

Analysis

August 3, 2022

```
[ ]: import numpy as np
import matplotlib.pyplot as plt
file = 'ESP32_Adv_sampling_rate_56.0_gain_40_fc_2415.0.iq'
samples = np.fromfile(file, np.complex64) # Read in file. We have to tell it
    ↪what format it is
# THRESHOLD = 0.01
print(len(samples))
# THRESHOLD = 0.05
# zeros = np.abs(samples)<THRESHOLD
# samples=zeros] = 0

Fs = 56e6
```

8009013

```
[ ]: from itertools import groupby
from operator import itemgetter

def frameFinder(samples):
    test_list = np.nonzero(samples)
    framesIndex = []
    for k, g in groupby(enumerate(test_list[0]), lambda ix: ix[0]-ix[1]):
        temp = list(map(itemgetter(1), g))
        if len(temp)< 1000:
            continue
        framesIndex.append([temp[0], temp[-1]])
    return np.array(framesIndex)
```

```
TotalFramesIndex = frameFinder(samples)
len(TotalFramesIndex)
```

[]: 655

```
[ ]: batchAna = 100000
start = 0
frameCnt = 1
```

```

for i in range(len(samples)//batchAna+1):
    x = samples[start:start + batchAna]
    framesIndex = frameFinder(x)
    plt.figure(figsize=(20, 3), dpi=100)
    plt.plot(np.linspace(start, start+len(x), len(x)), np.abs(x))

    try:
        plt.stem(np.add(framesIndex.flatten(), [start]*len(framesIndex)*2), [
        .05]*len(framesIndex.flatten()), 'r')
        for frame in framesIndex:
            plt.text(np.average(frame)+start,.1, str(frameCnt) )
            frameCnt +=1
    except:
        start += batchAna
        continue
    start += batchAna
    plt.xlabel("time (s)")
    plt.ylabel("amplitude")
    # # lt.grid(True)

plt.show()
plt.close()

```

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More than 20 figures have been opened. Figures created through the pyplot interface (`matplotlib.pyplot.figure`) are retained until explicitly closed and may consume too much memory. (To control this warning, see the rcParam `figure.max_open_warning`).

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C:\Users\moh\AppData\Local\Temp\ipykernel_17972\378996072.py:11:
MatplotlibDeprecationWarning: Passing the linefmt parameter positionally is
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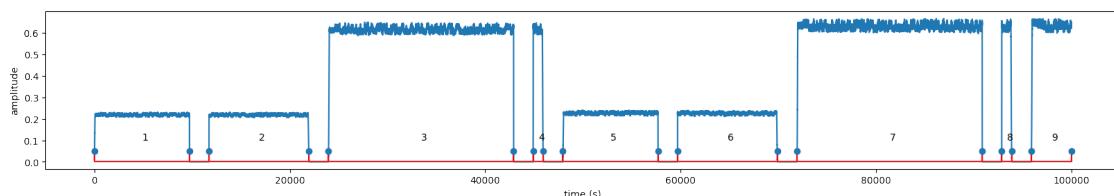
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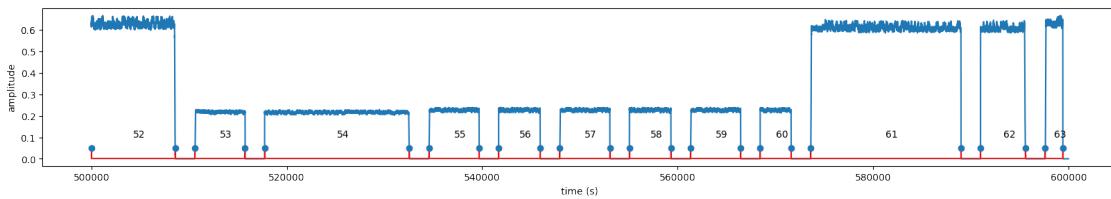
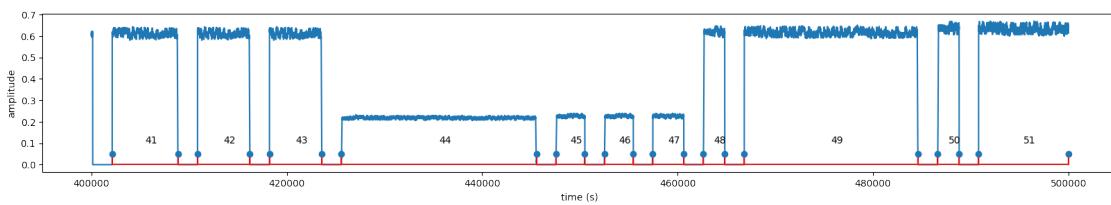
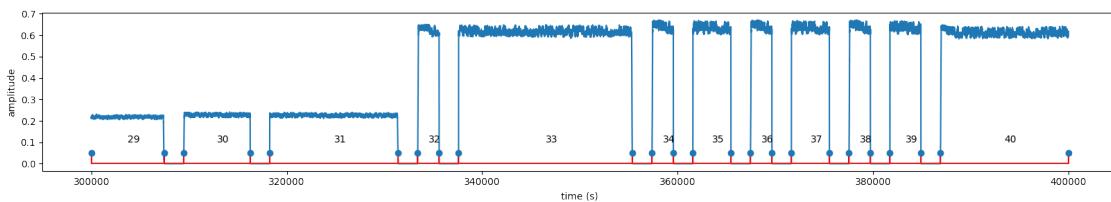
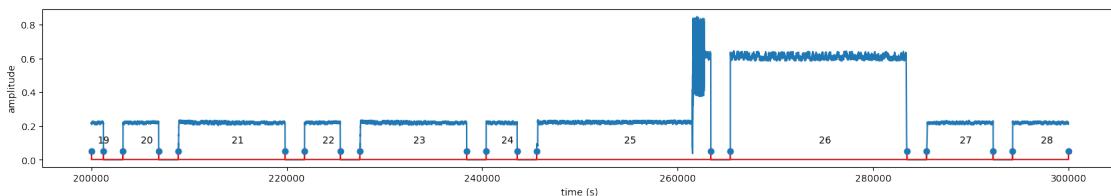
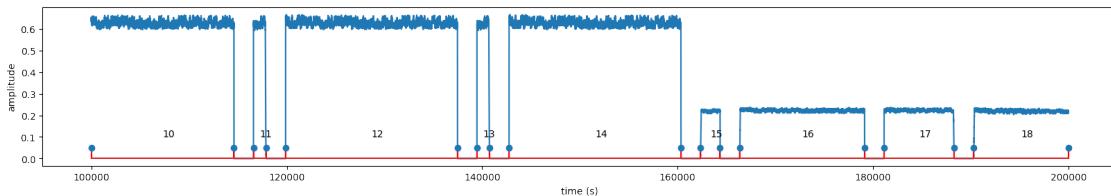
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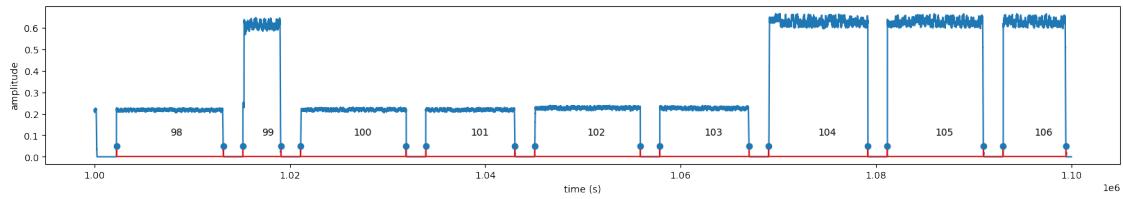
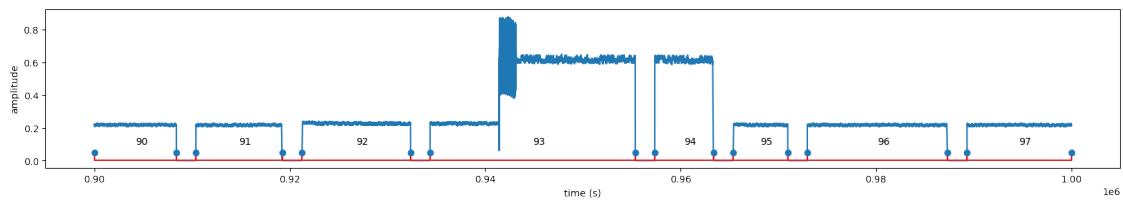
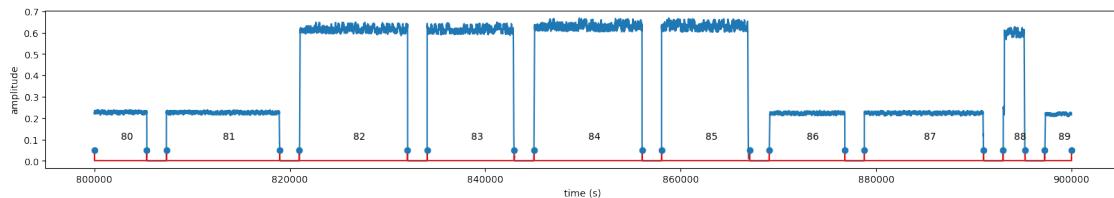
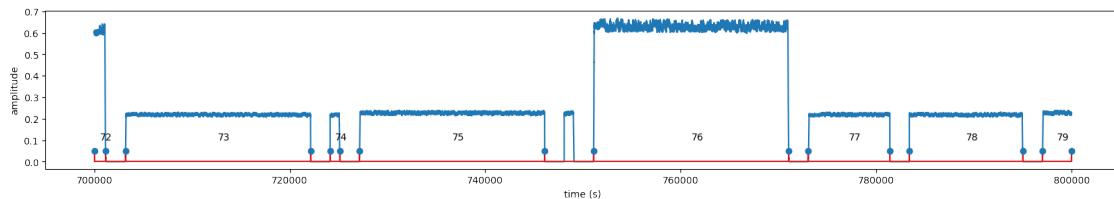
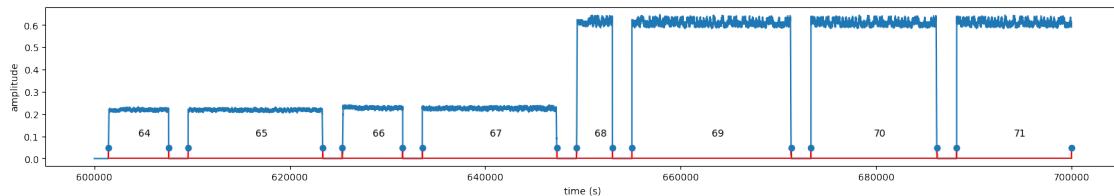
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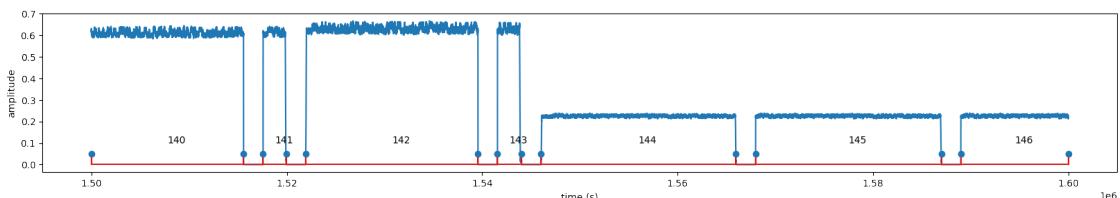
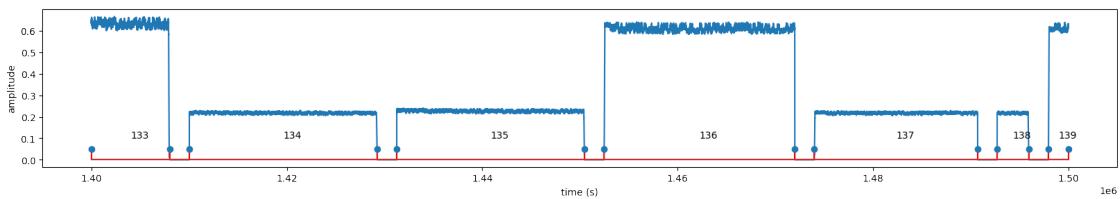
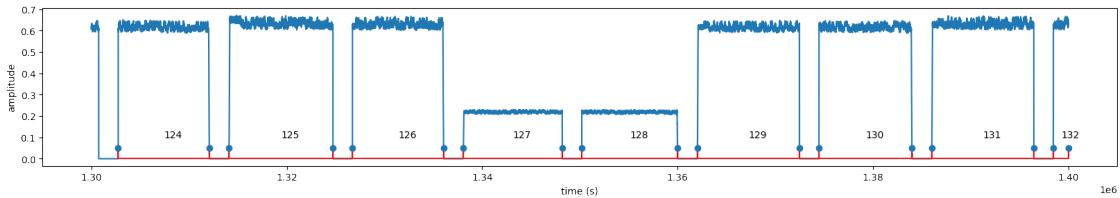
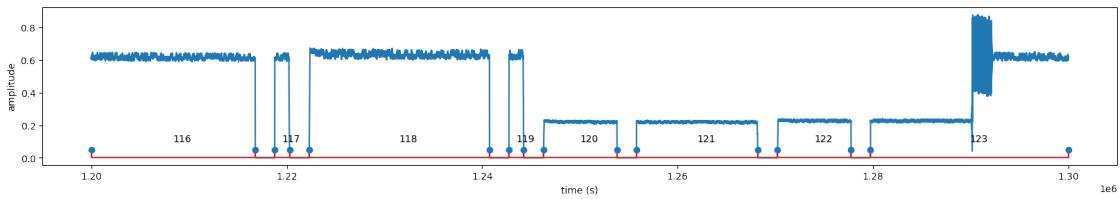
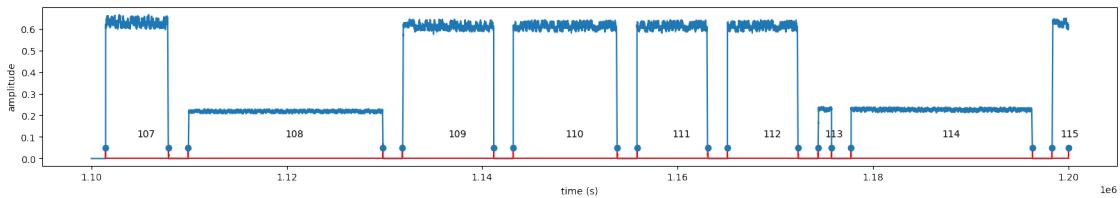
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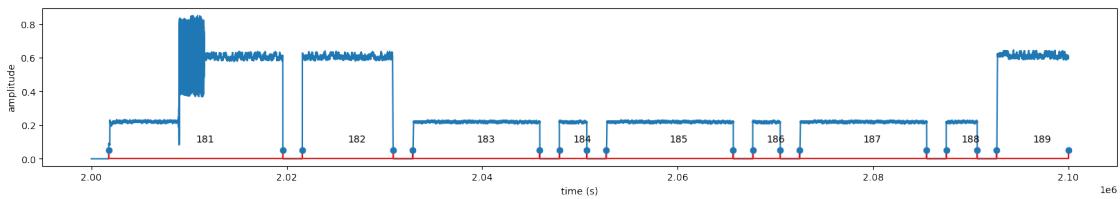
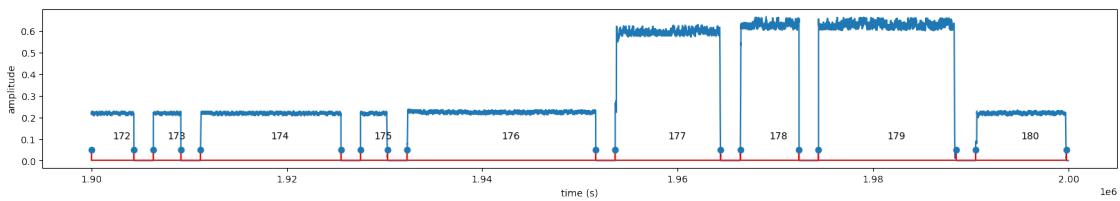
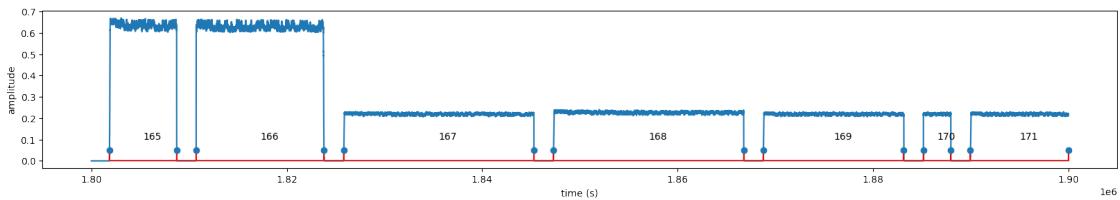
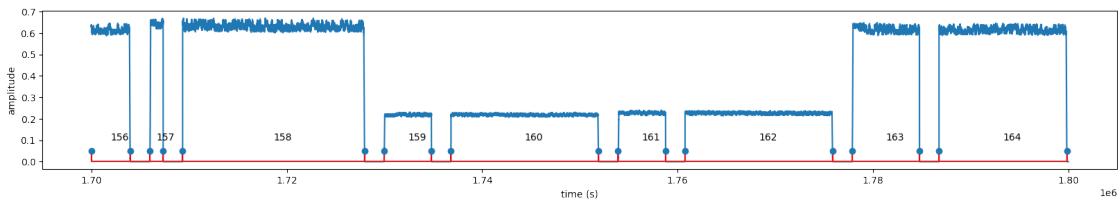
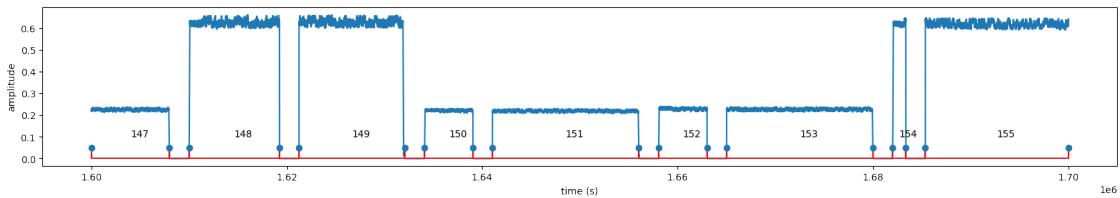
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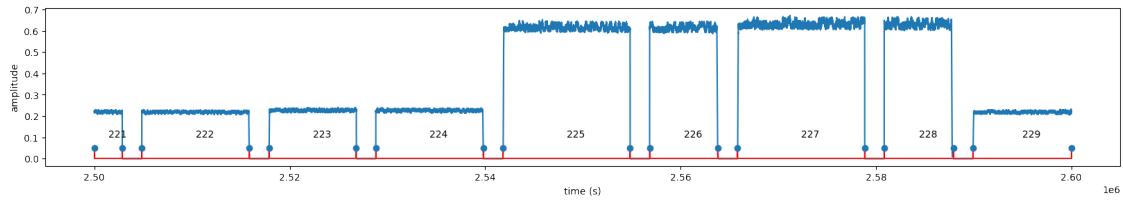
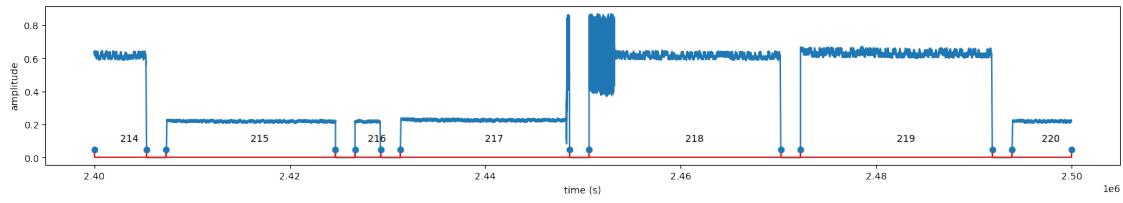
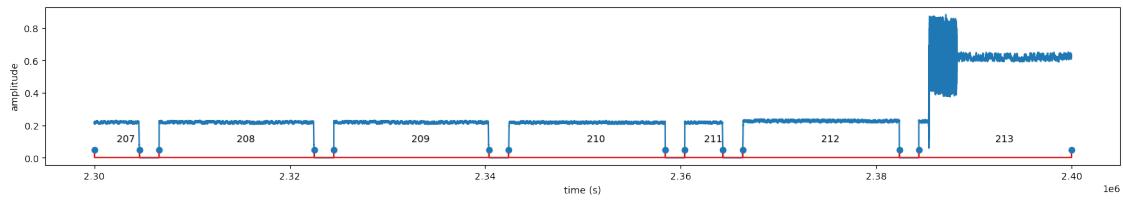
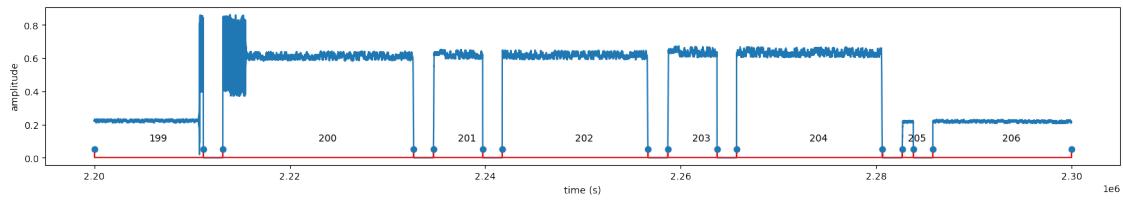
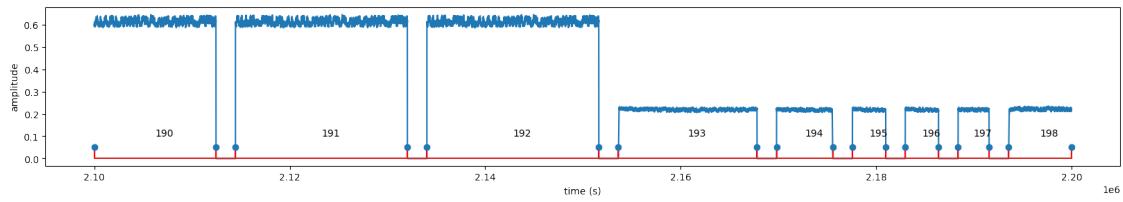


