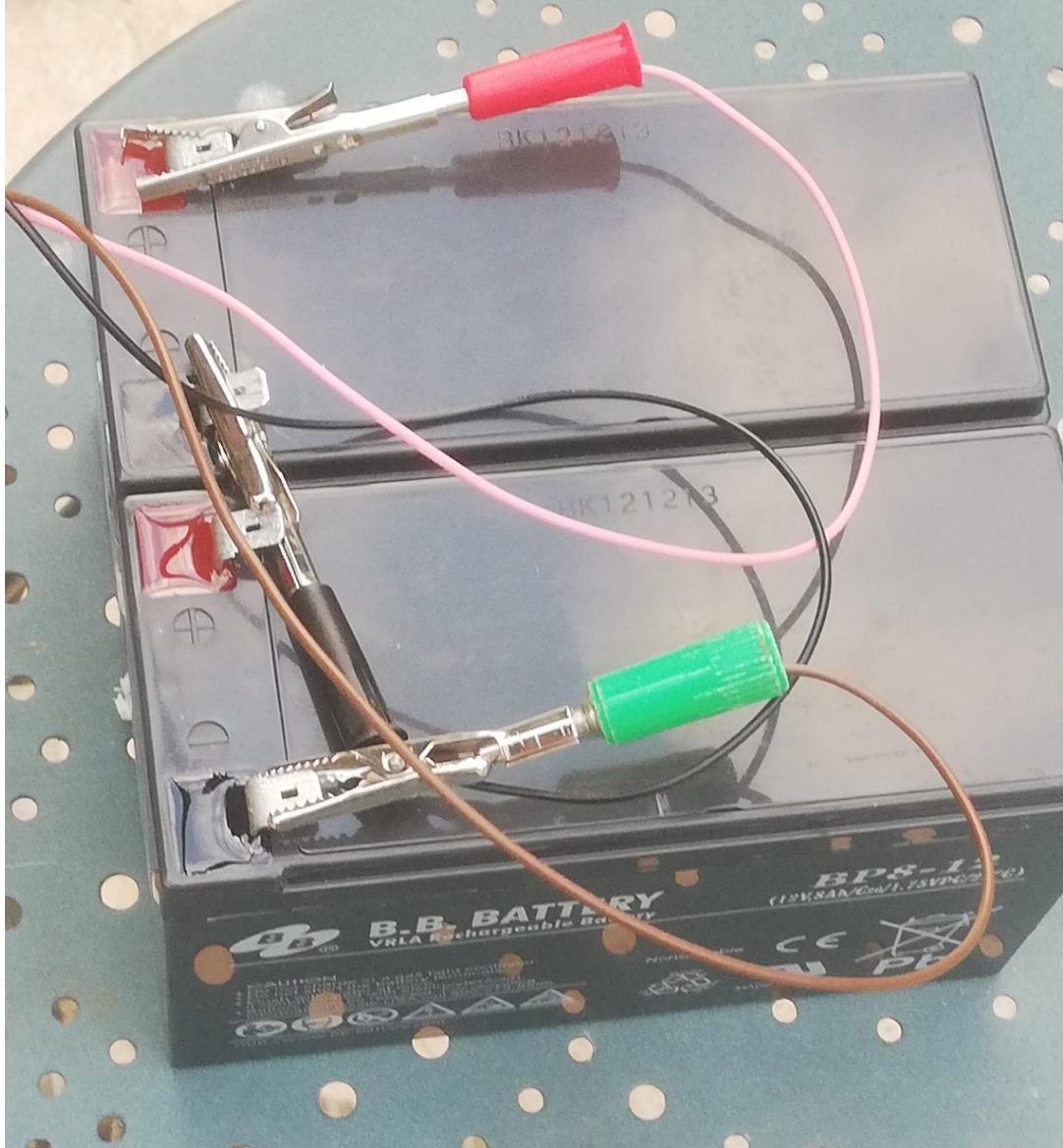
Réponse en fréquence mesurée avec C8 = 4,7nF uF

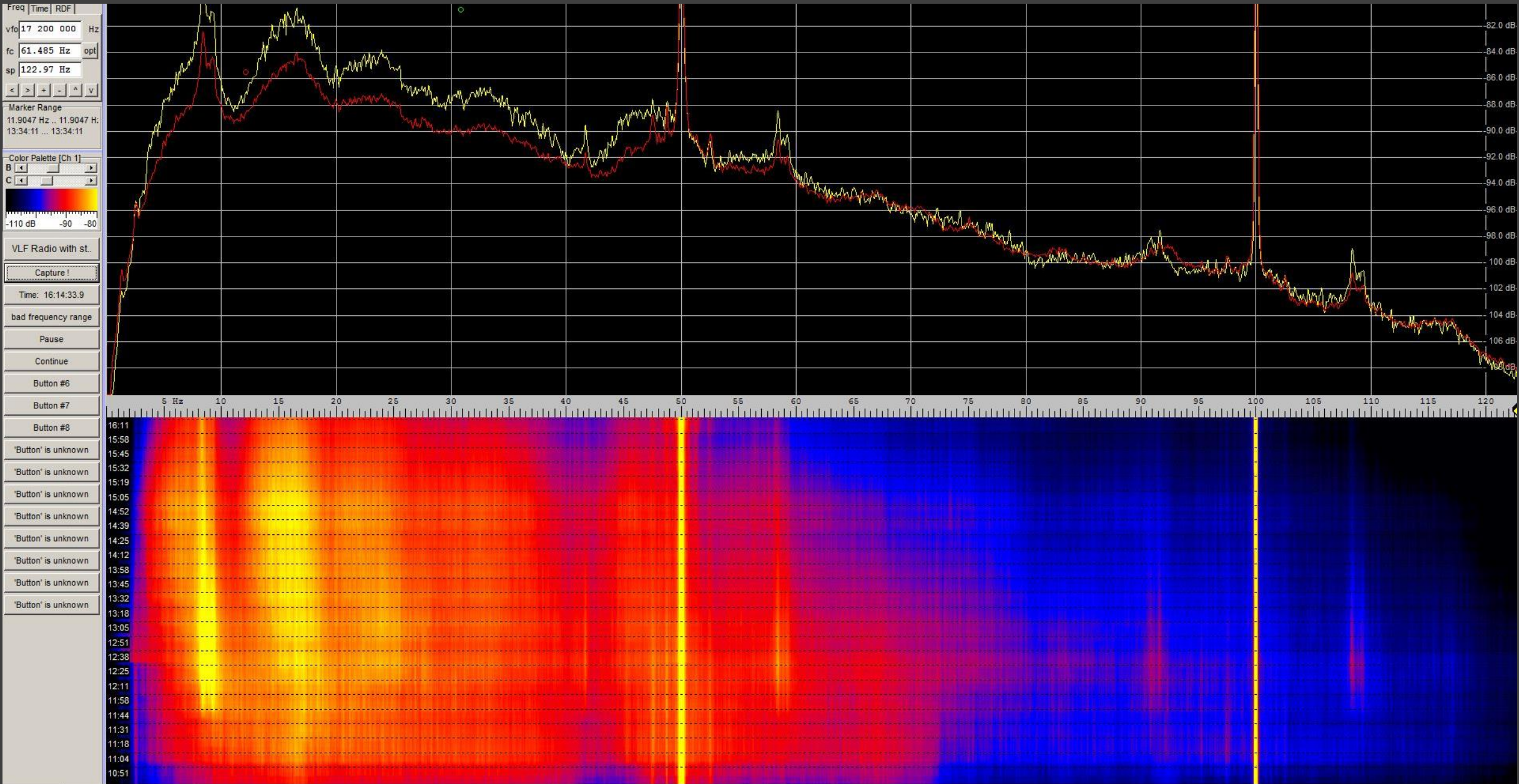
Gain tension $G_v(\text{dB})=f(\text{Hz})$ - cout=4,7nF












SpecLab Configuration and Display Control

TRX Control

Memory

FileNames

Audio Files

Markers

System

Freq-Resp

Spectrum (1)

.. (2)

.. (3)