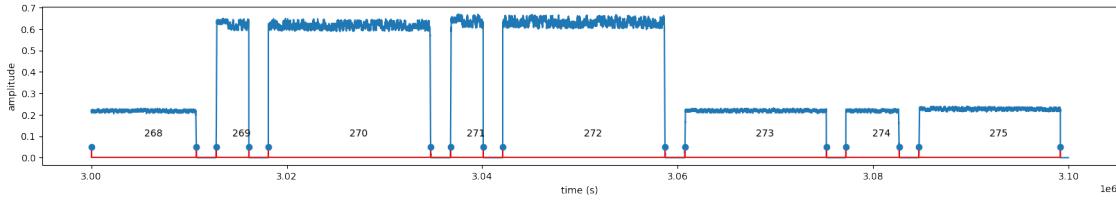
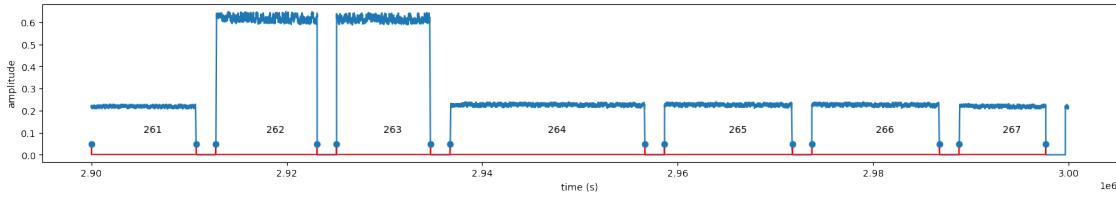
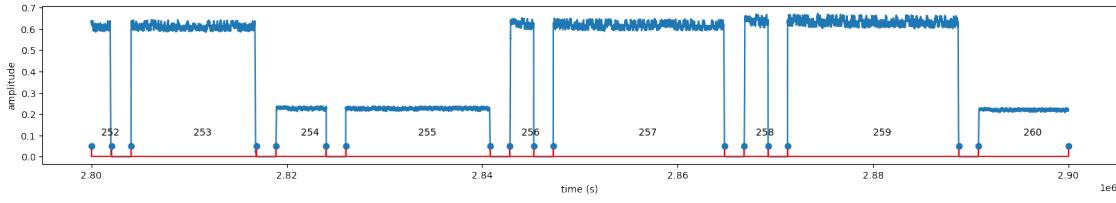
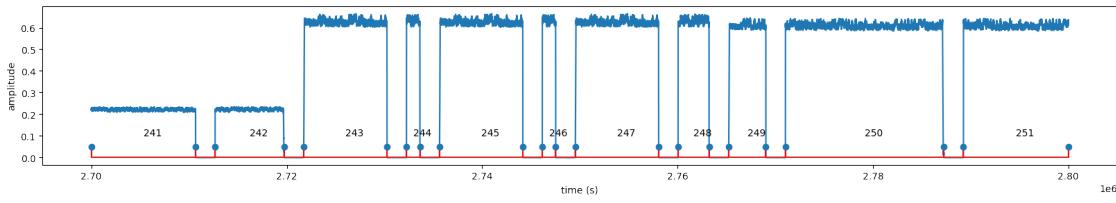
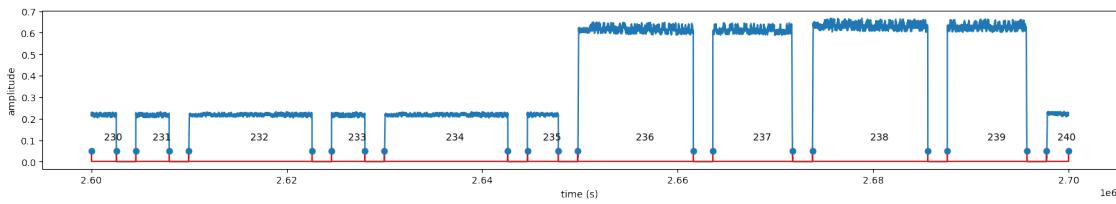


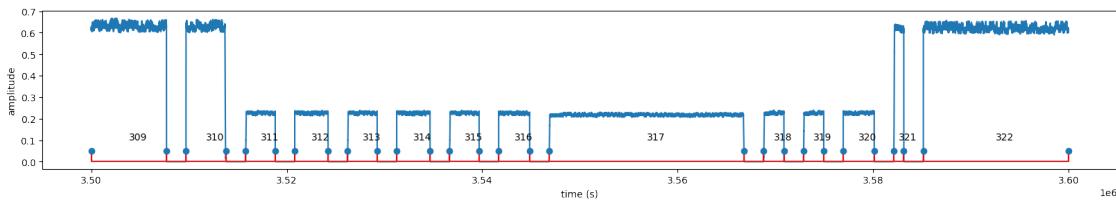
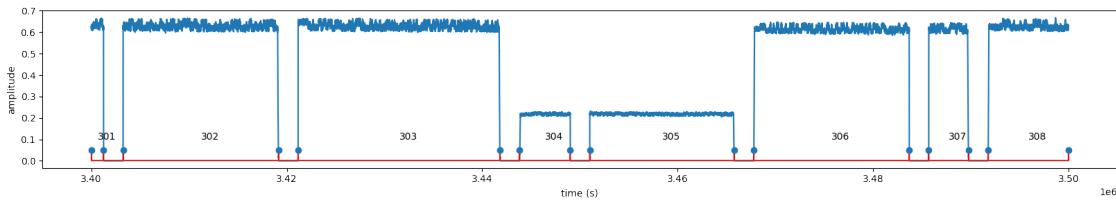
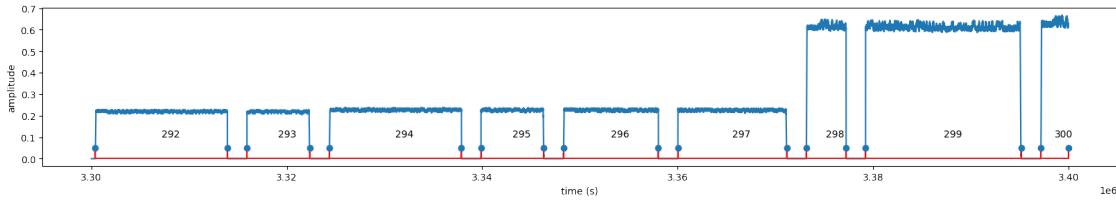
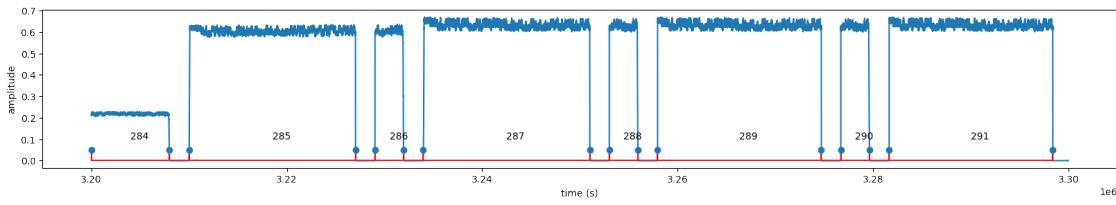
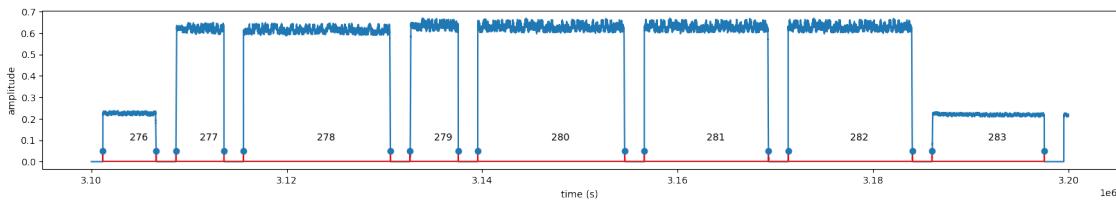


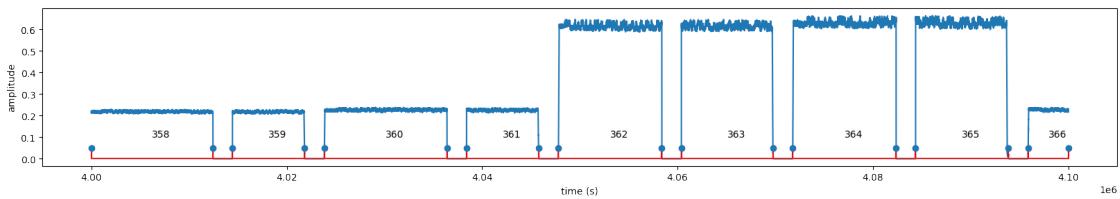
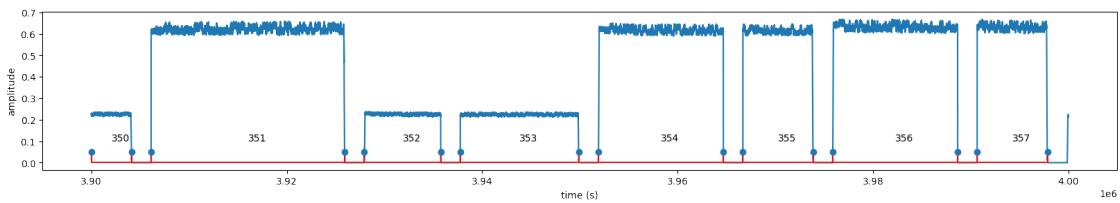
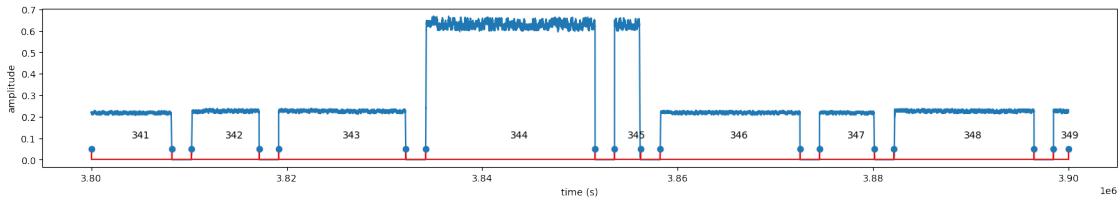
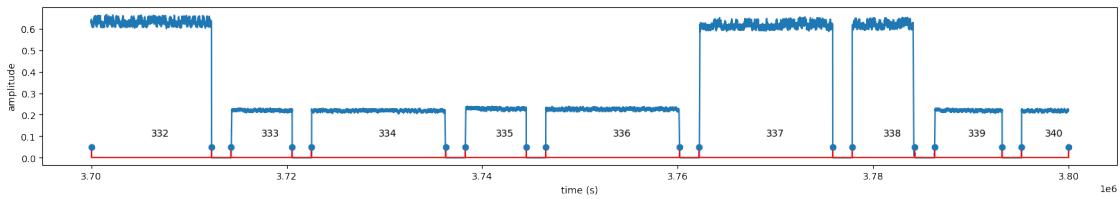
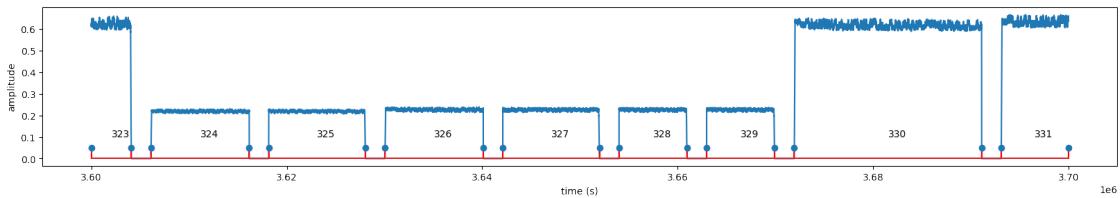


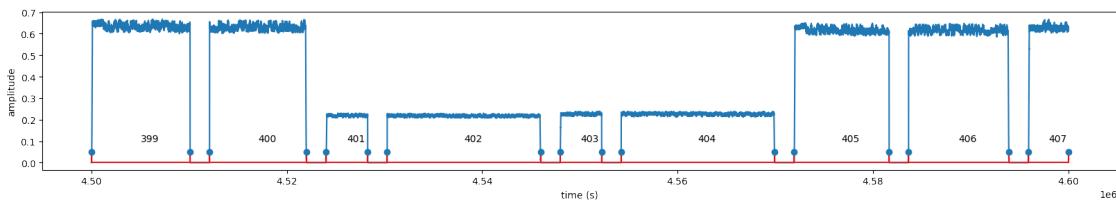
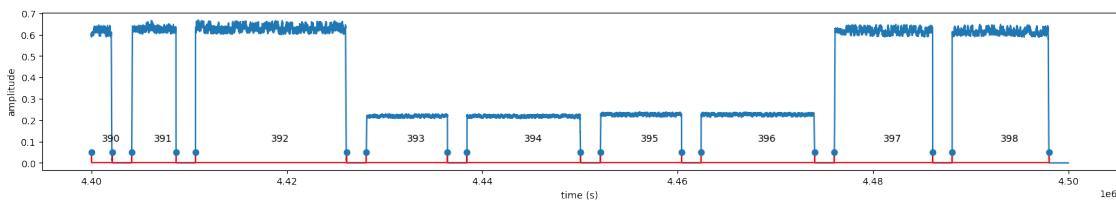
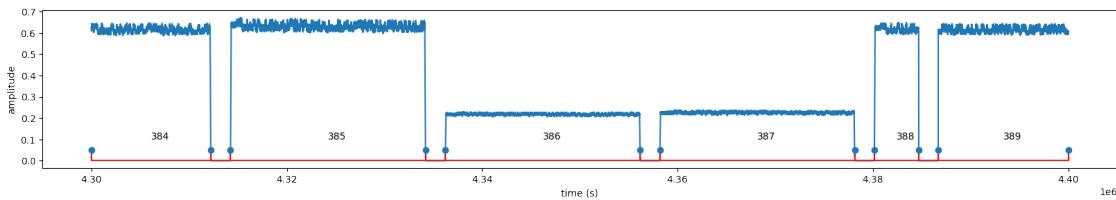
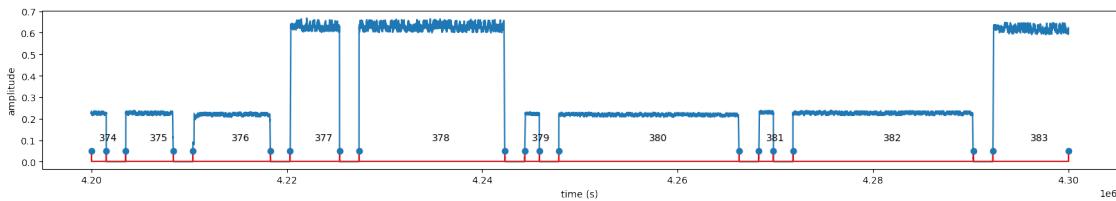
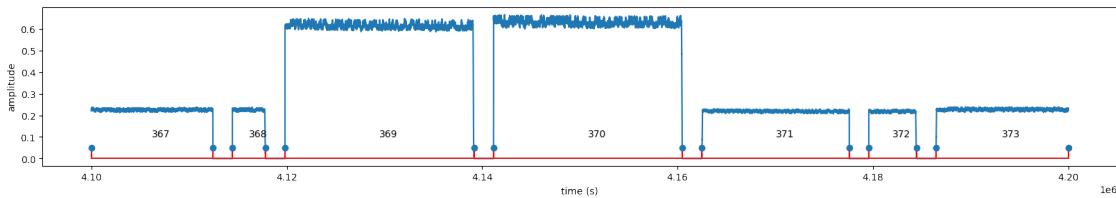


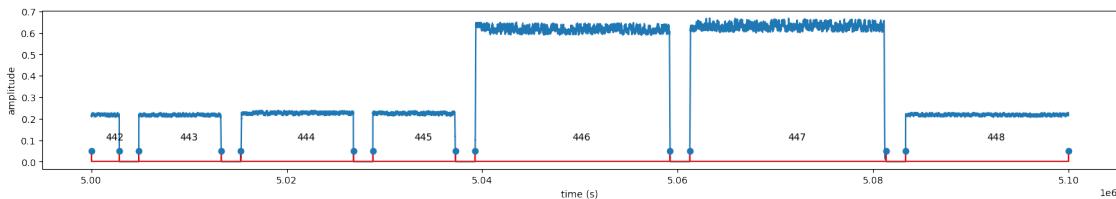
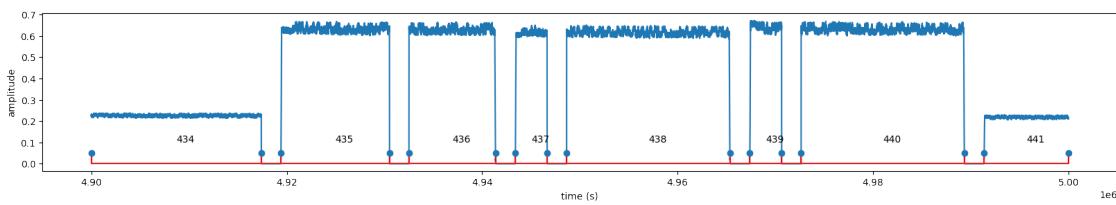
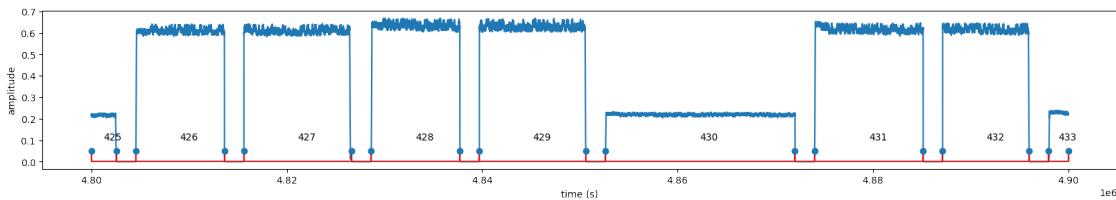
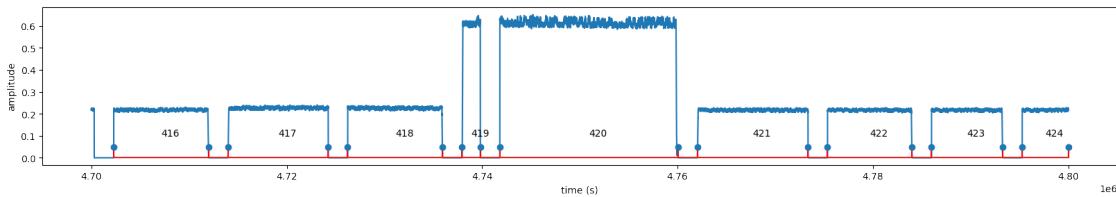
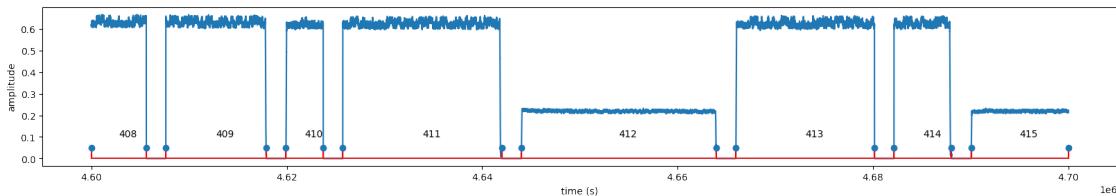


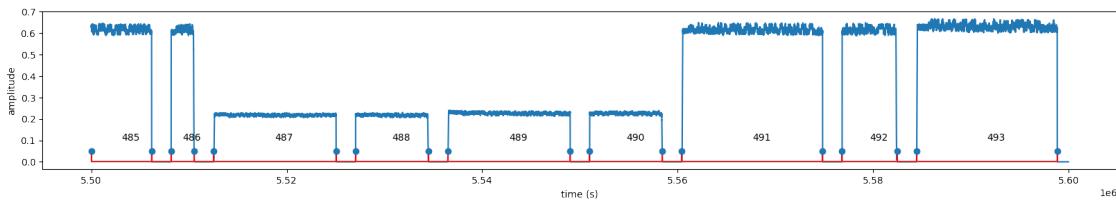
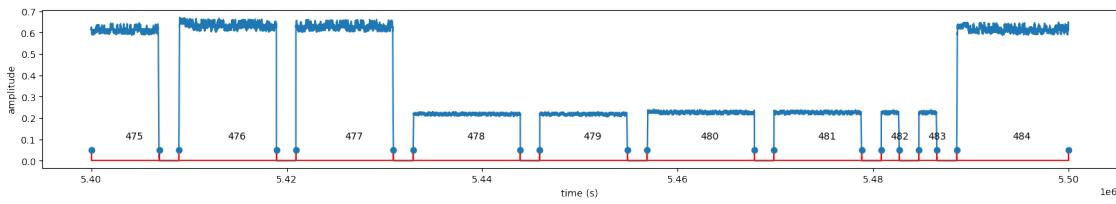
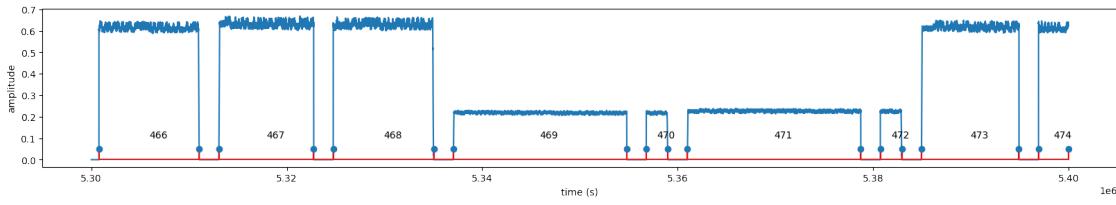
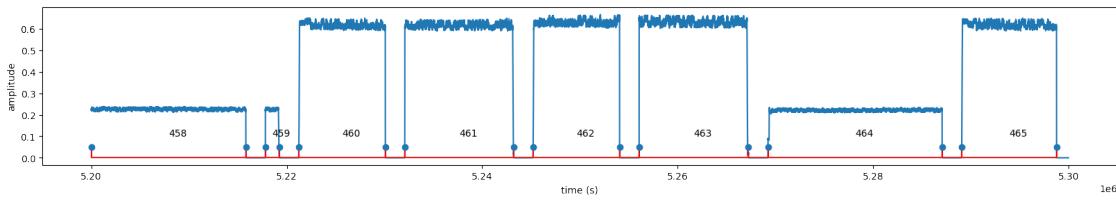
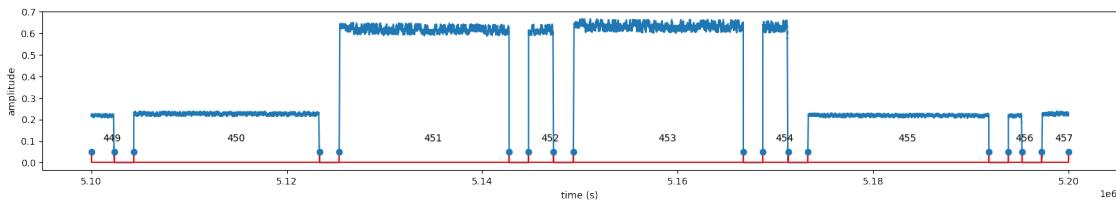