.. (4)

Radio DF

FFT

Audio I/O

AD/DA Server

FFT properties, frequency resolution

Decimate input by (divisor)

FFT input size ("length")

FFT window function

☒ use anti-alias filter for decimation

☒ same FFT params for all analyser channels

Effect of FFT settings with $f_s = 375.000$ Hz:

Width of one FFT-bin: 5.72205 mHz

Equiv. noise bandwidth: 8.58307 mHz

Max freq range: 0.00000 Hz .. 187.500 Hz

FFT window time (length): 2.913 min

FFT window overlap: 75.0 % (automatic)

FFT Input (same for all channels)

Type

Source

Center frequency [Hz]

☐ Sweep [Hz/sec] :

☐ Include F.O. calibrator

FFT Output

Type

Unit

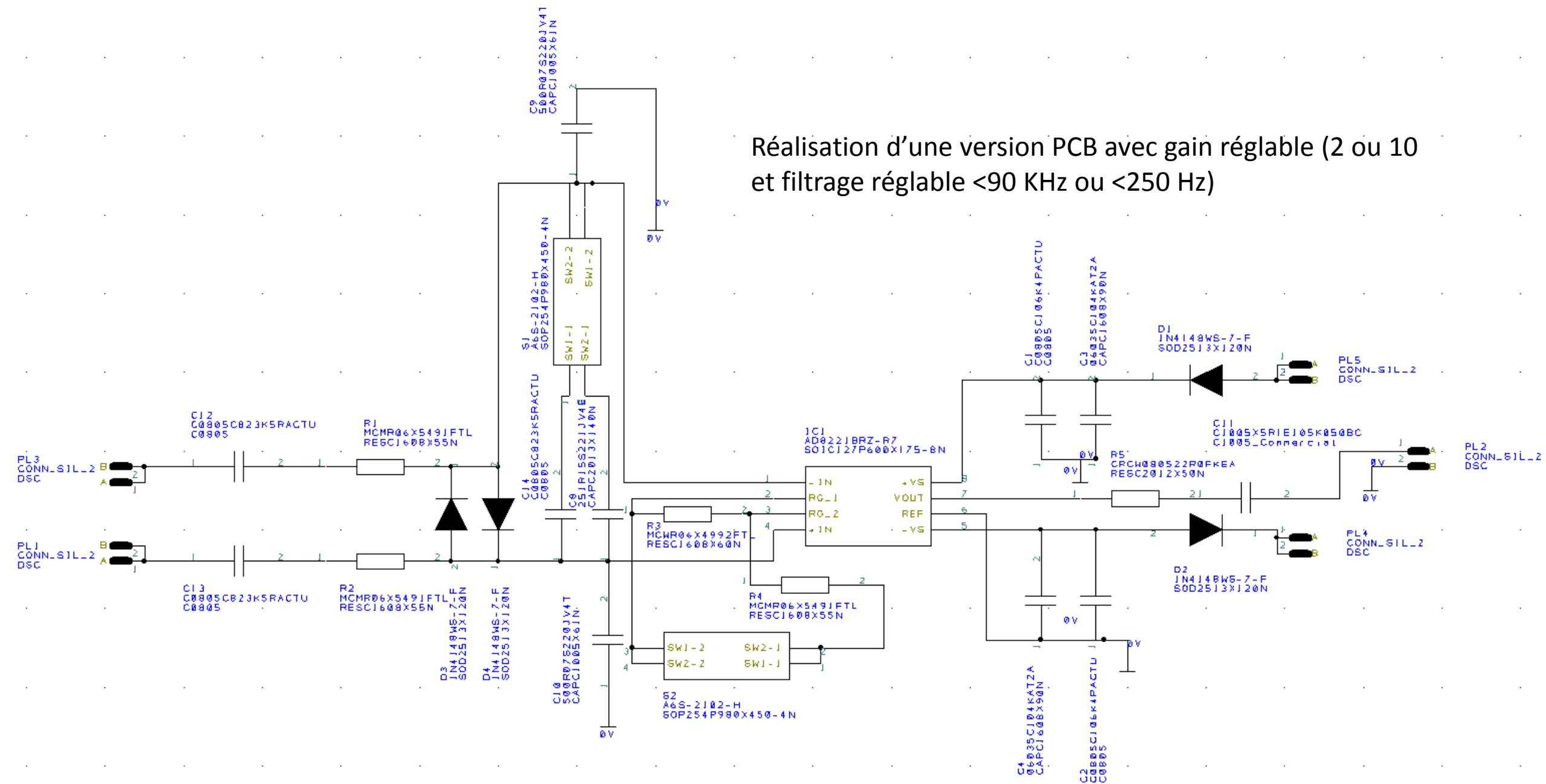
internal average (#FFTs)

smoothing (#bins)

Warning: "1 IN 1-2 (9- BEHRINGER UMC 204HD)" doesn't EXACTLY match any detected device.

Shown: Settings for Analyser 1, channel 1 (L)

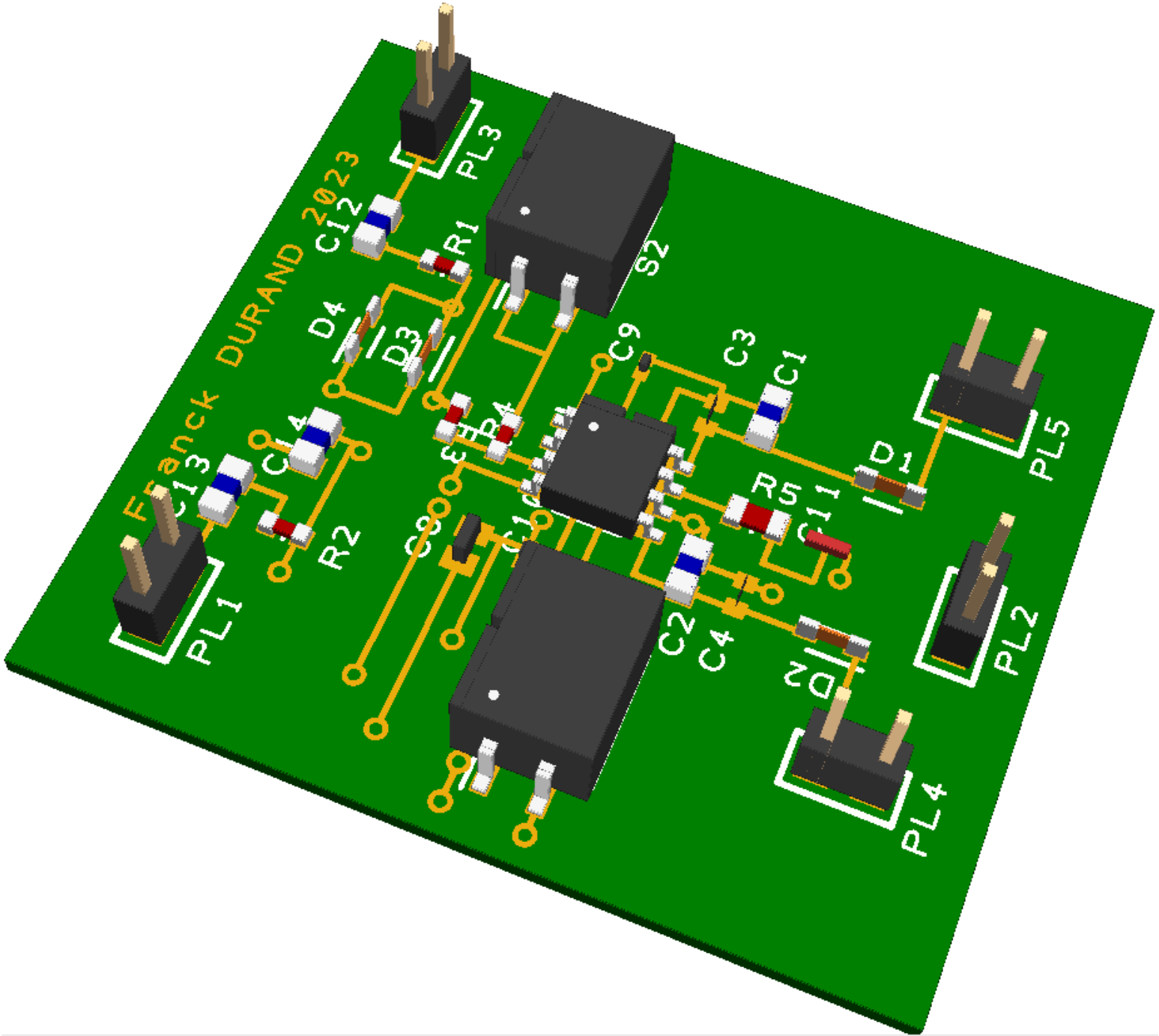
Réalisation d'une version PCB avec gain réglable (2 ou 10
et filtrage réglable <90 KHz ou <250 Hz)