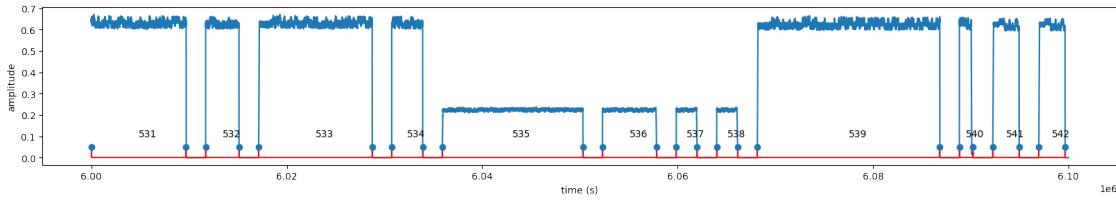
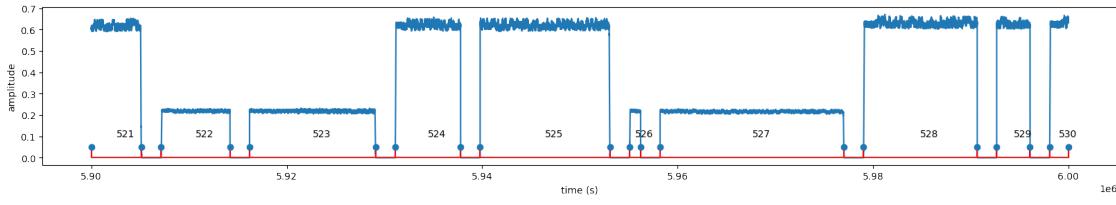
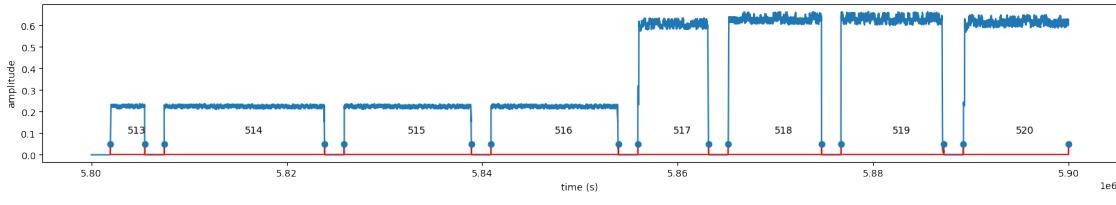
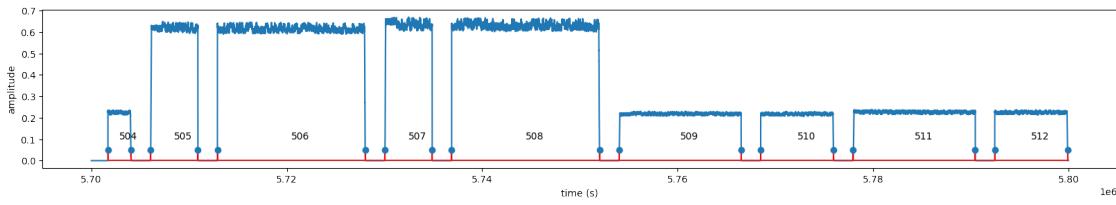
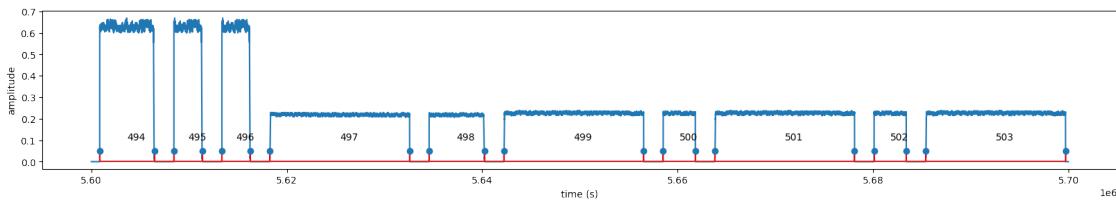


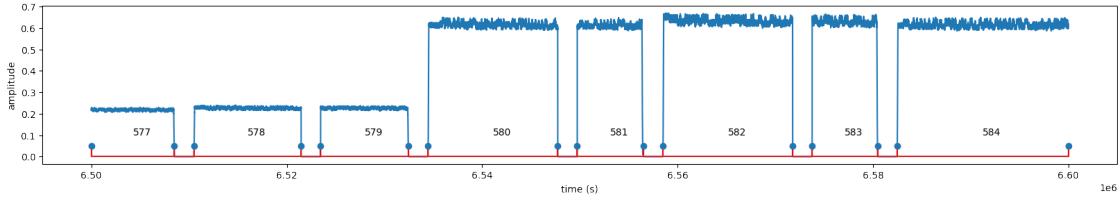
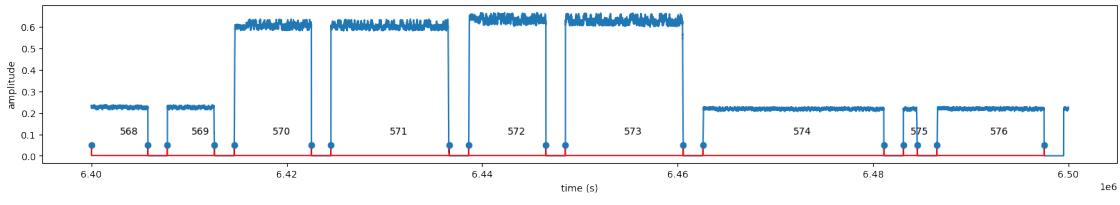
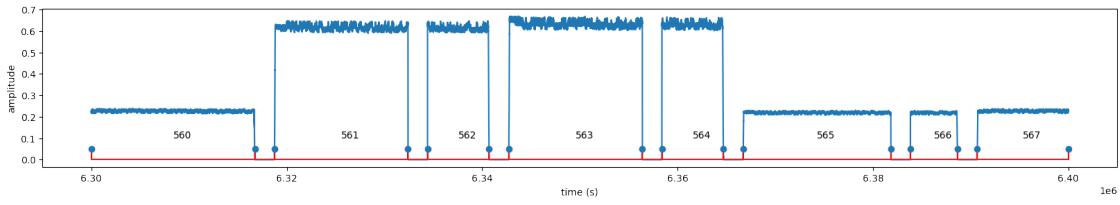
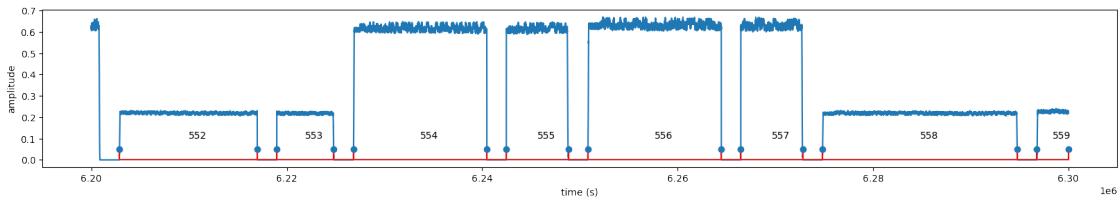
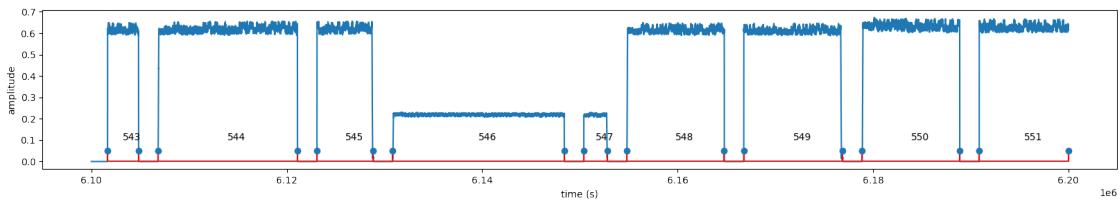


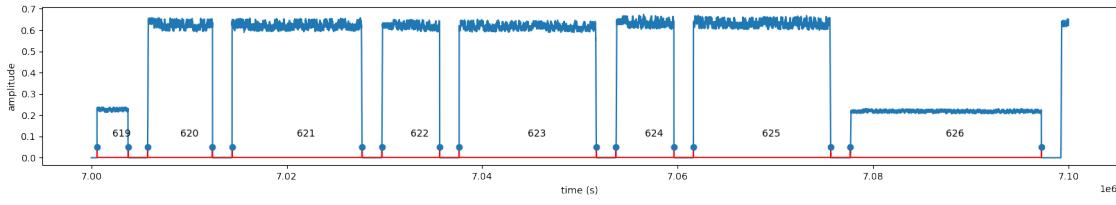
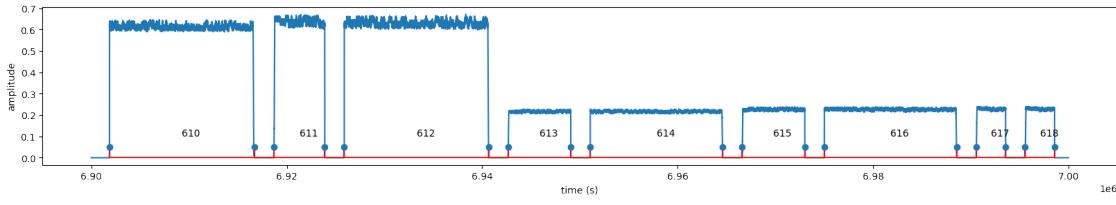
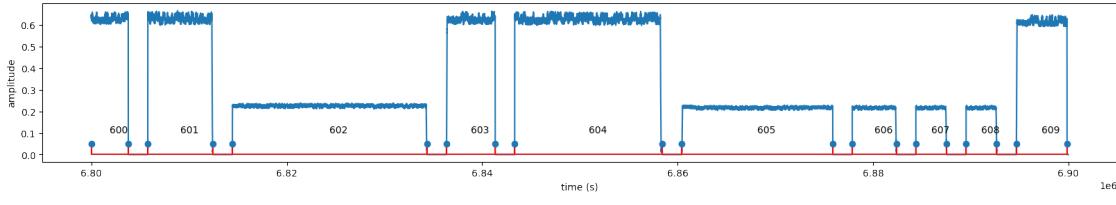
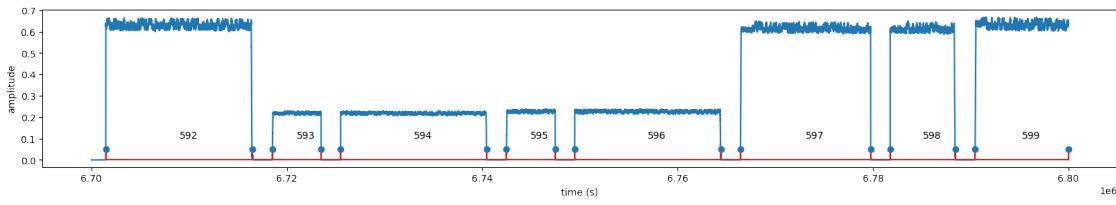
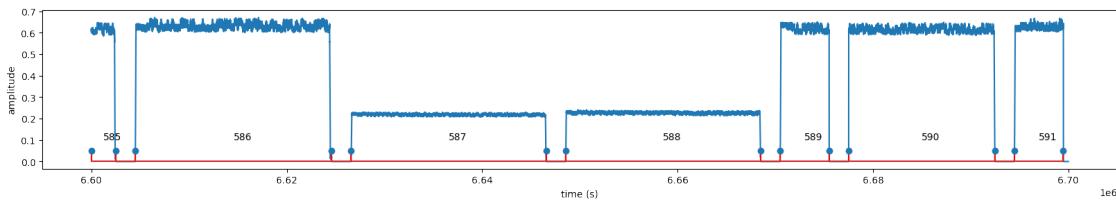


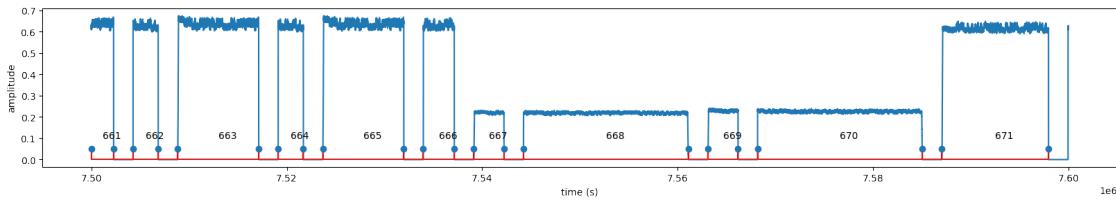
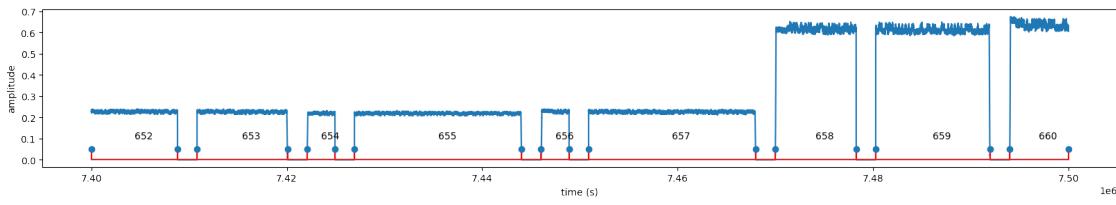
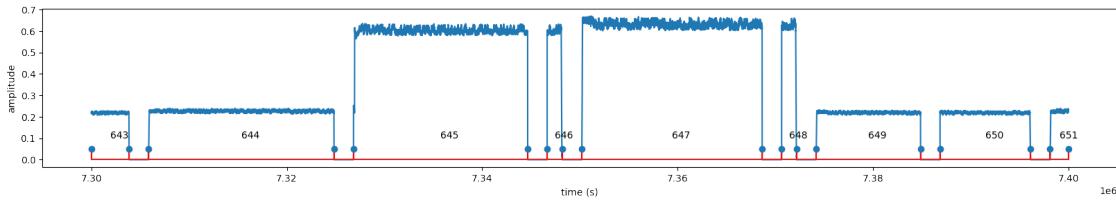
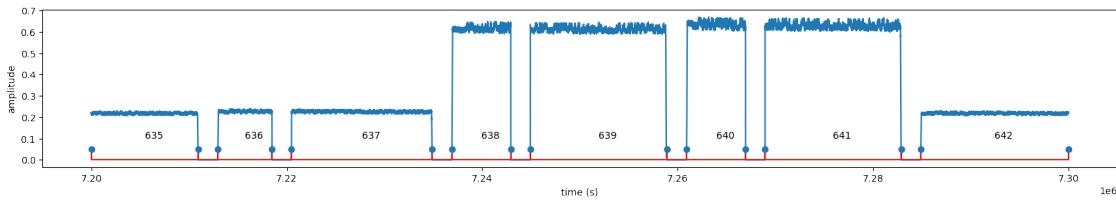
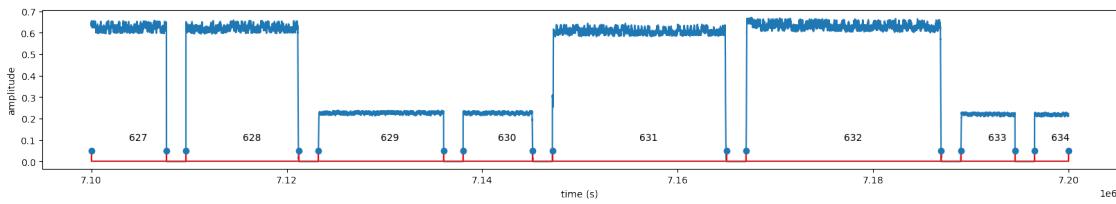


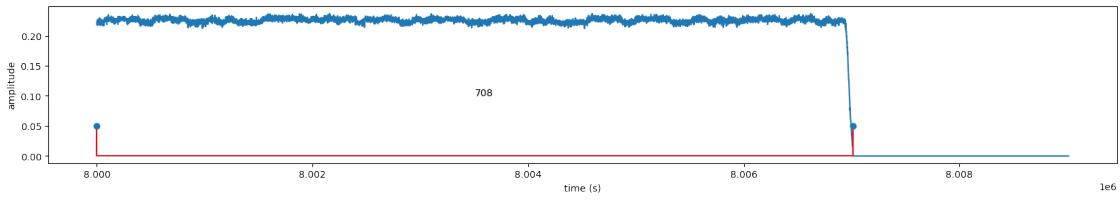
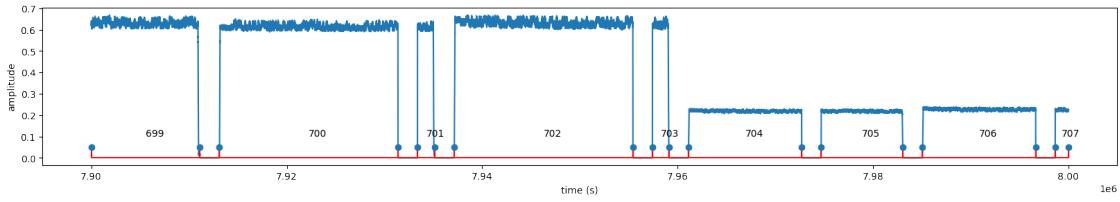
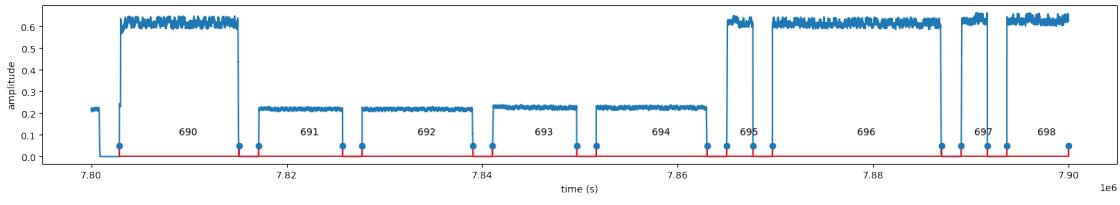
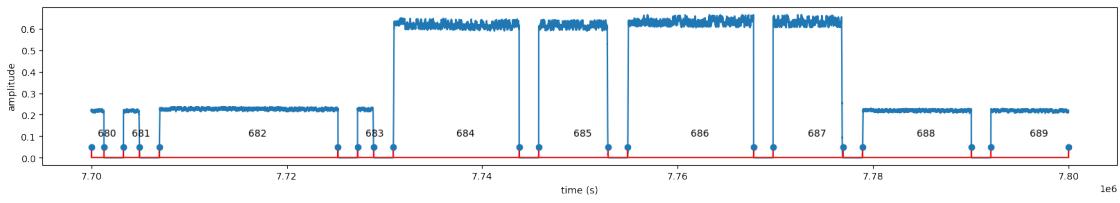
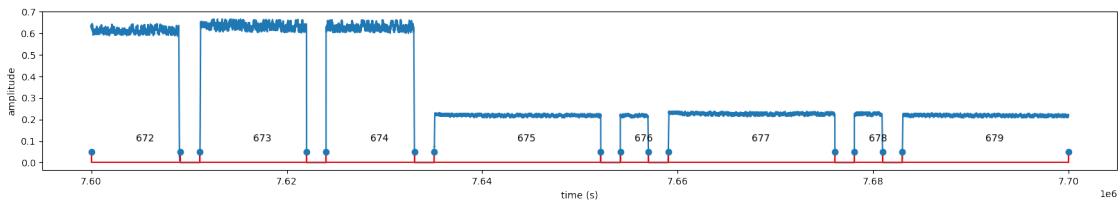