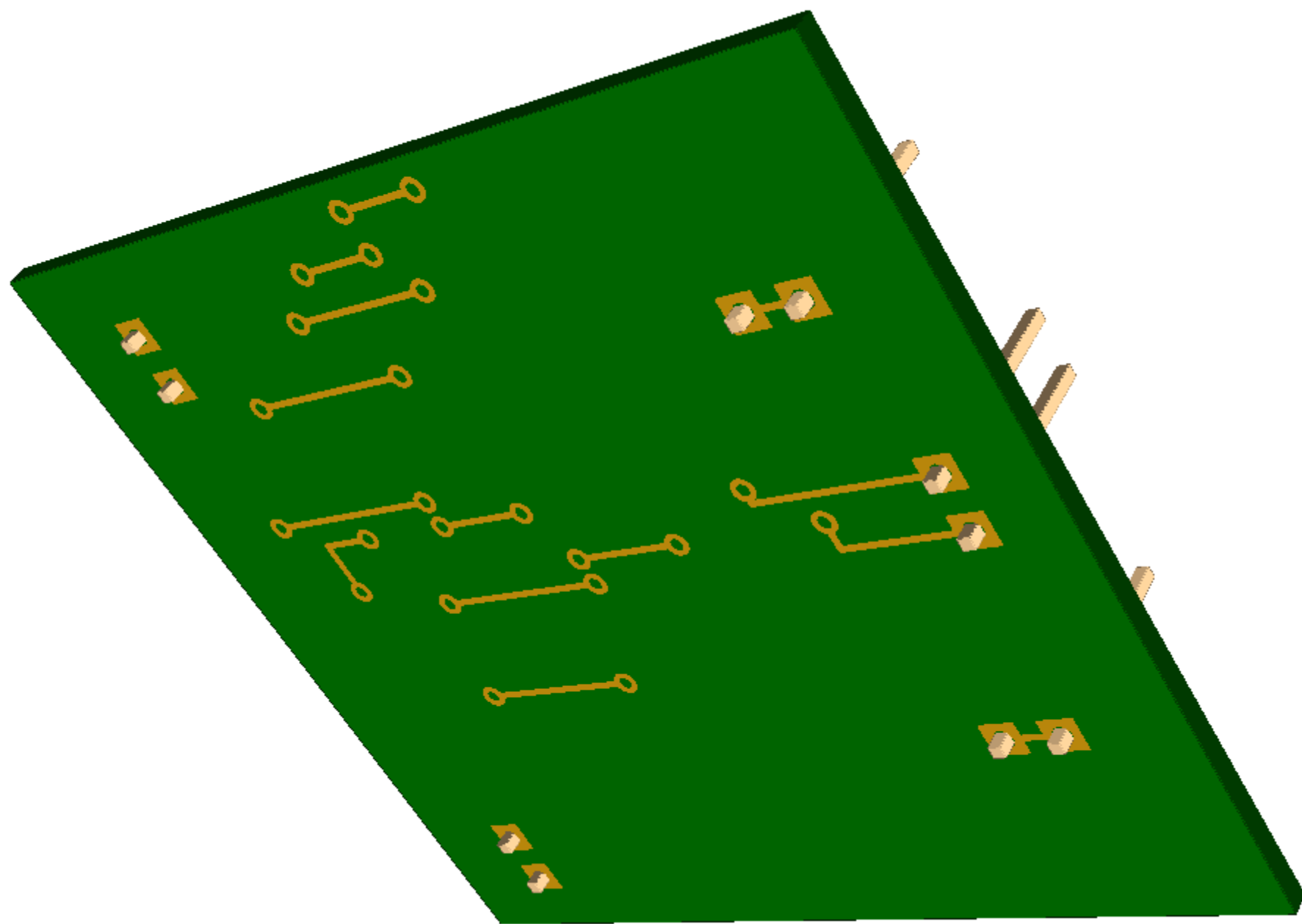


BOM

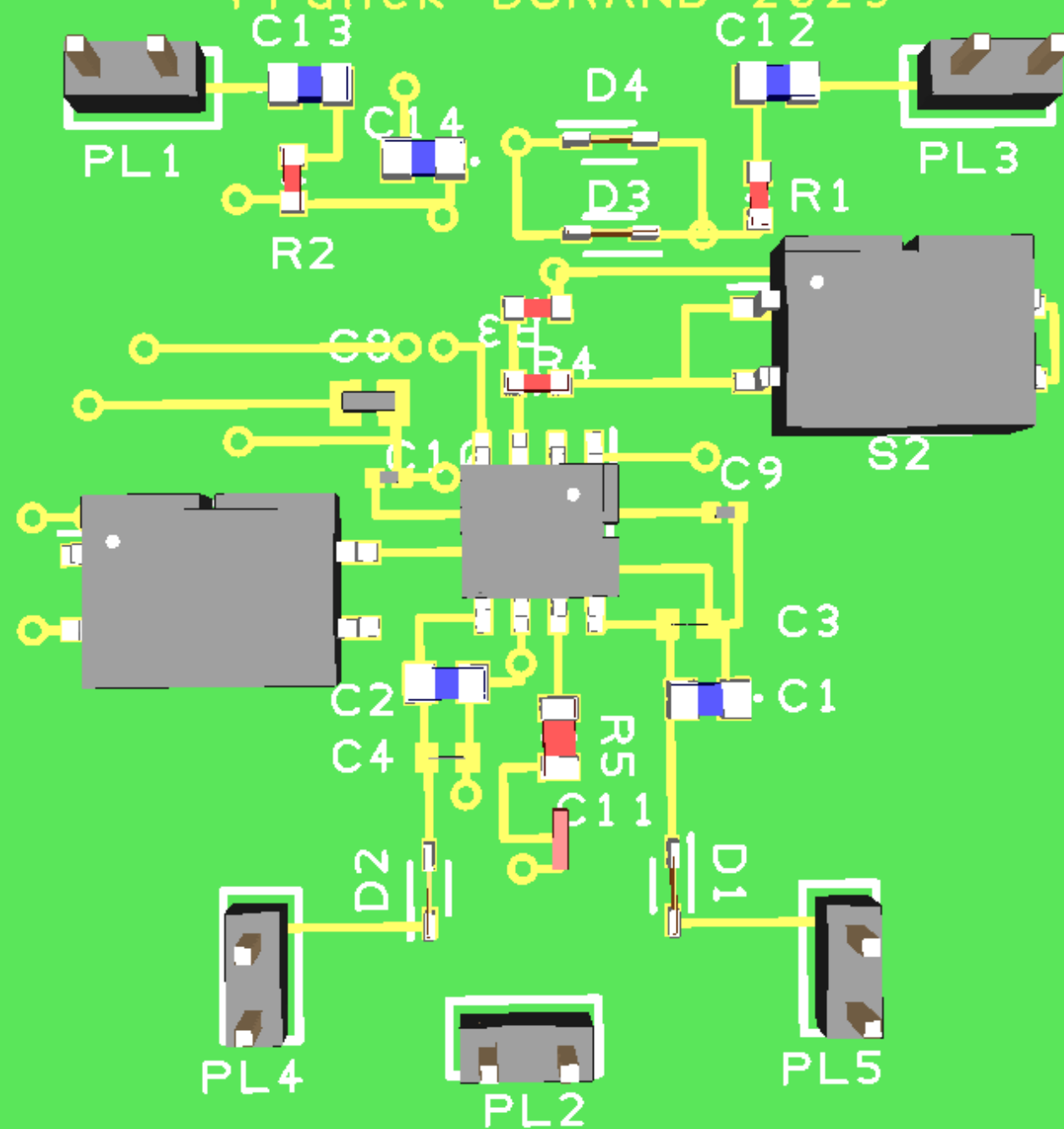
Name	△	Component	Description	RS Part Numb...	RS Price/Stock	Manufacturer_N...	Manufacturer_Part_
C1		C0805C106K4PACTU	SMD Comm X5R, Ceramic, 10 uF, 10%, 16 VDC, 40 VDC, 85C, -55C, X5R, SMD, MLCC, Temperature Stable, Class II, 10 %, 10 MOhms, 21 mg, 0805, 2mm, 1.25mm, 1.25mm, 0.75...	6911161P	http://uk.rs-online.com/web/p/products/6911161P	KEMET	C0805C106K4PACTU
C2		C0805C106K4PACTU	SMD Comm X5R, Ceramic, 10 uF, 10%, 16 VDC, 40 VDC, 85C, -55C, X5R, SMD, MLCC, Temperature Stable, Class II, 10 %, 10 MOhms, 21 mg, 0805, 2mm, 1.25mm, 1.25mm, 0.75...	6911161P	http://uk.rs-online.com/web/p/products/6911161P	KEMET	C0805C106K4PACTU
C3		06035C104KAT2A	Capacitor MLCC 0603 100nF 50V AVX 0603 Standard 100nF Ceramic Multilayer Capacitor, 50 V dc X7R Dielectric ?????10% SMD	6983260P	http://uk.rs-online.com/web/p/products/6983260P	AVX	06035C104KAT2A
C4		06035C104KAT2A	Capacitor MLCC 0603 100nF 50V AVX 0603 Standard 100nF Ceramic Multilayer Capacitor, 50 V dc X7R Dielectric ?????10% SMD	6983260P	http://uk.rs-online.com/web/p/products/6983260P	AVX	06035C104KAT2A
C9		500R07S220JV4T	JOHANSON TECHNOLOGY - 500R07S220JV4T - Capacitor, RF, High-Q, 22 pF, 50 V, S-Series, +/- 5%, 125 C, 0402 [1005 Metric]			JOHANSON TEC...	500R07S220JV4T
C8		251R15S221JV4E	JOHANSON TECHNOLOGY - 251R15S221JV4E - Capacitor, RF, High-Q, 220 pF, 250 V, S Series, +/- 5%, 125 C, 0805 [2012 Metric]			JOHANSON TEC...	251R15S221JV4E
C10		500R07S220JV4T	JOHANSON TECHNOLOGY - 500R07S220JV4T - Capacitor, RF, High-Q, 22 pF, 50 V, S-Series, +/- 5%, 125 C, 0402 [1005 Metric]			JOHANSON TEC...	500R07S220JV4T
C11		C1005X5R1E105K050BC	MULTILAYER CERAMIC CHIP CAPACITORS, 1005, Commercial grade, general (Up to 75V)	9156323P	http://befr.rs-online.com/web/p/products/9156323P	TDK	C1005X5R1E105K050BC
C12		C0805C823K5RACTU	SMD Comm X7R, Ceramic, 0.082 uF, 10%, 50 VDC, 125 VDC, 125C, -55C, X7R, SMD, MLCC, Temperature Stable, Class II, 2.5 %, 12.1951 GOhms, 13 mg, 0805, 2mm, 1.25mm, 0.9...			KEMET	C0805C823K5RACTU
C13		C0805C823K5RACTU	SMD Comm X7R, Ceramic, 0.082 uF, 10%, 50 VDC, 125 VDC, 125C, -55C, X7R, SMD, MLCC, Temperature Stable, Class II, 2.5 %, 12.1951 GOhms, 13 mg, 0805, 2mm, 1.25mm, 0.9...			KEMET	C0805C823K5RACTU