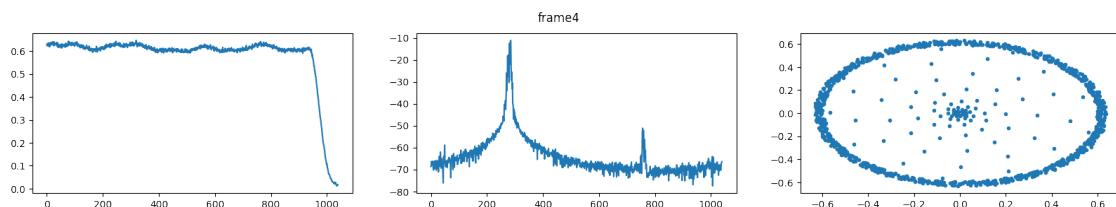
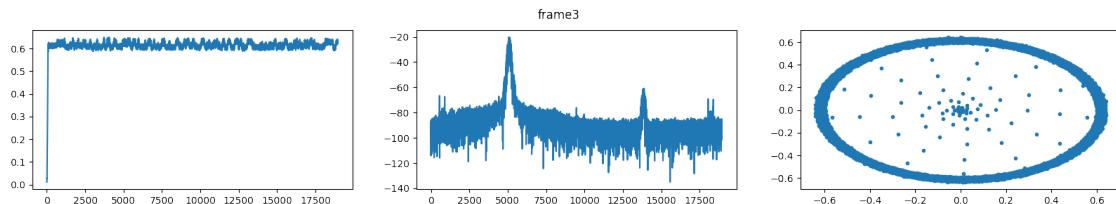
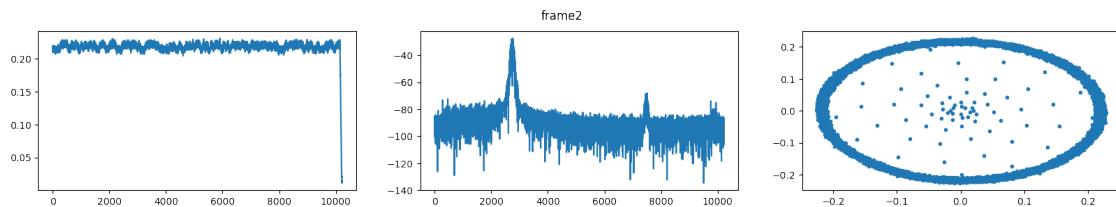
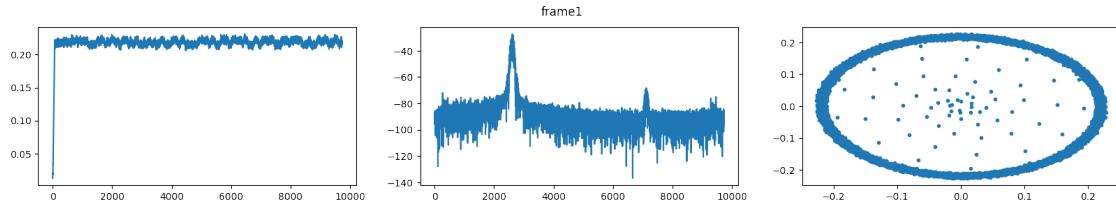