C14		C0805C823K5RACTU	SMD Comm X7R, Ceramic, 0.082 uF, 10%, 50 VDC, 125 VDC, 125C, -55C, X7R, SMD, MLCC, Temperature Stable, Class II, 2.5 %, 12.1951 GOhms, 13 mg, 0805, 2mm, 1.25mm, 0.9...			KEMET	C0805C823K5RACTU
D1		1N4148WS-7-F	Diode Switching 150mA 75V 200mW SOD323 Diodes Inc 1N4148WS-7-F Switching Diode, 150mA 75V, 2-Pin SOD-323	7384737P	http://uk.rs-online.com/web/p/products/7384737P	Diodes Inc.	1N4148WS-7-F
D2		1N4148WS-7-F	Diode Switching 150mA 75V 200mW SOD323 Diodes Inc 1N4148WS-7-F Switching Diode, 150mA 75V, 2-Pin SOD-323	7384737P	http://uk.rs-online.com/web/p/products/7384737P	Diodes Inc.	1N4148WS-7-F
D3		1N4148WS-7-F	Diode Switching 150mA 75V 200mW SOD323 Diodes Inc 1N4148WS-7-F Switching Diode, 150mA 75V, 2-Pin SOD-323	7384737P	http://uk.rs-online.com/web/p/products/7384737P	Diodes Inc.	1N4148WS-7-F
D4		1N4148WS-7-F	Diode Switching 150mA 75V 200mW SOD323 Diodes Inc 1N4148WS-7-F Switching Diode, 150mA 75V, 2-Pin SOD-323	7384737P	http://uk.rs-online.com/web/p/products/7384737P	Diodes Inc.	1N4148WS-7-F
IC1		AD8221BRZ-R7	ANALOG DEVICES - AD8221BRZ-R7 - Instrument Amplifier, 1 Amplifier, 25 V, 2 V/s, 825 kHz, +/- 2.3V to +/- 18V, NSOIC			Analog Devices	AD8221BRZ-R7
PL1		CONN_SIL_2	2 way Pin Header				
PL2		CONN_SIL_2	2 way Pin Header				
PL3		CONN_SIL_2	2 way Pin Header				
PL4		CONN_SIL_2	2 way Pin Header				
PL5		CONN_SIL_2	2 way Pin Header				
R1		MCMR06X5491FTL	MULTICOMP - MCMR06X5491FTL - RES, 5K49, 1%, 0.1W, 0603, CERAMIC			MULTICOMP	MCMR06X5491FTL
R2		MCMR06X5491FTL	MULTICOMP - MCMR06X5491FTL - RES, 5K49, 1%, 0.1W, 0603, CERAMIC			MULTICOMP	MCMR06X5491FTL
R3		MCWR06X4992FTL	MULTICOMP - MCWR06X4992FTL - RES, THICK FILM, 49.9KOHM, 1%, 0.1W			MULTICOMP	MCWR06X4992FTL
R4		MCMR06X5491FTL	MULTICOMP - MCMR06X5491FTL - RES, 5K49, 1%, 0.1W, 0603, CERAMIC			MULTICOMP	MCMR06X5491FTL
R5		CRCW080522R0FKEA	CRCW0805 Resistor T/R 0.125W,1%,22R Vishay CRCW Series Thick Film Surface Mount Resistor 0805 Case 22 +/-1% 0.125W +/-100ppm/C	6791112P	http://uk.rs-online.com/web/p/products/6791112P	Vishay	CRCW080522R0FKEA
REF1		0V	Power				
REF2		0V	Power				
REF3		0V	Power				
REF4		0V	Power				
REF5		0V	Power				
S1		A6S-2102-H	2 Way Surface Mount DIP Switch DP	0534768	http://uk.rs-online.com/web/p/products/0534768	Omron Electronics	A6S-2102-H
S2		A6S-2102-H	2 Way Surface Mount DIP Switch DP	0534768	http://uk.rs-online.com/web/p/products/0534768	Omron Electronics	A6S-2102-H

Vue 3D





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