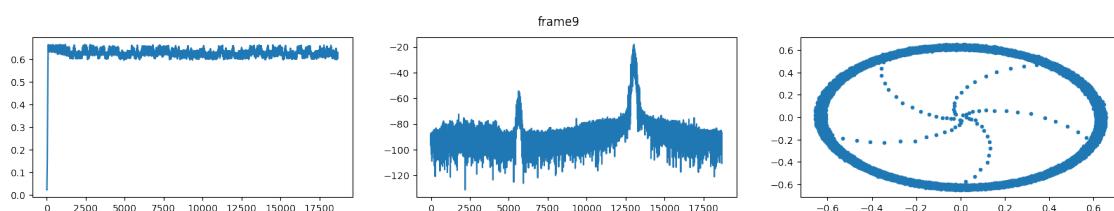
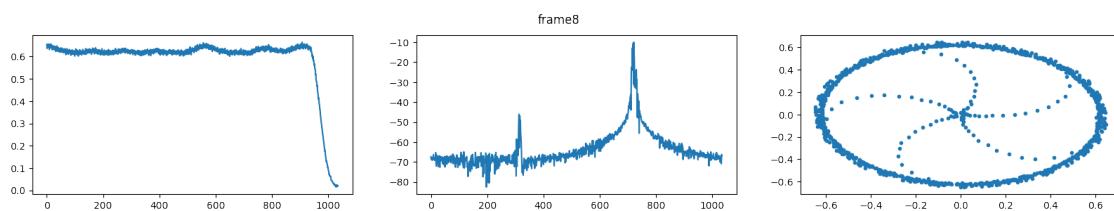
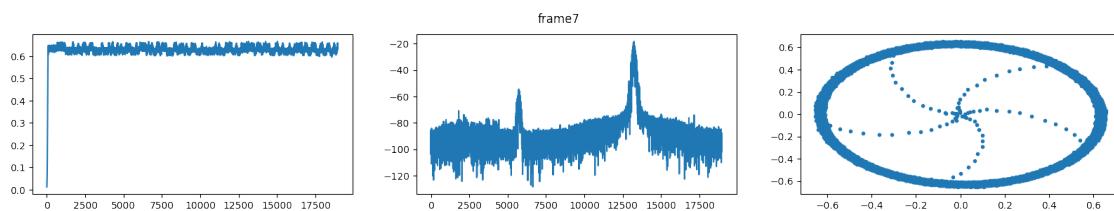
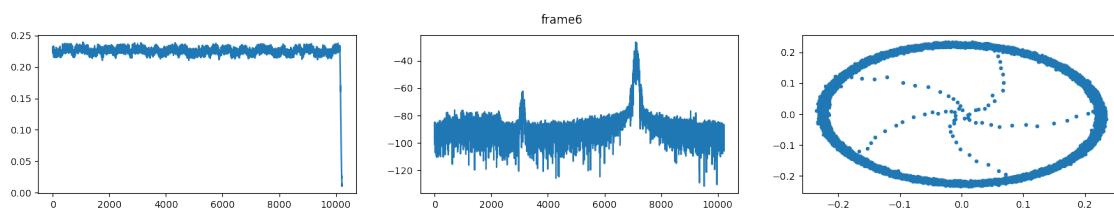
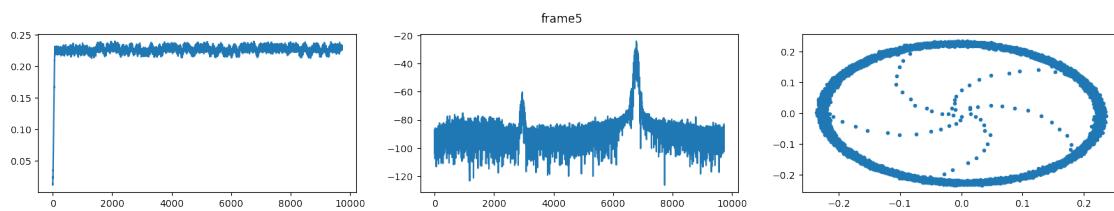
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[ ]: cnt =0
for i,j in TotalFramesIndex:
    frame = samples[i:j]
```

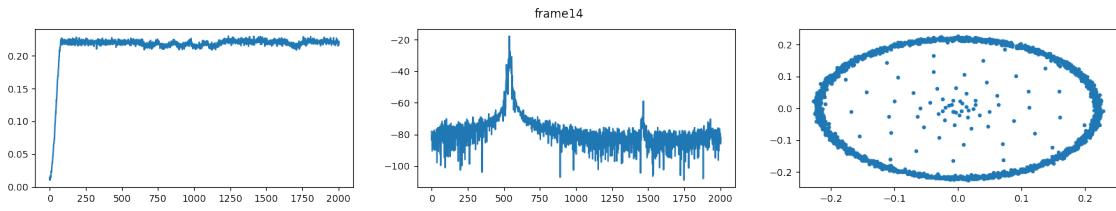
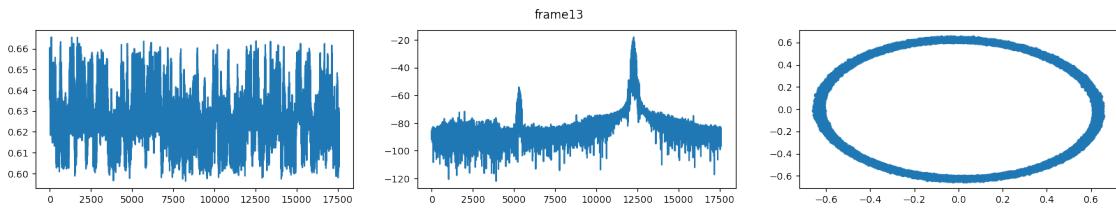
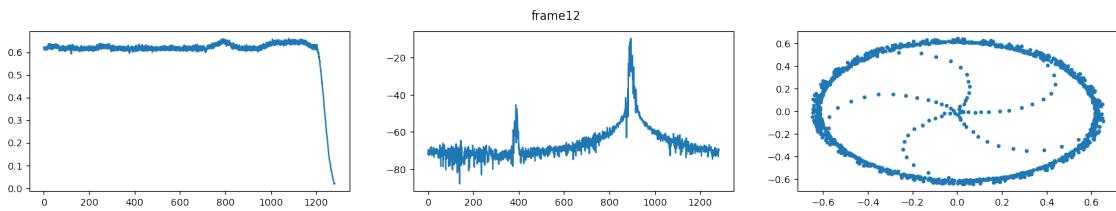
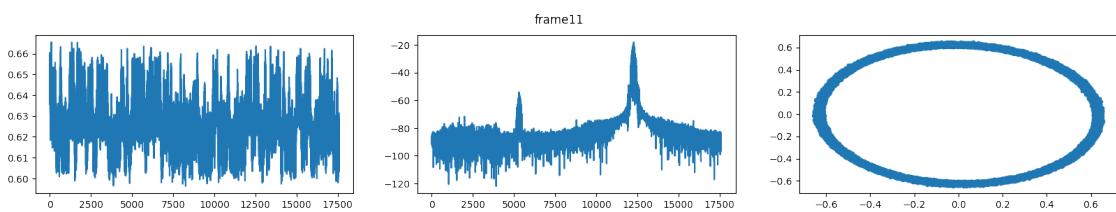
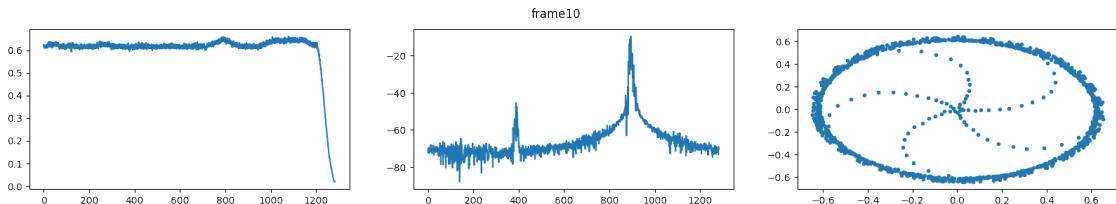
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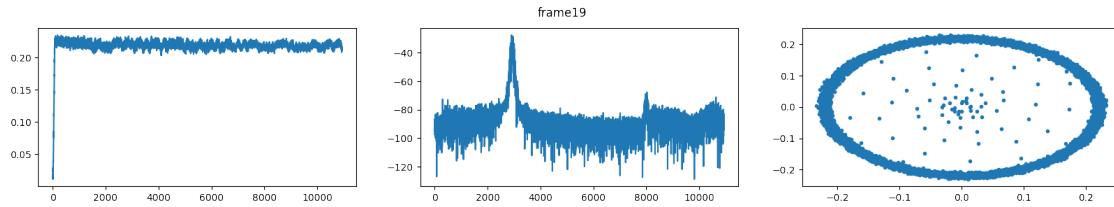
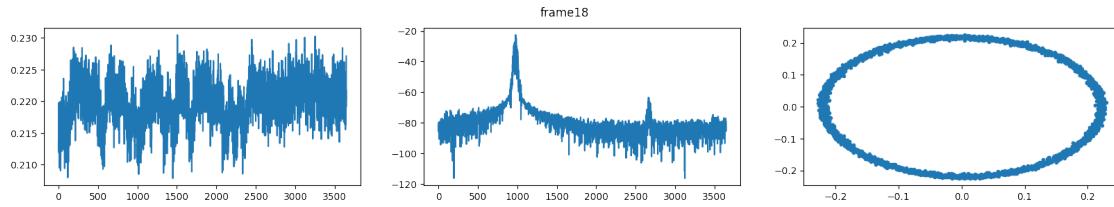
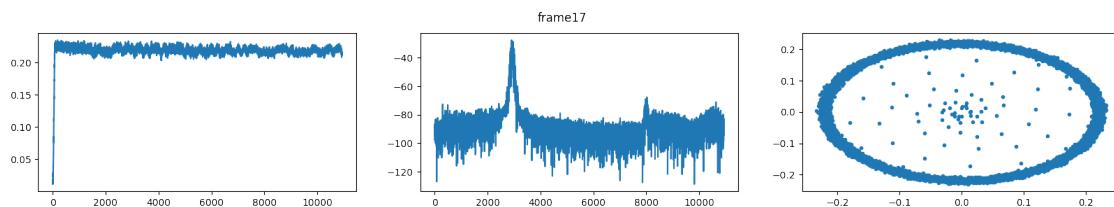
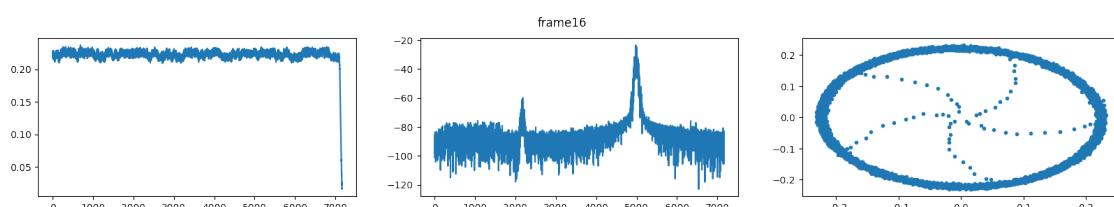
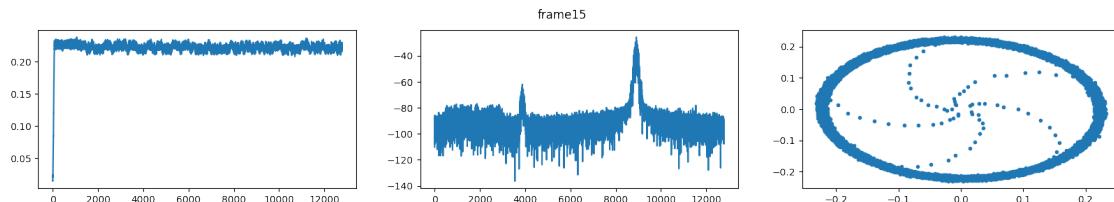
PSD = (np.abs(np.fft.fft(frame))/len(frame))**2
PSD_log = 10.0*np.log10(PSD)
PSD_shifted = np.fft.fftshift(PSD_log)
plt.figure(figsize=(20, 3), dpi=100)
plt.subplot(1,3,1)
plt.plot(np.abs(frame))
plt.subplot(1,3,2)
plt.plot(PSD_shifted)
plt.subplot(1,3,3)
plt.plot(np.real(frame),np.imag(frame),'.')
cnt+=1
plt.suptitle('frame'+ str(cnt))
plt.show()

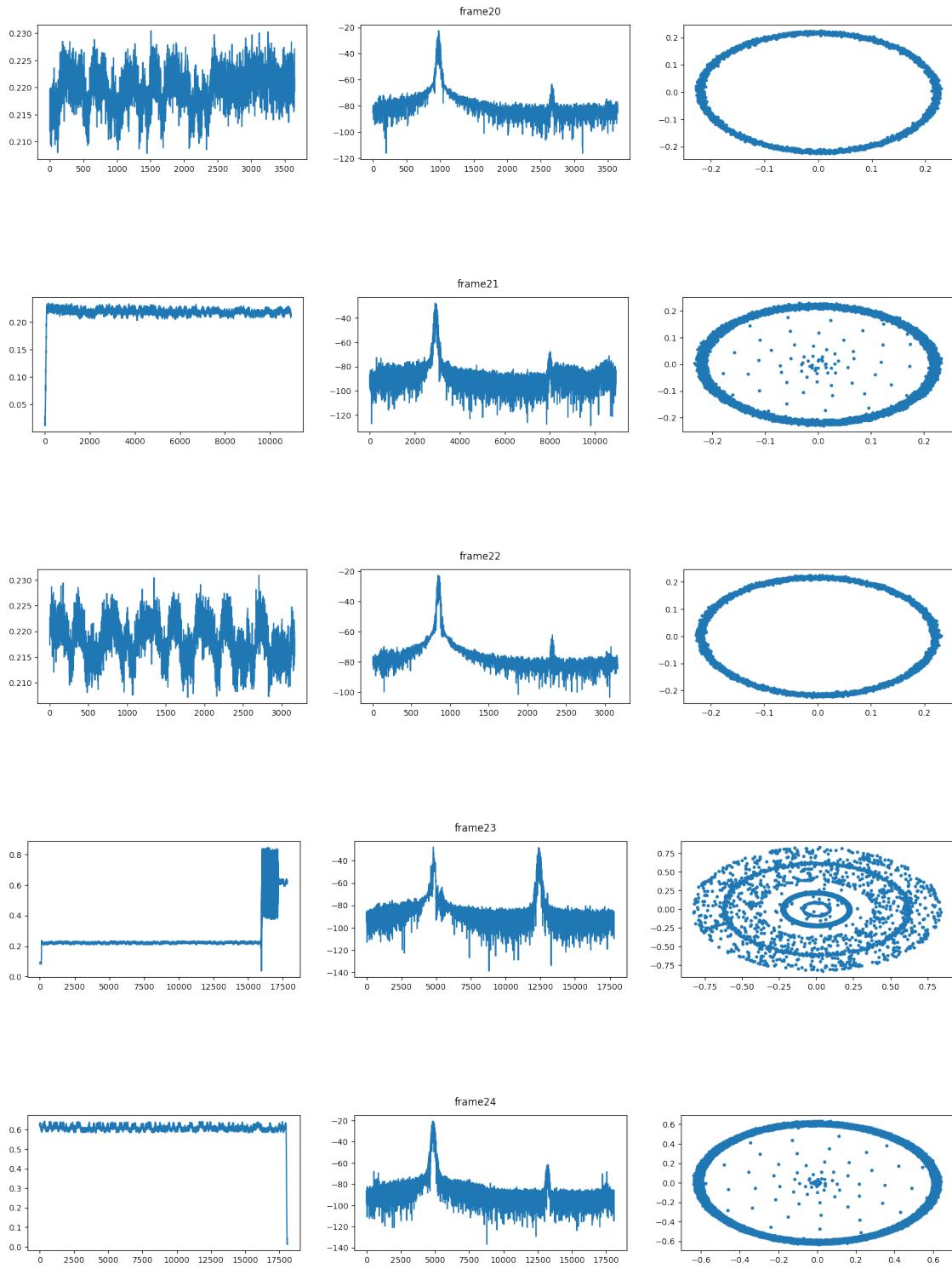
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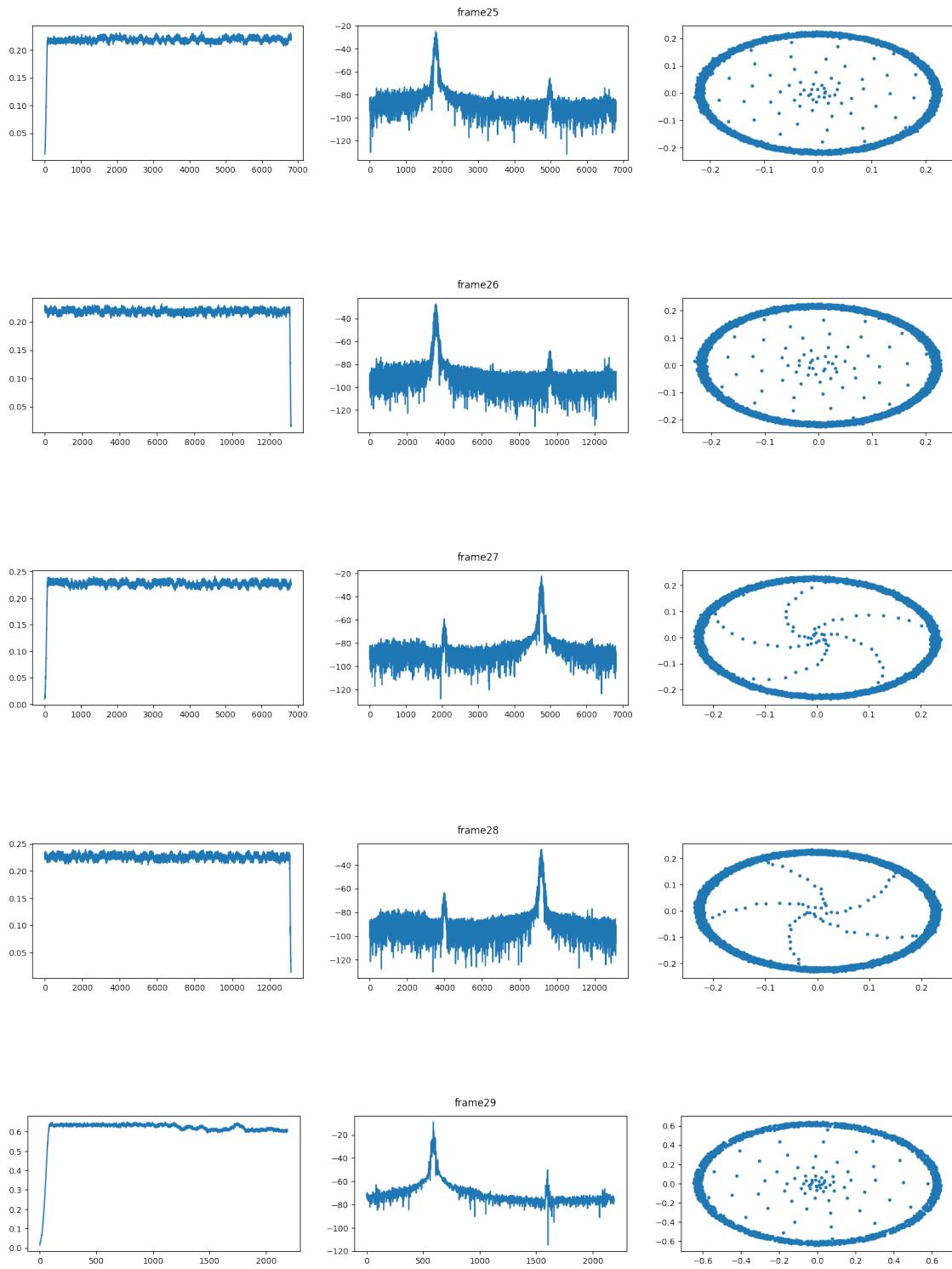


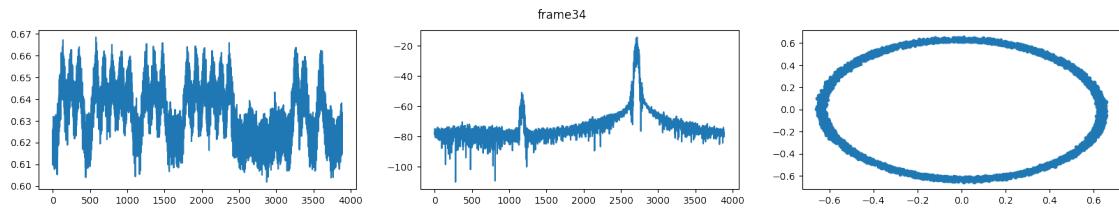
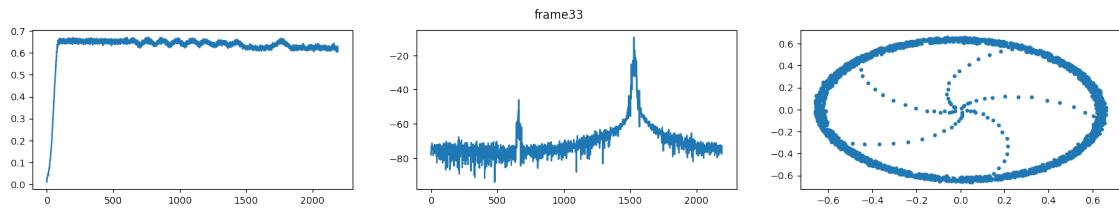
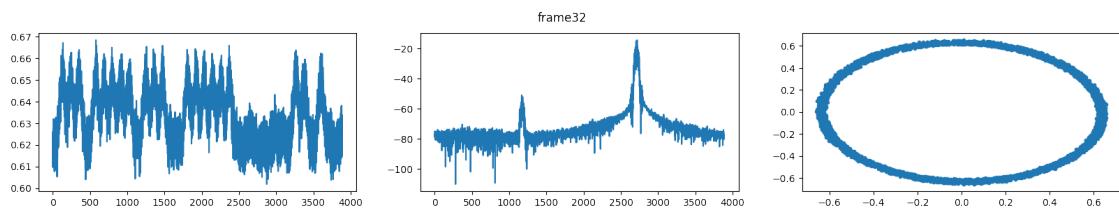
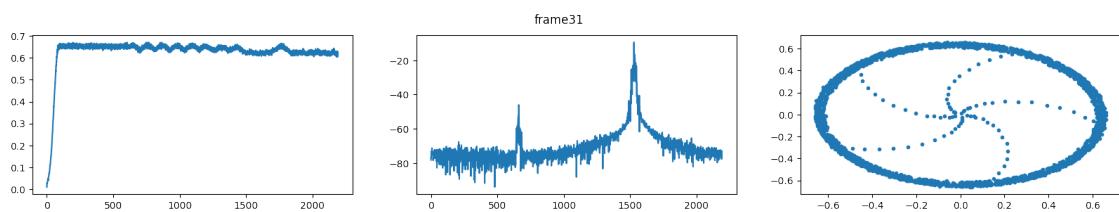
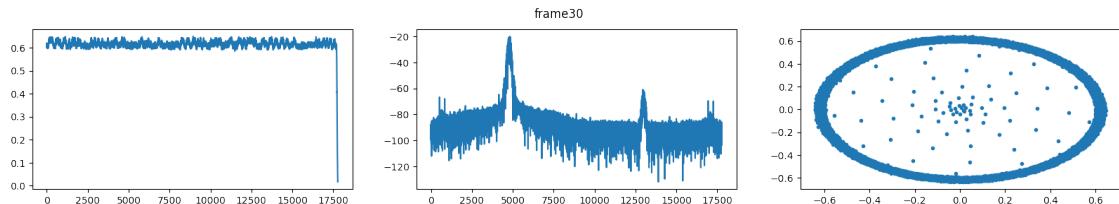


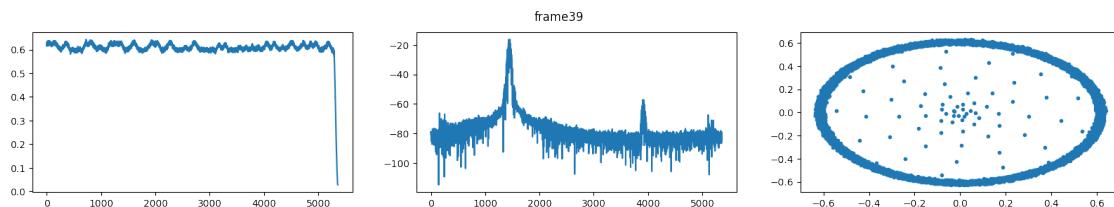
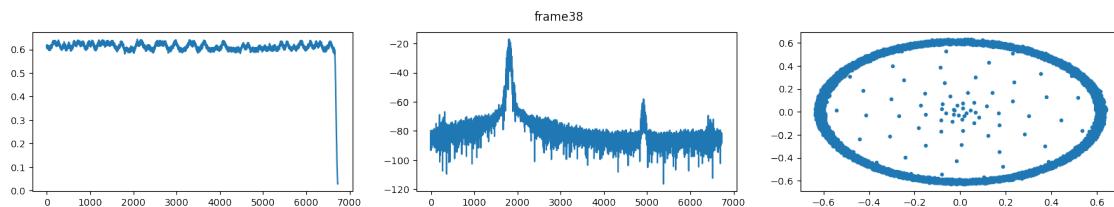
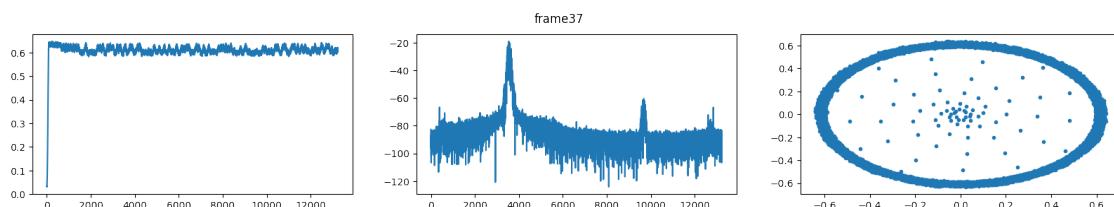
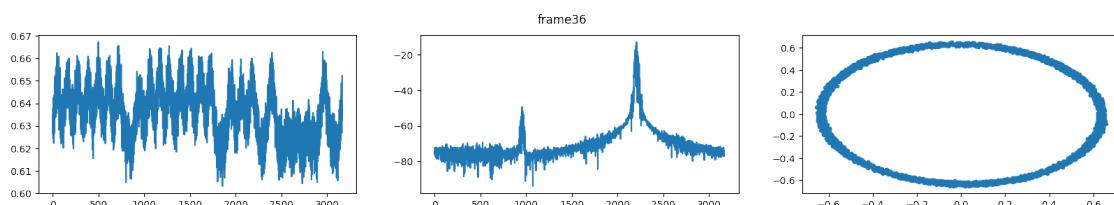
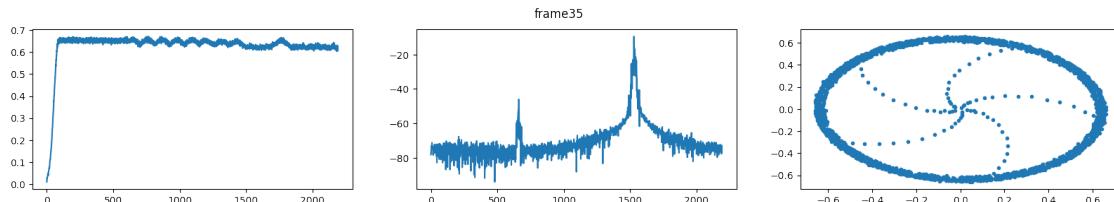


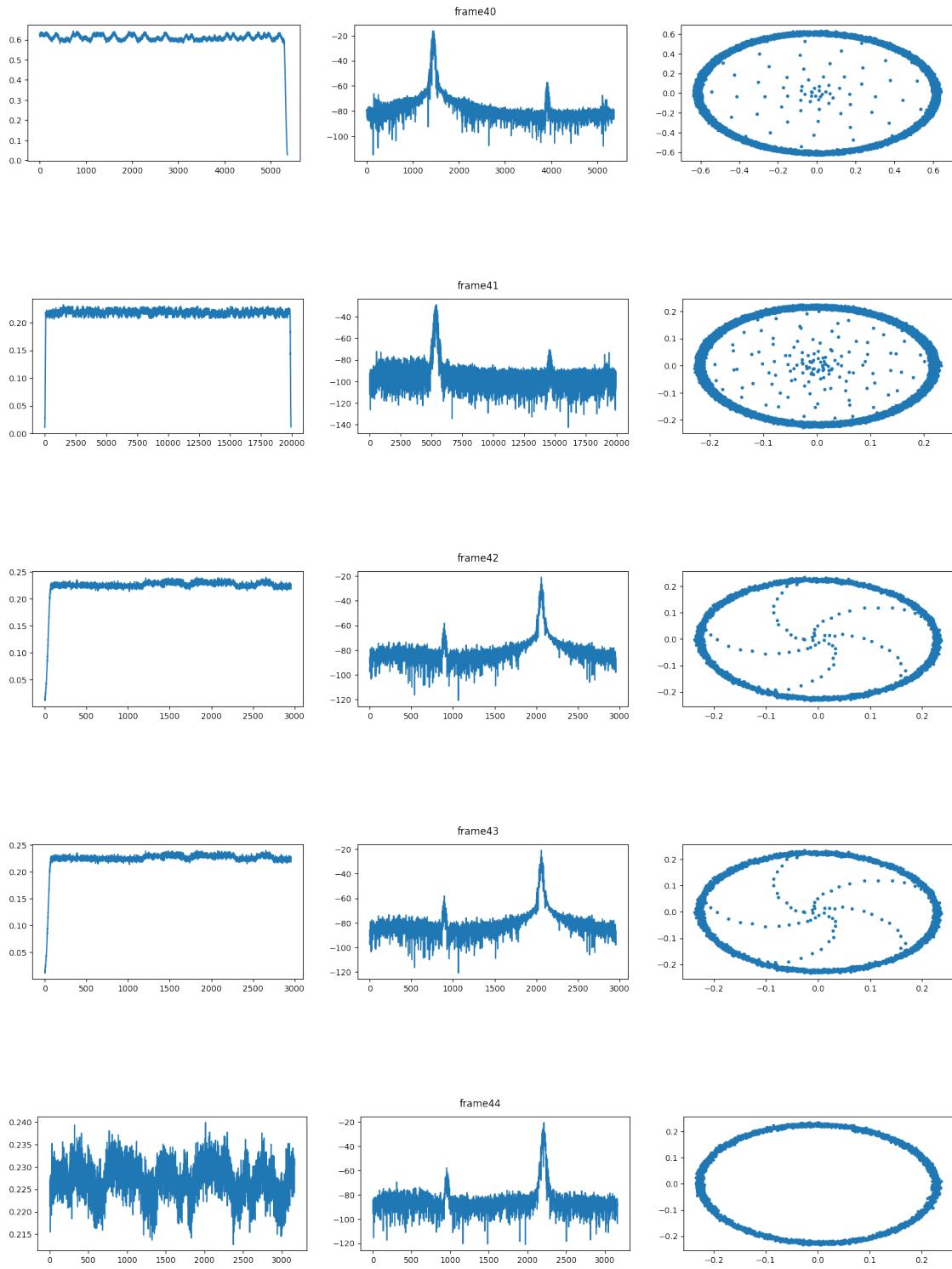


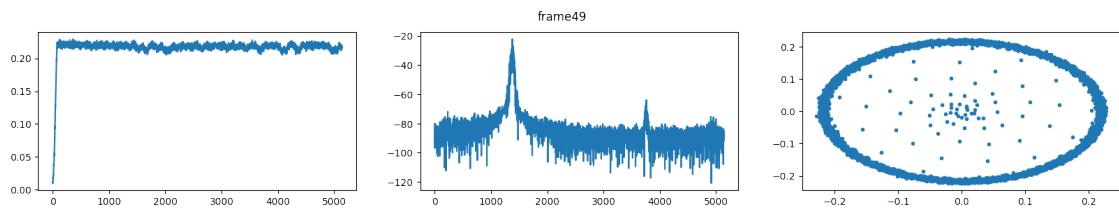
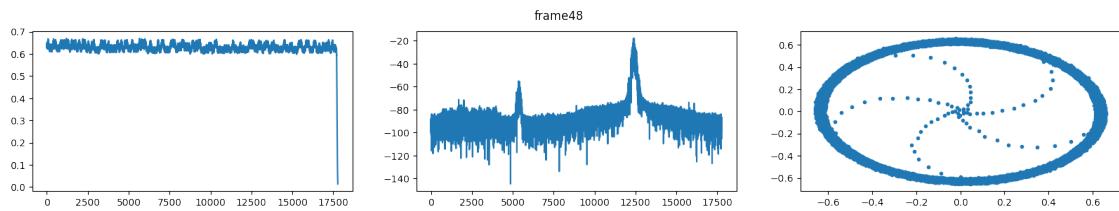
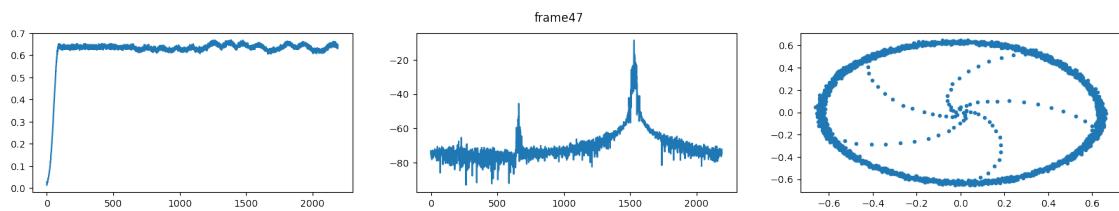
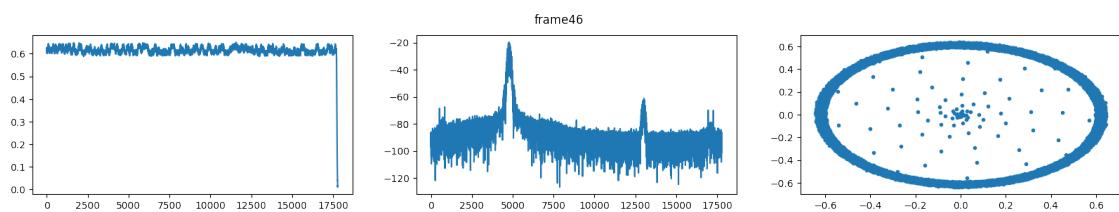
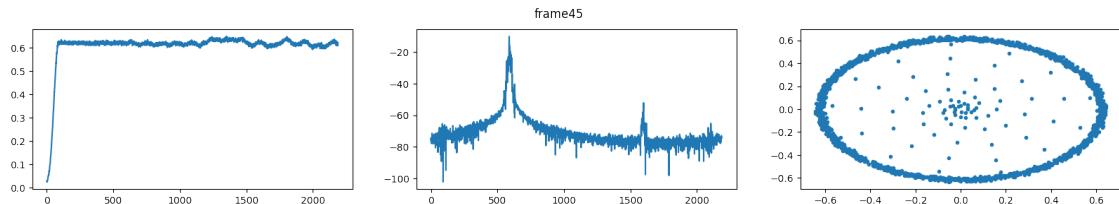


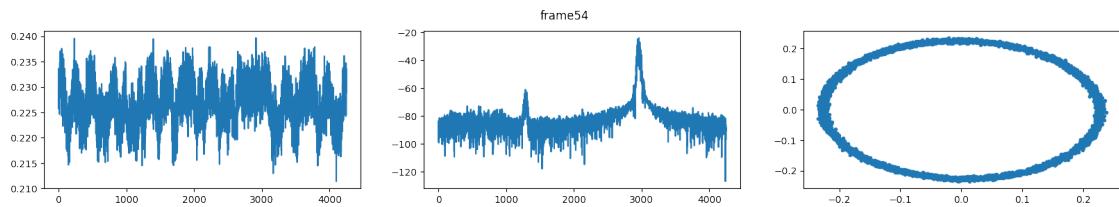
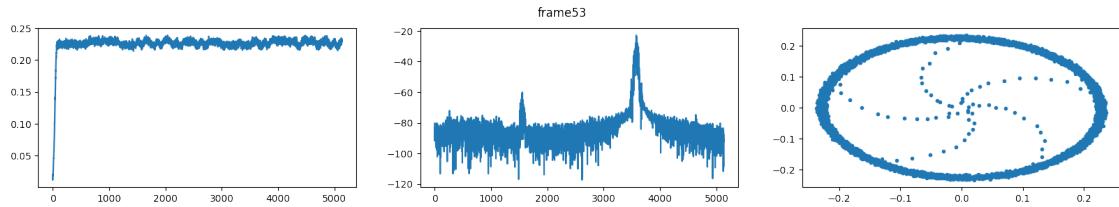
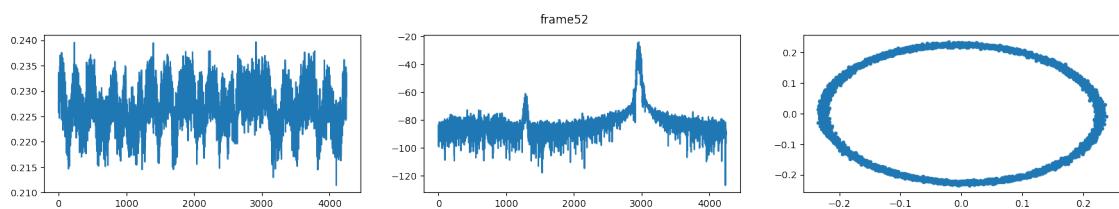
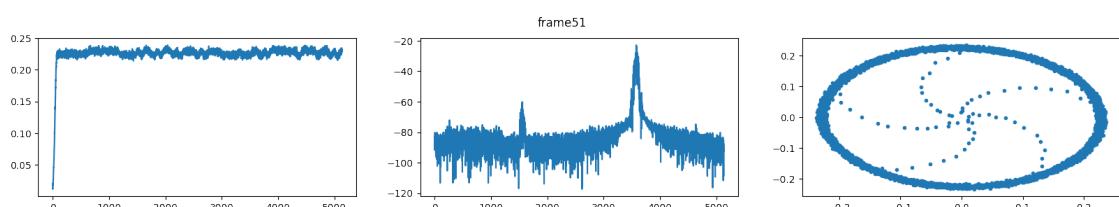
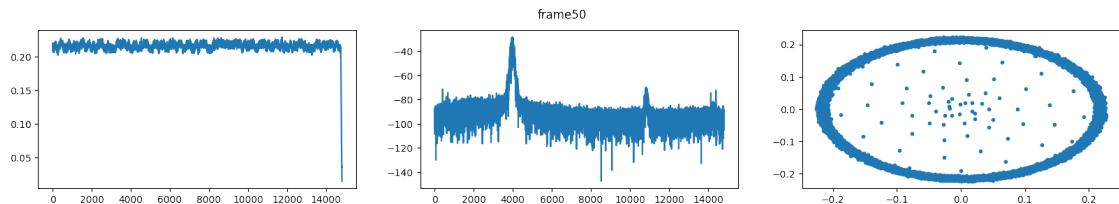


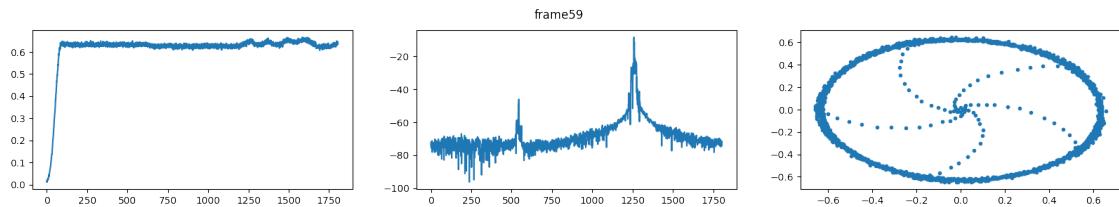
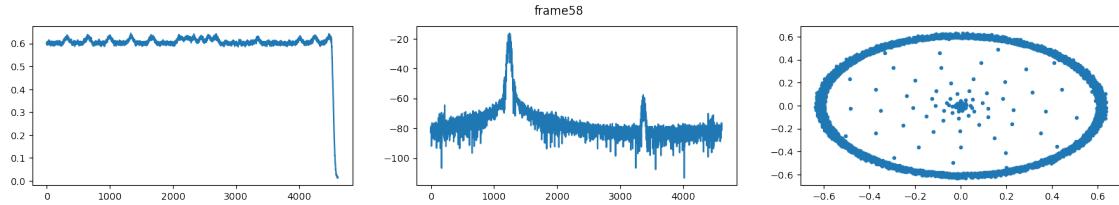
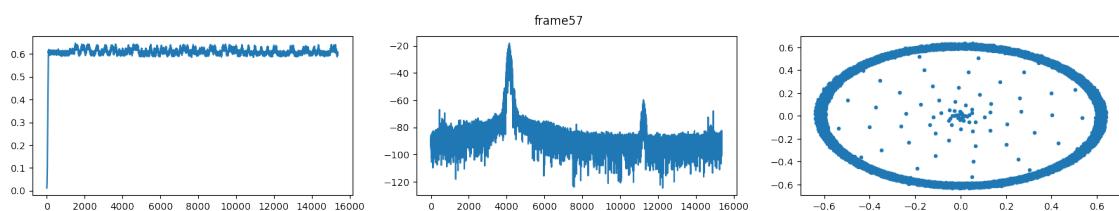
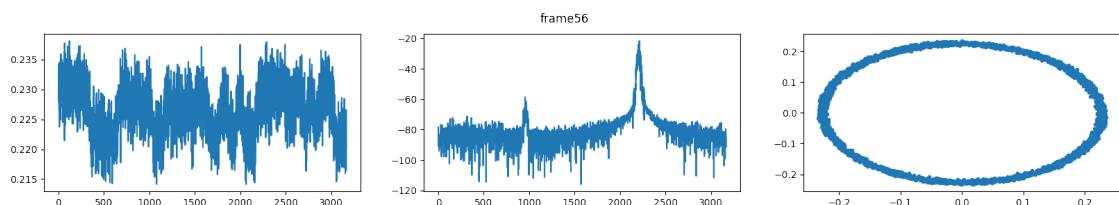
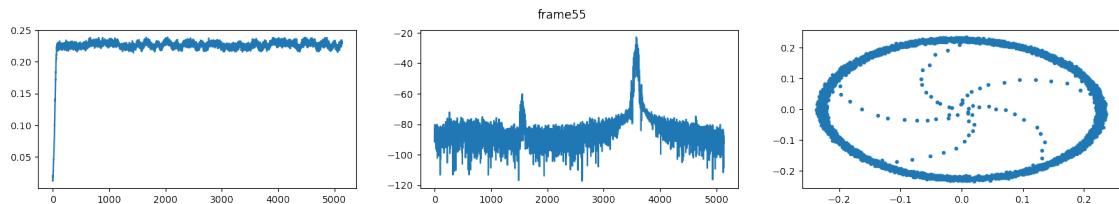


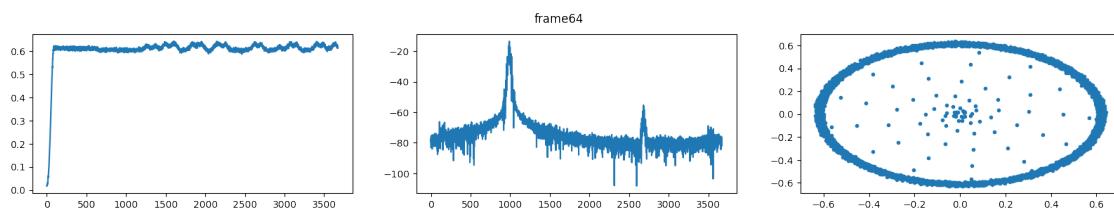
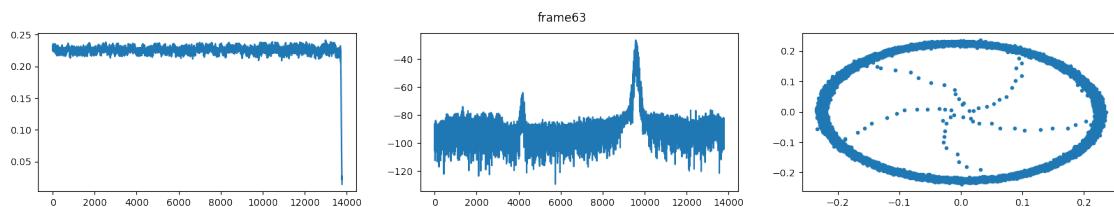
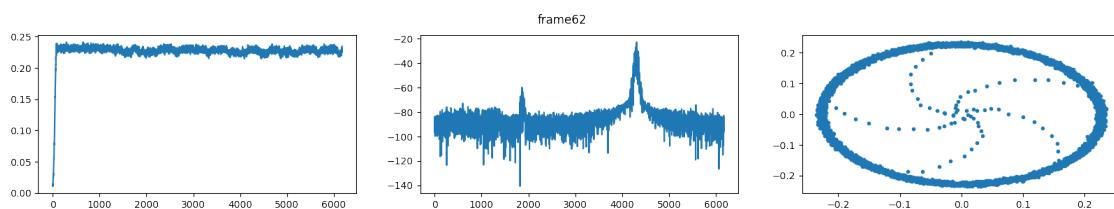
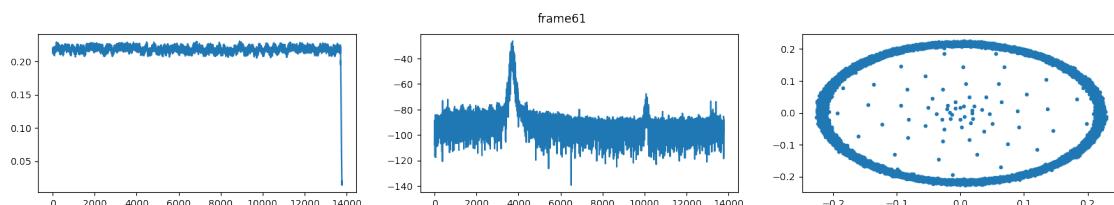
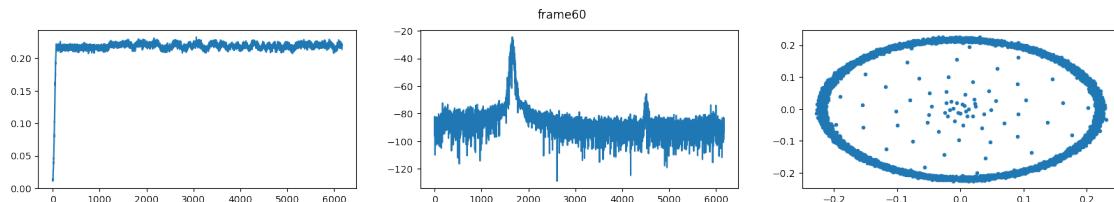


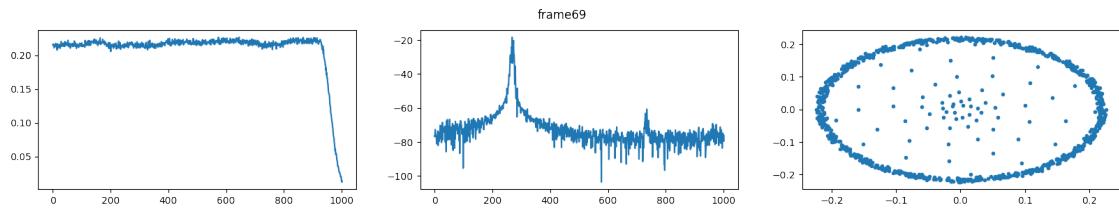
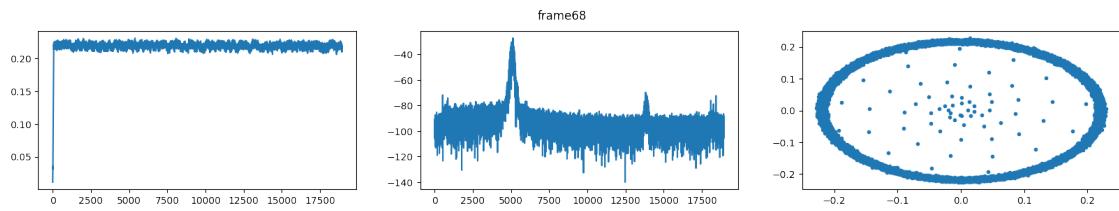
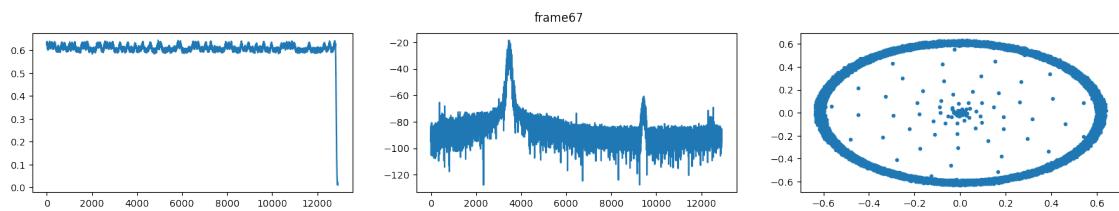
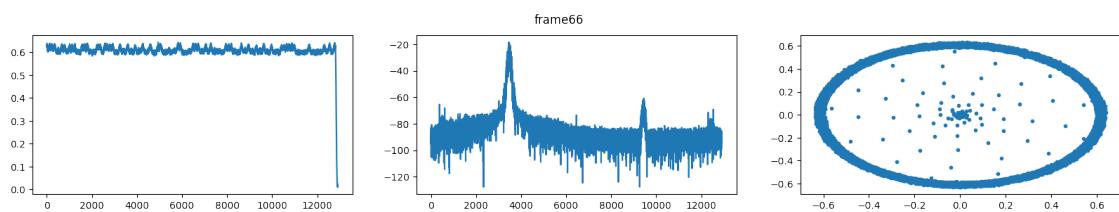
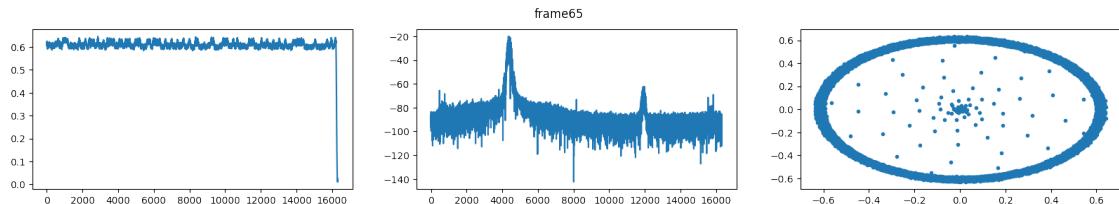


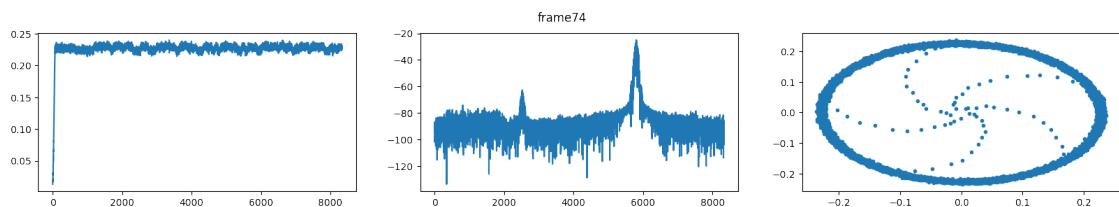
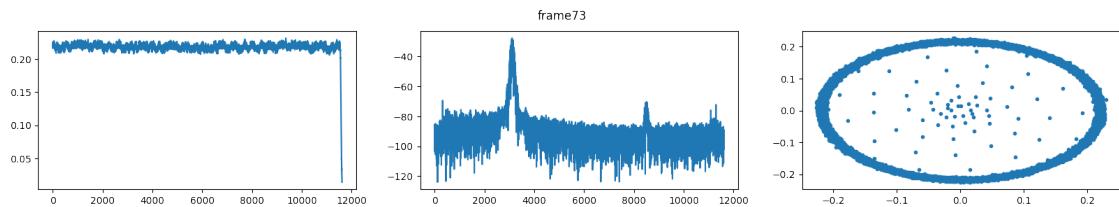
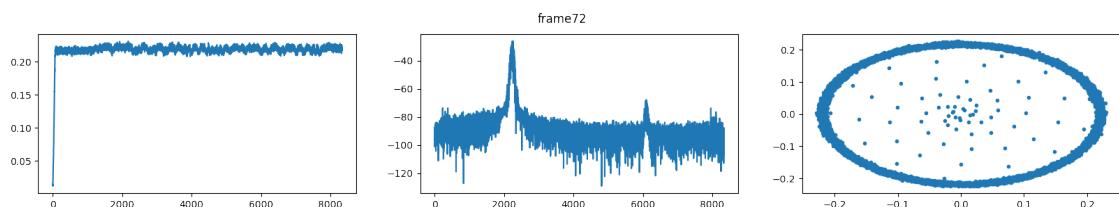
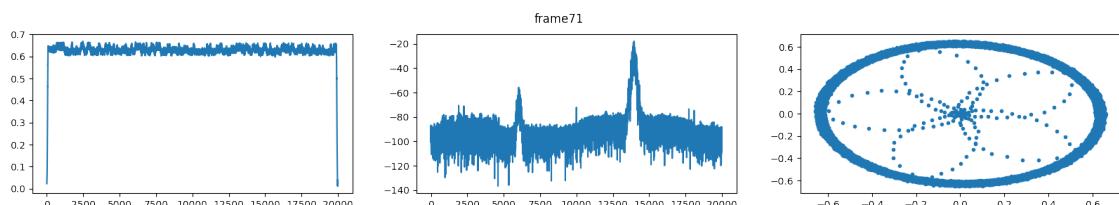
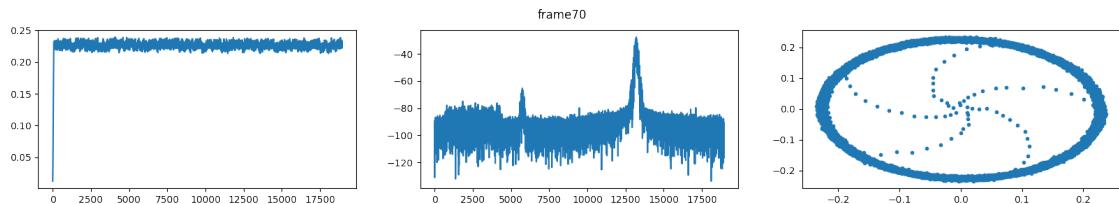


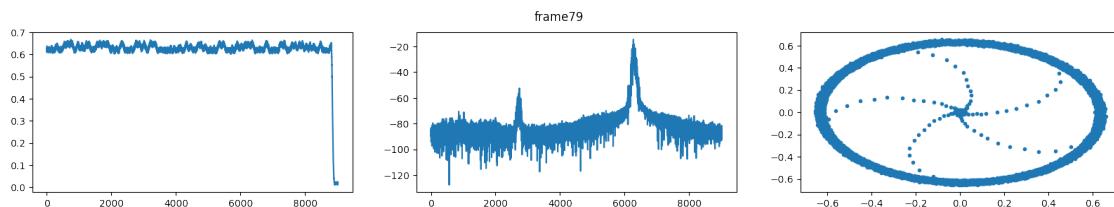
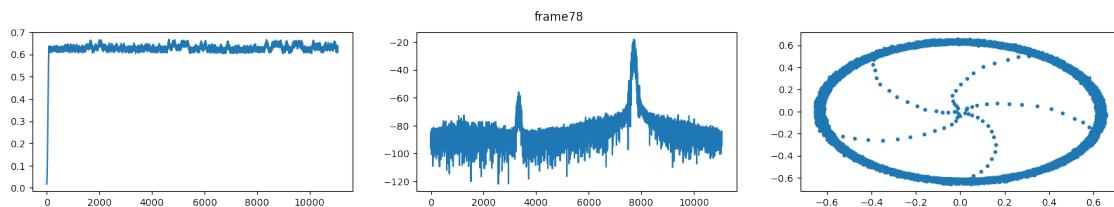
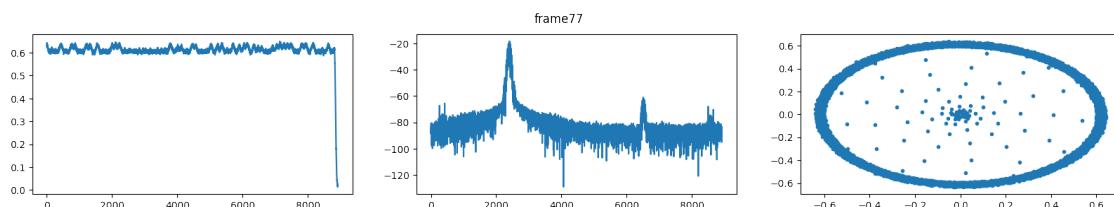
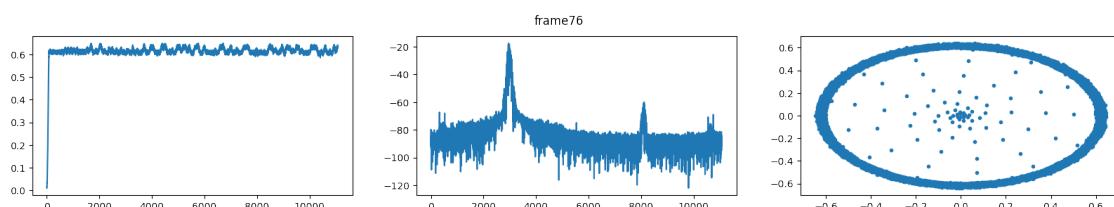
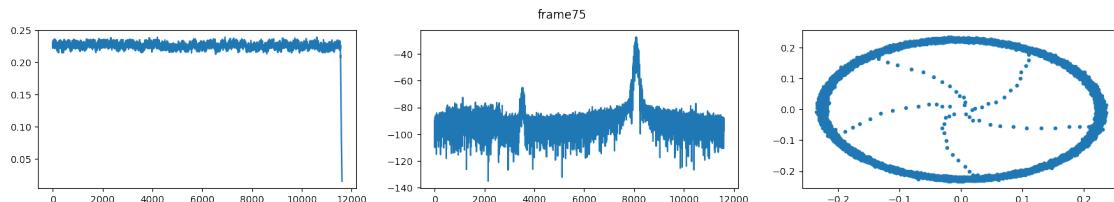


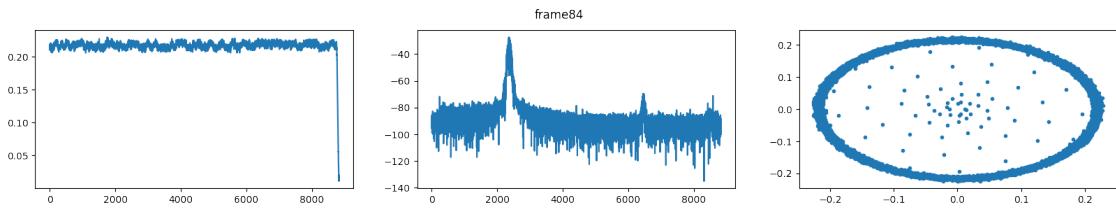
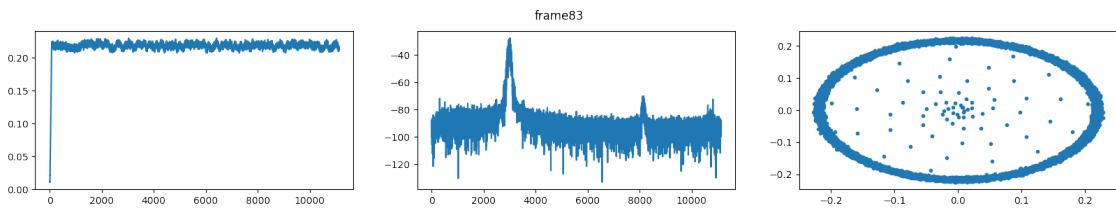
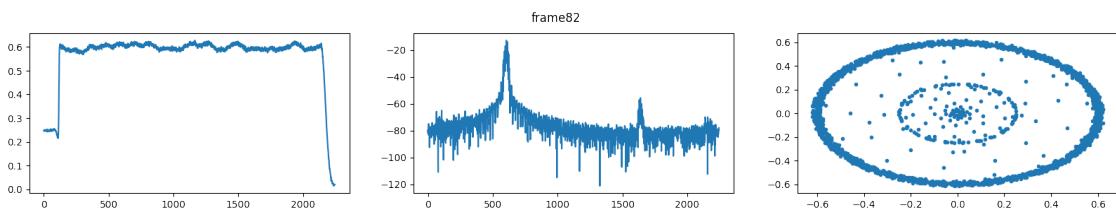
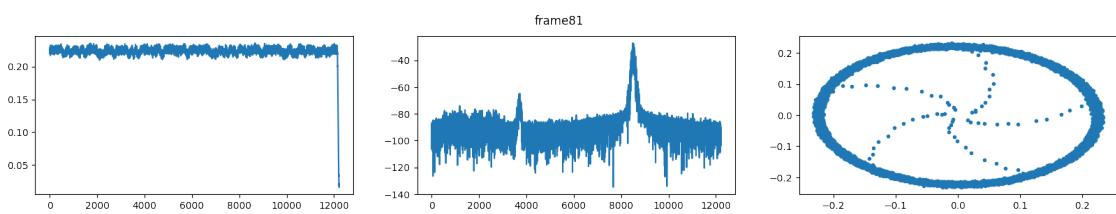
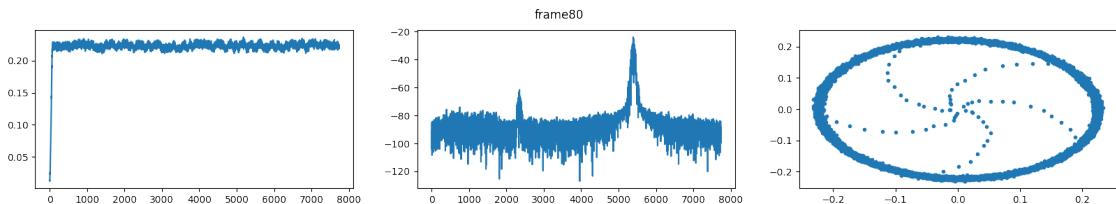


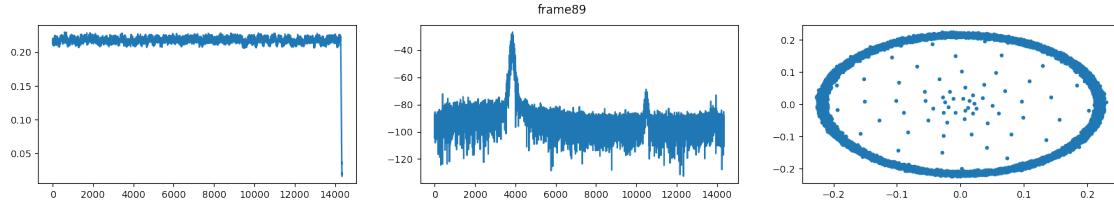
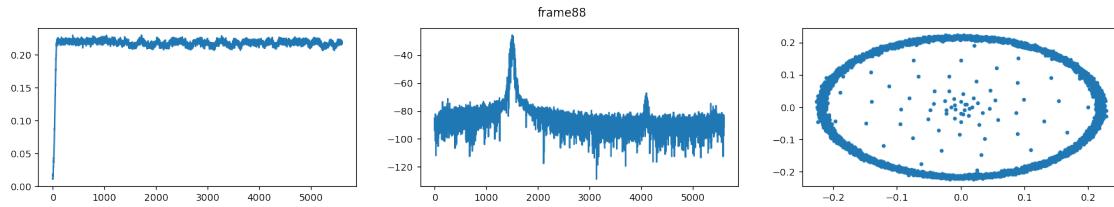
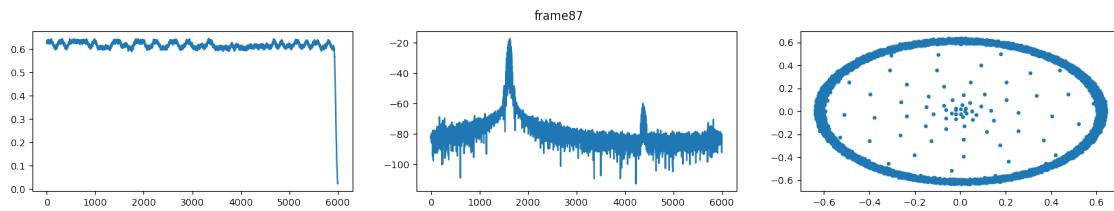
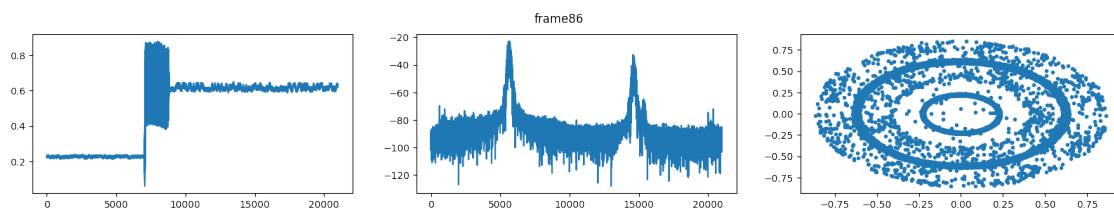
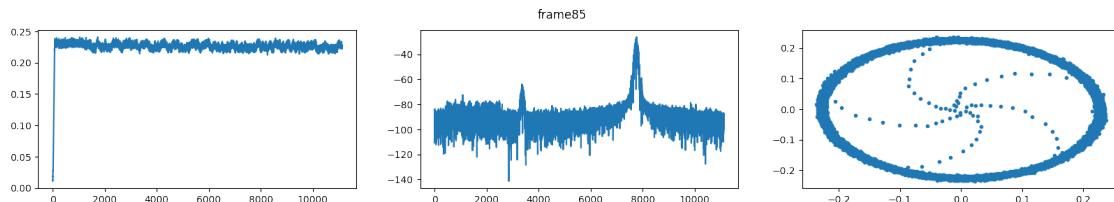


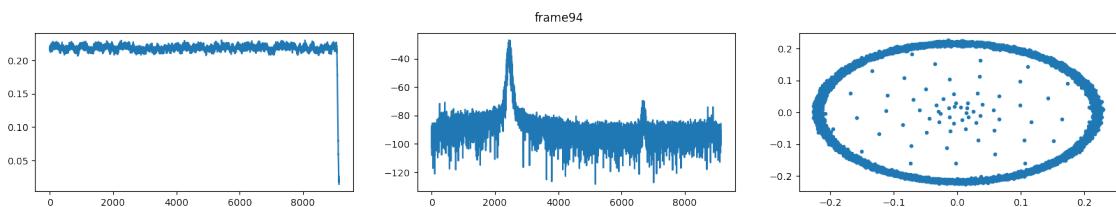
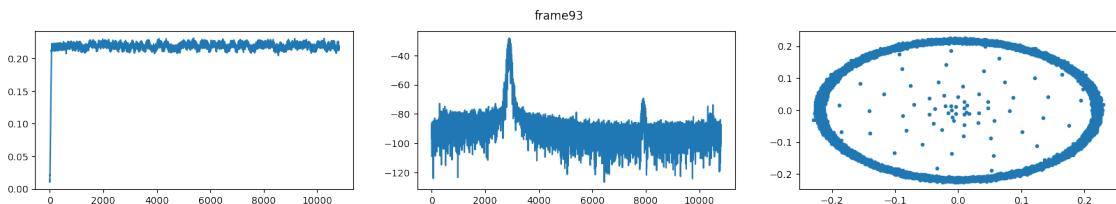
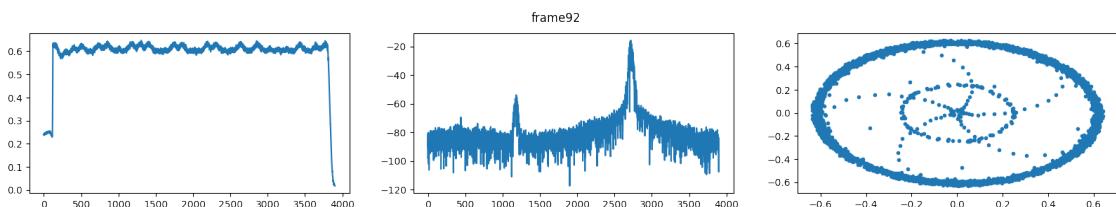
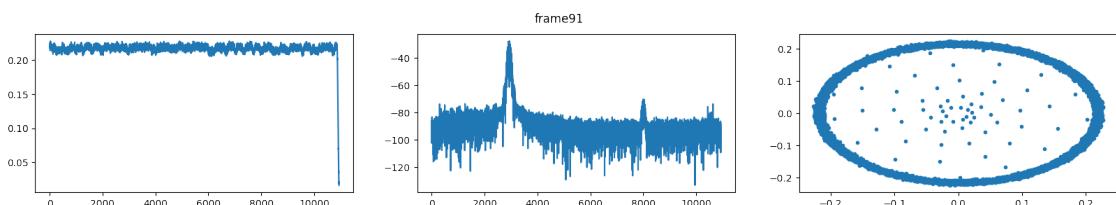
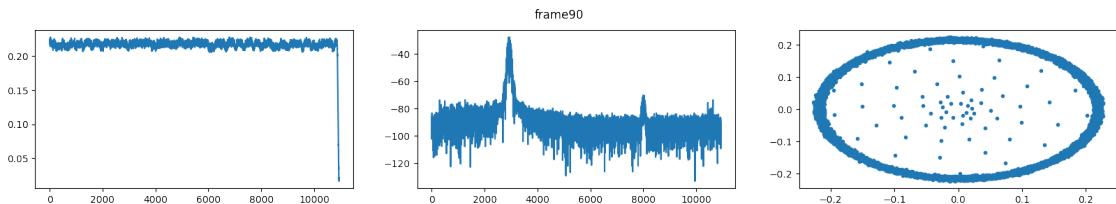


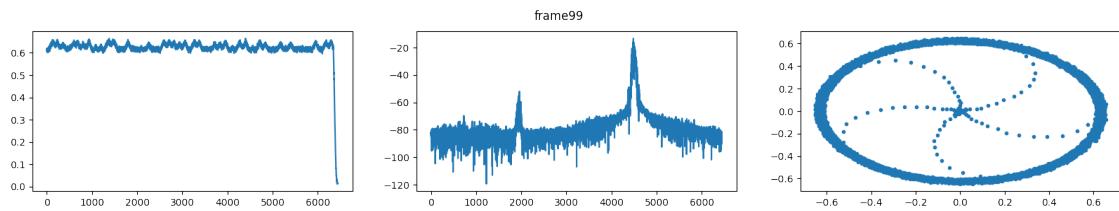
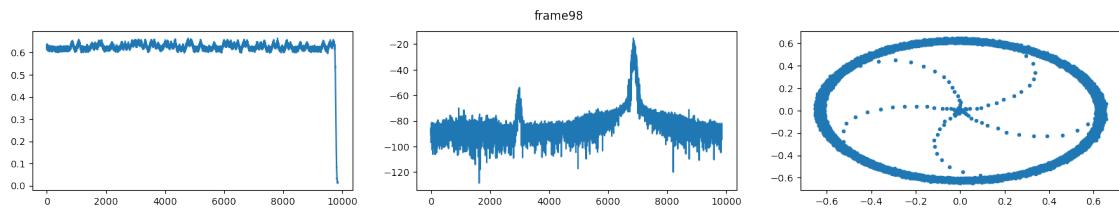
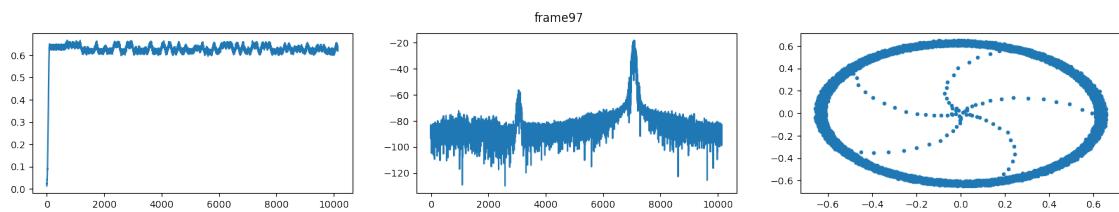
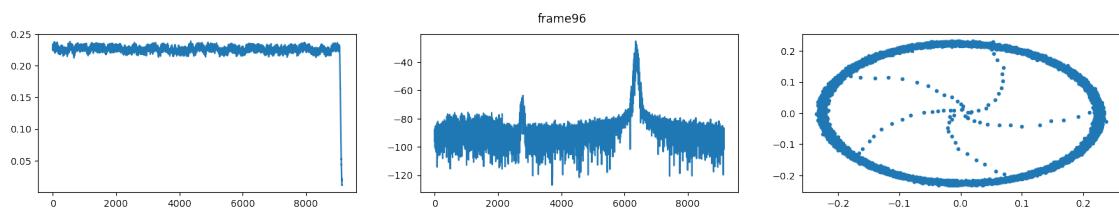
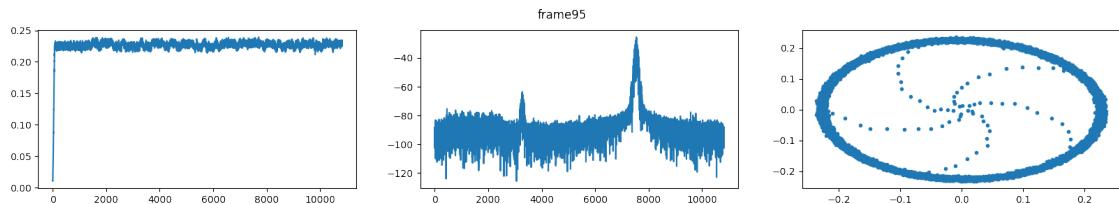


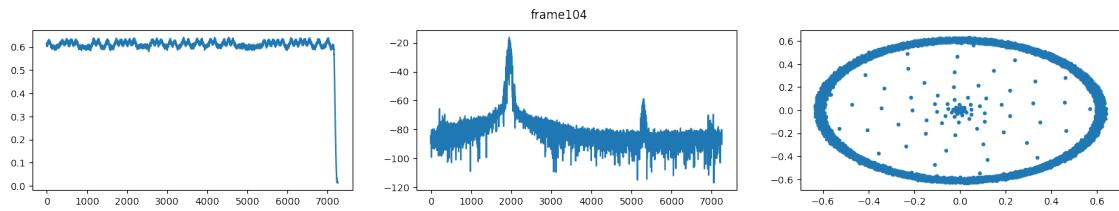
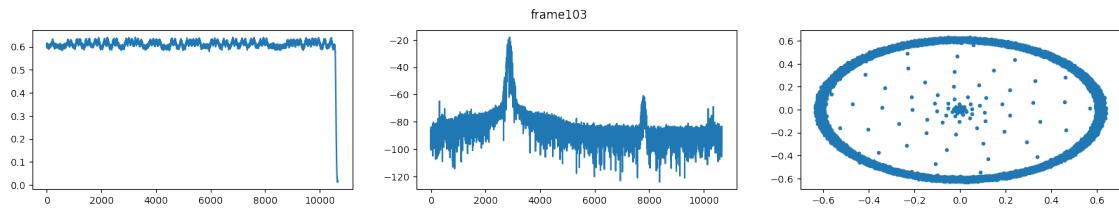
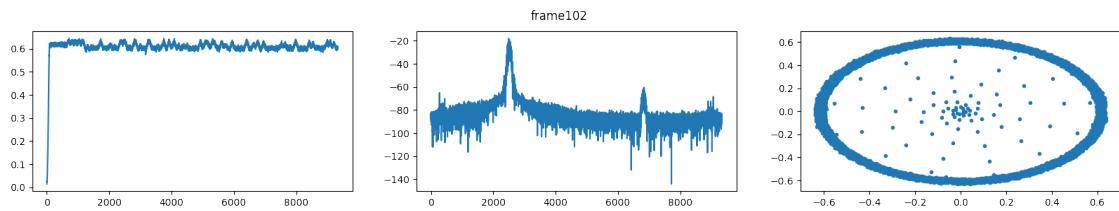
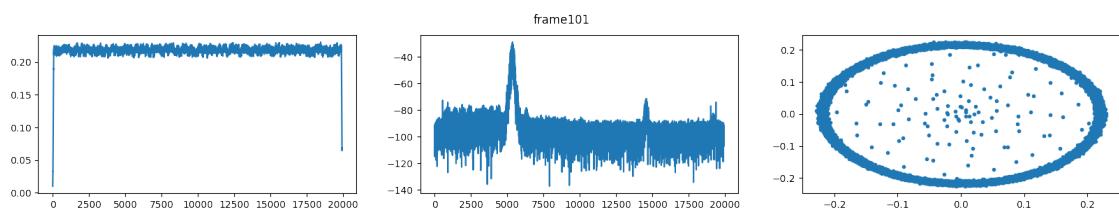
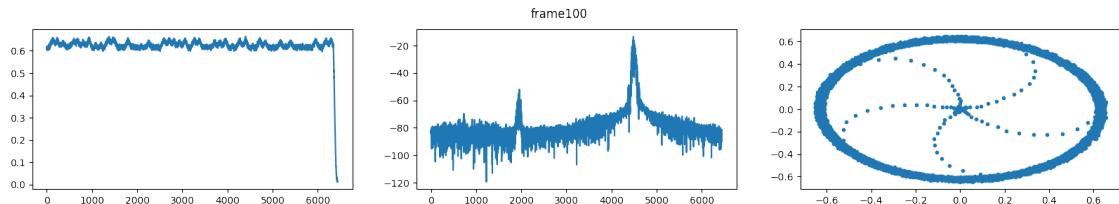


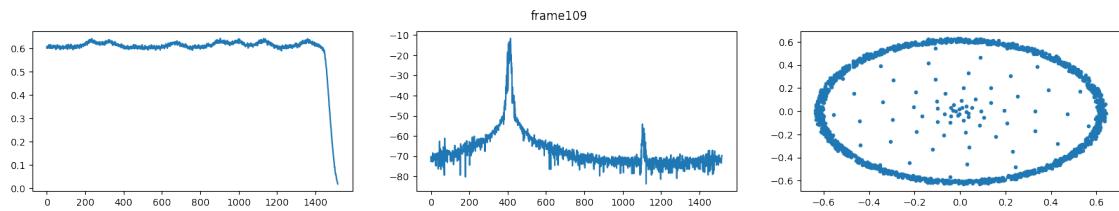
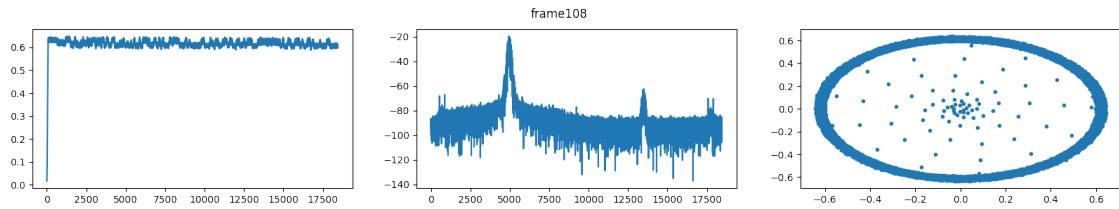
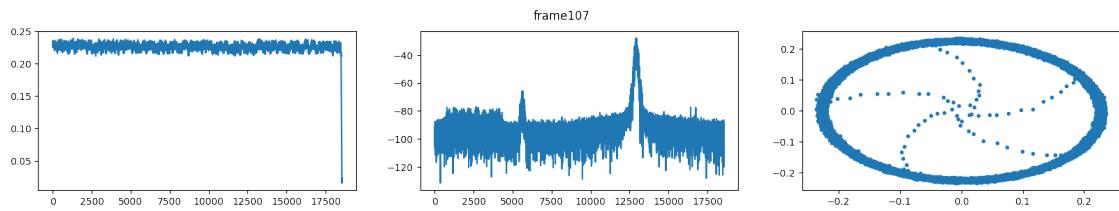
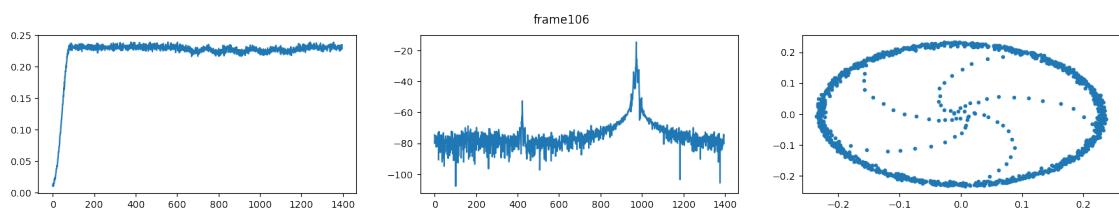
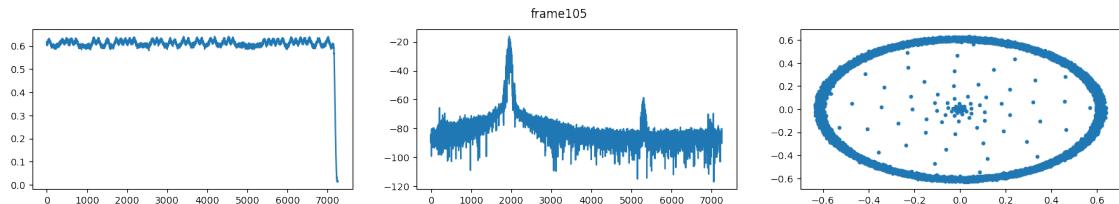


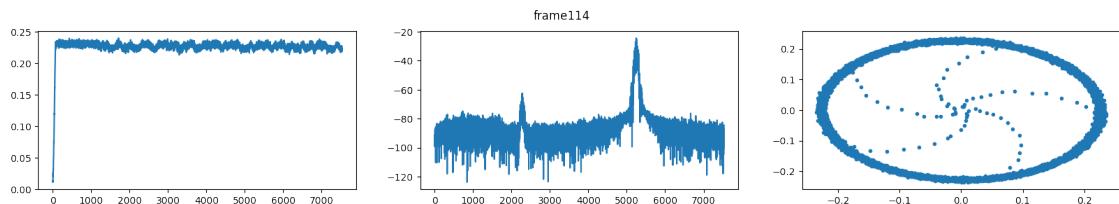
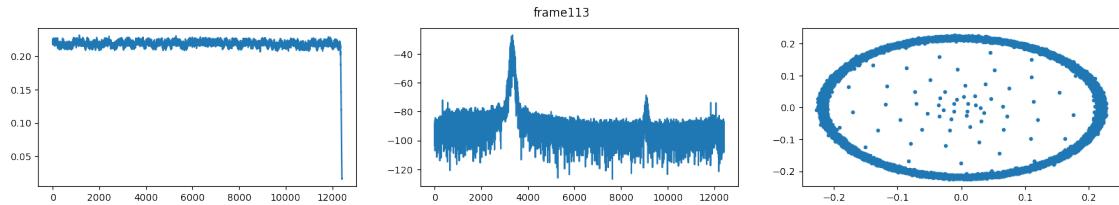
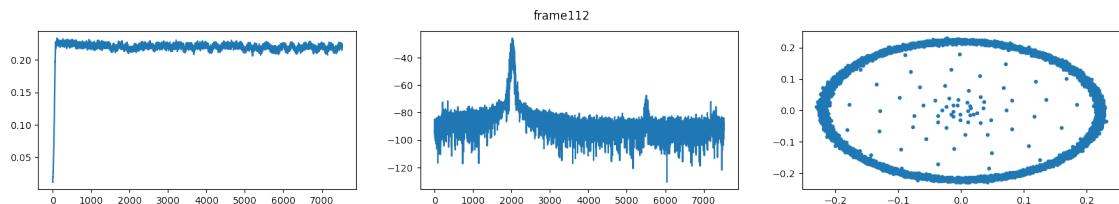
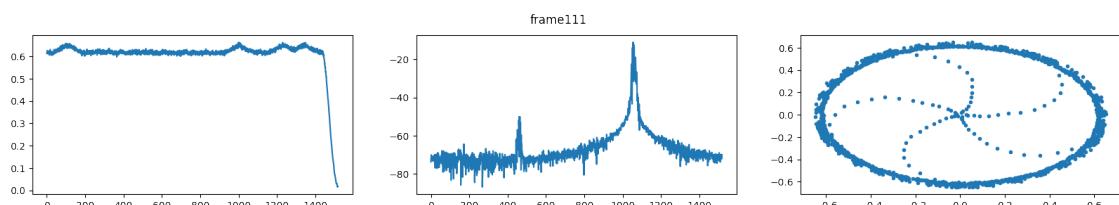
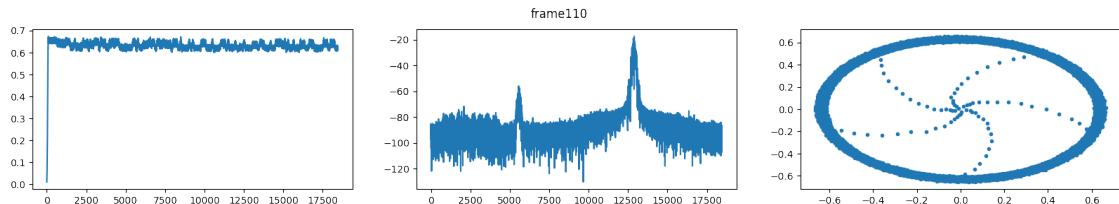


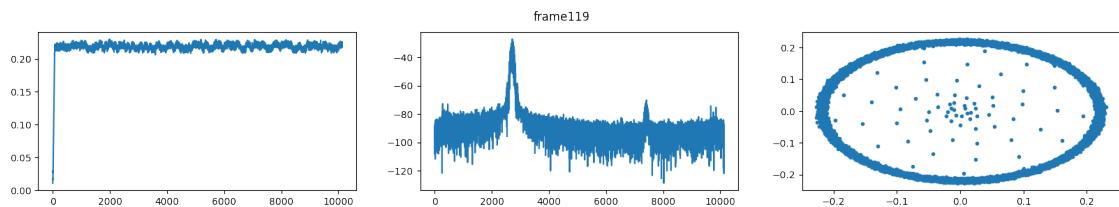
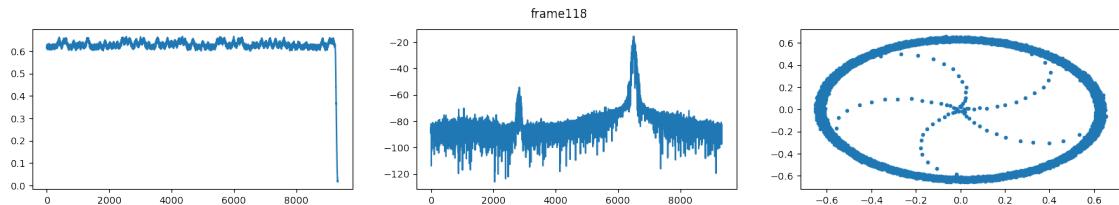
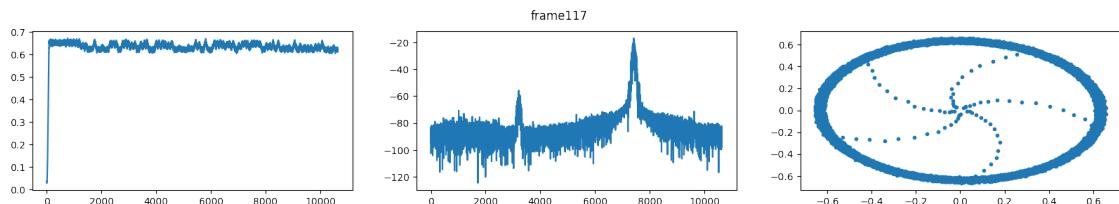
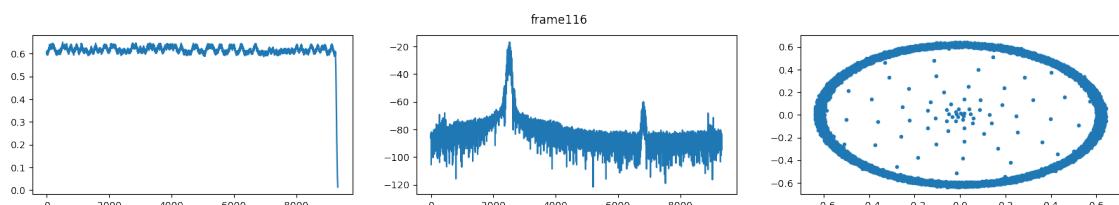
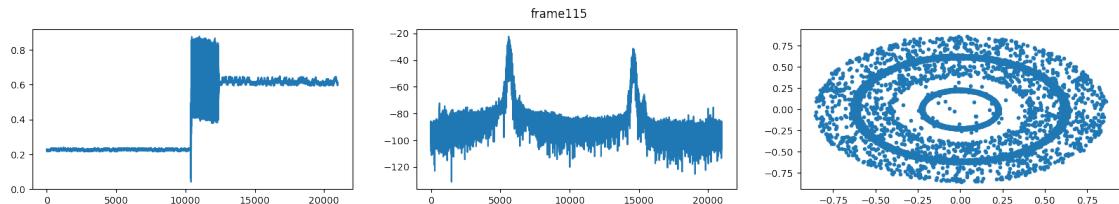


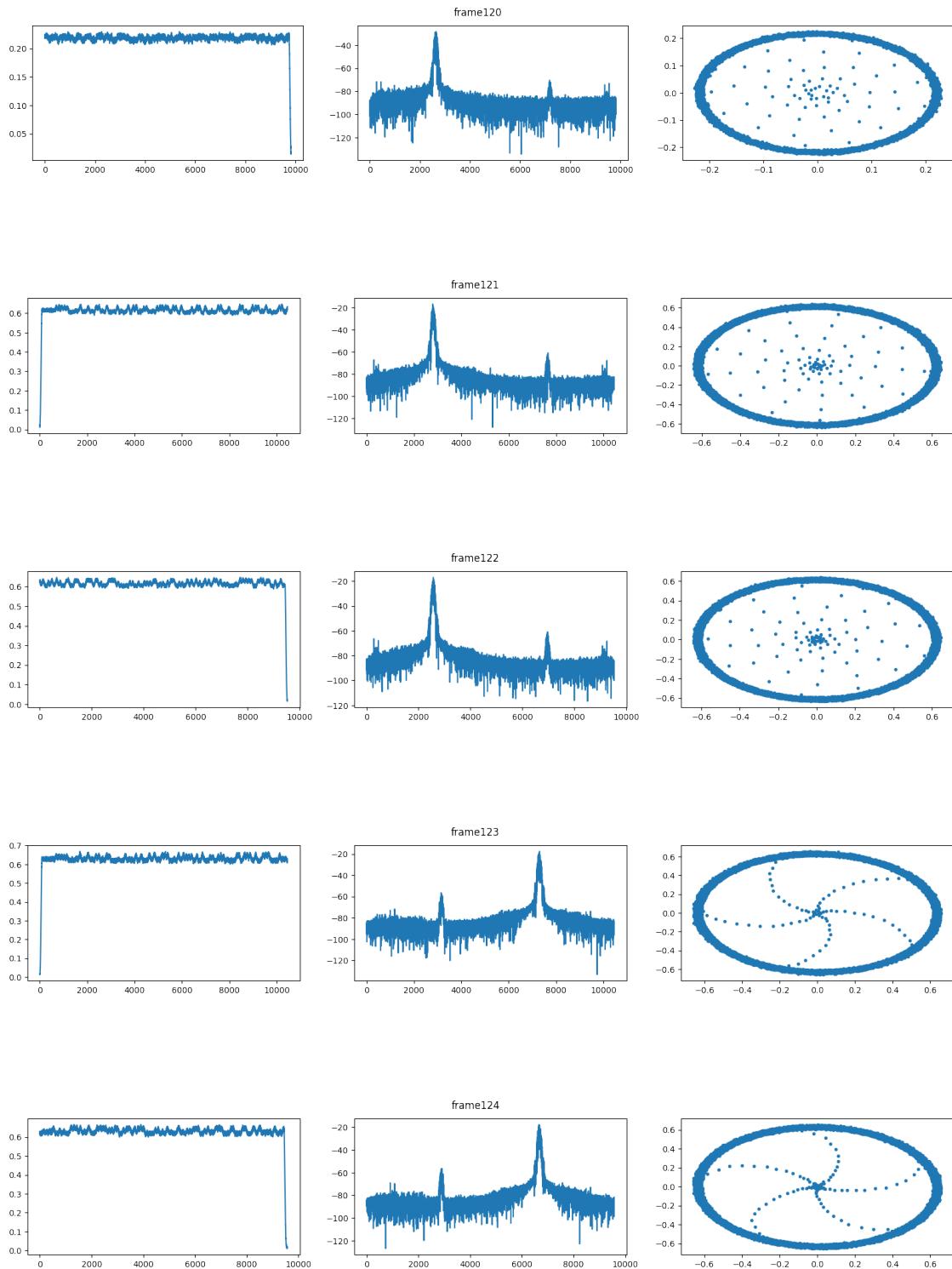


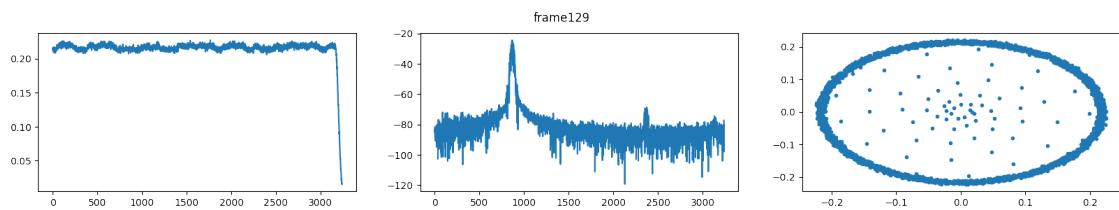
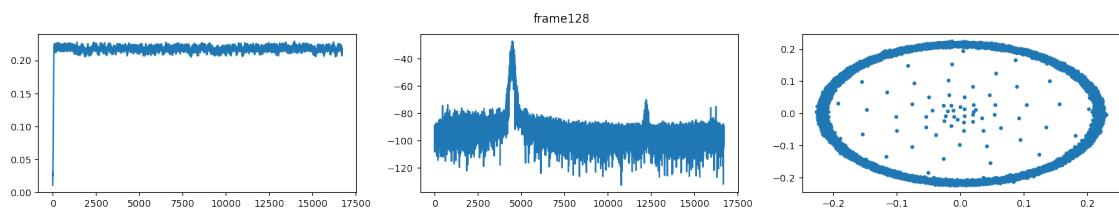
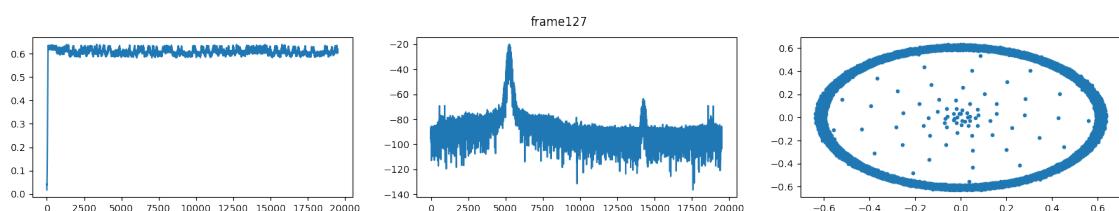
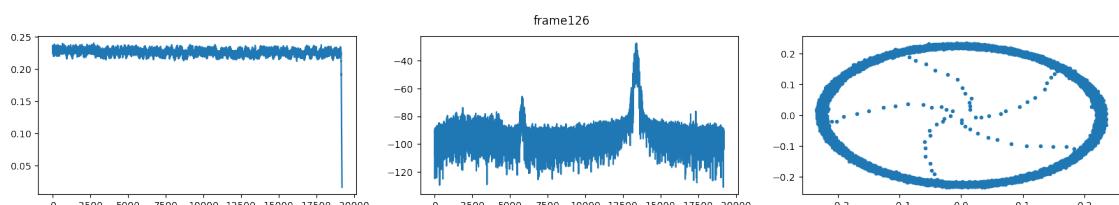
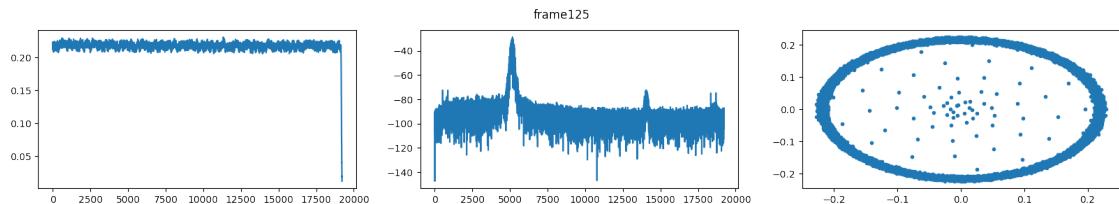


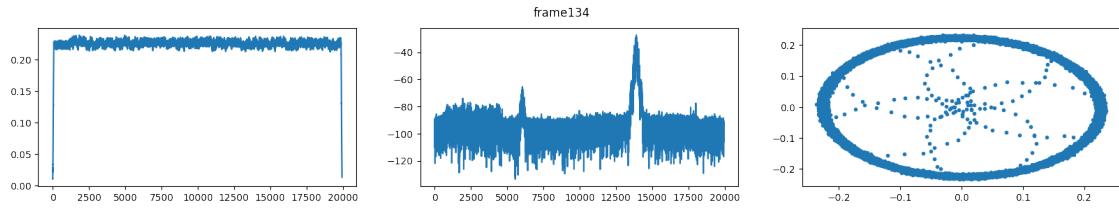
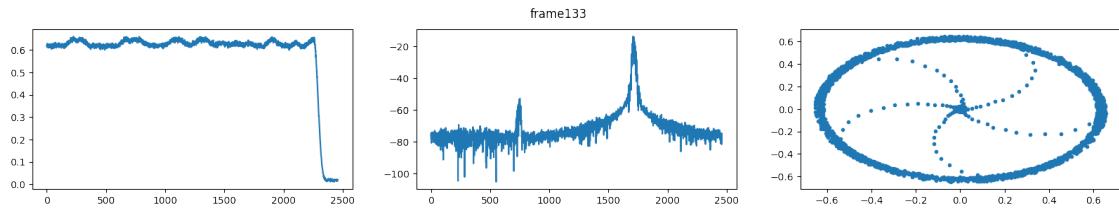
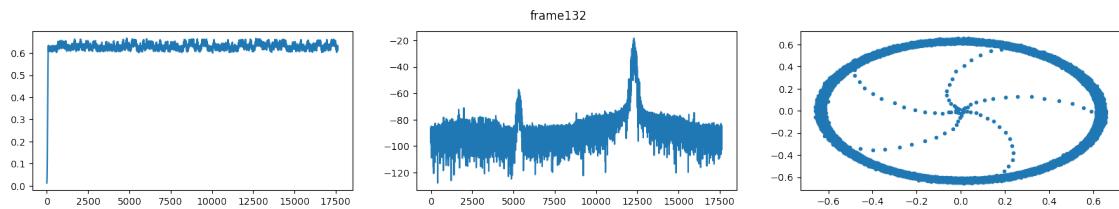
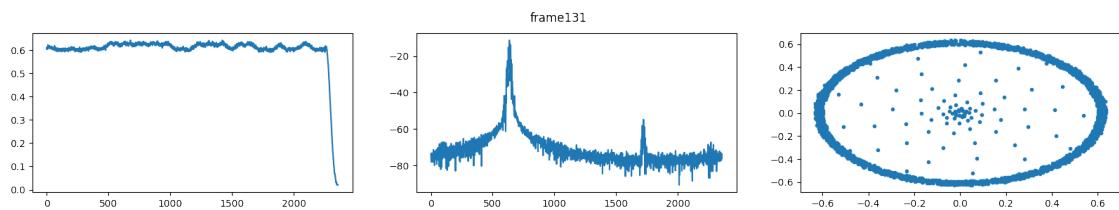
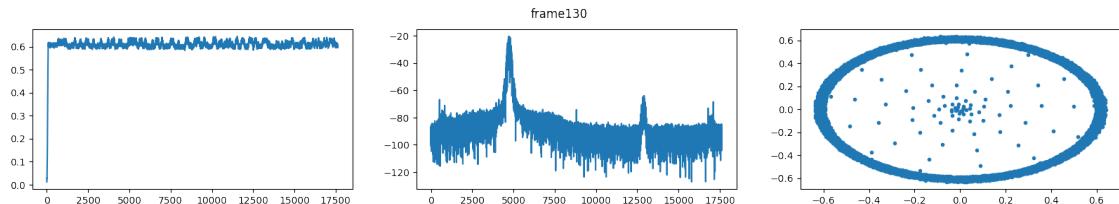


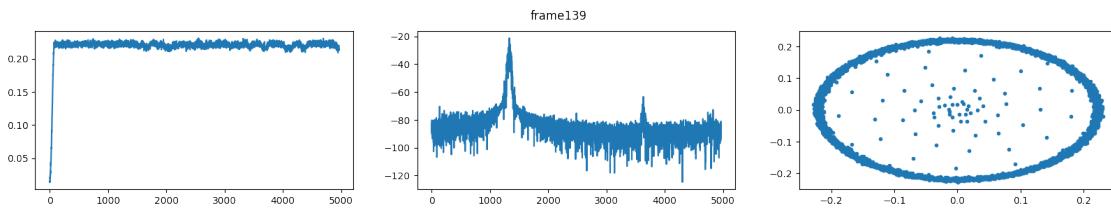
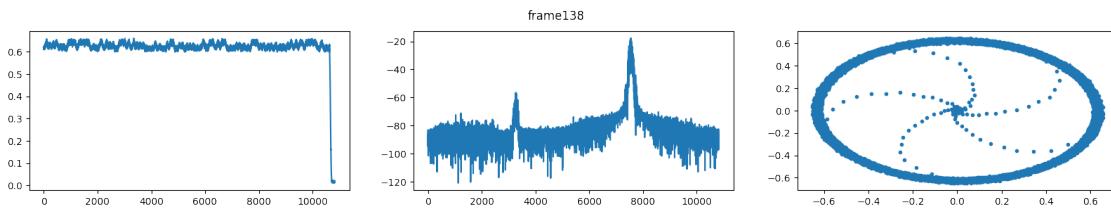
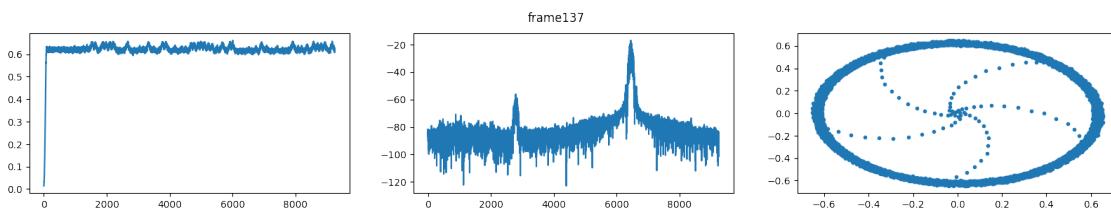
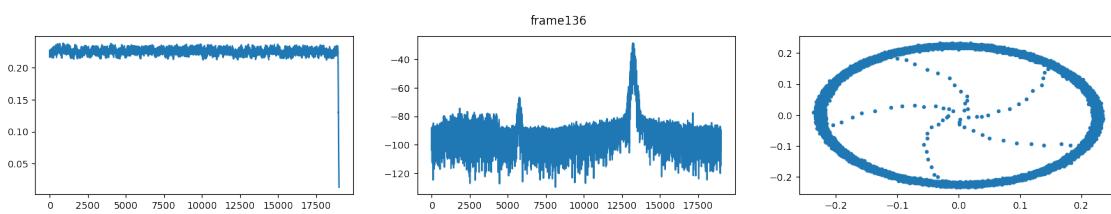
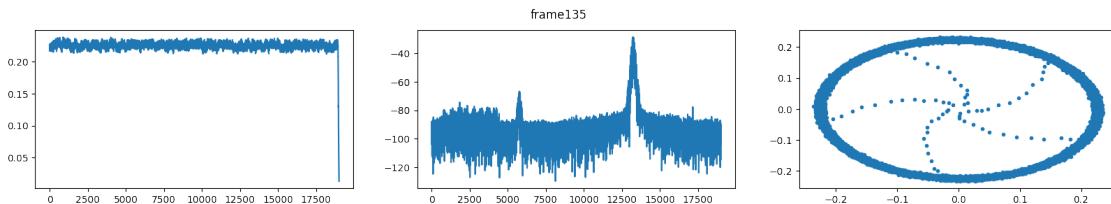


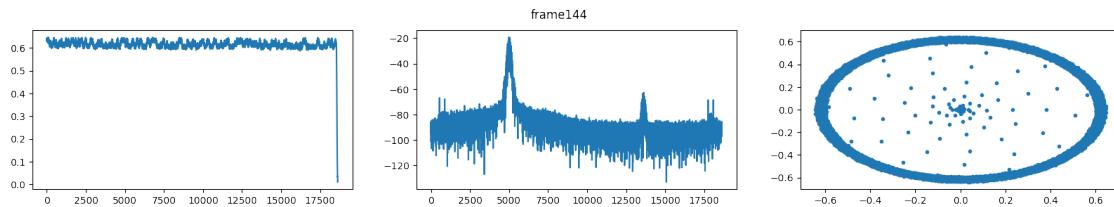
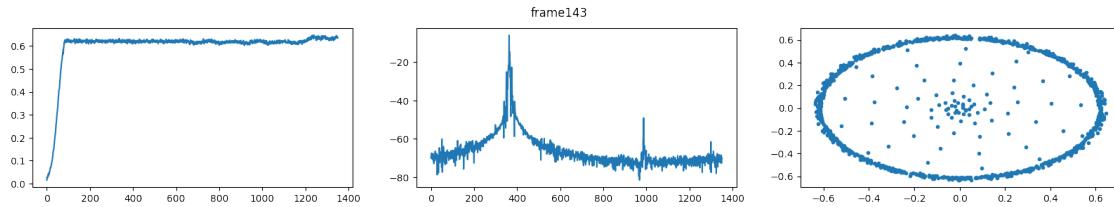
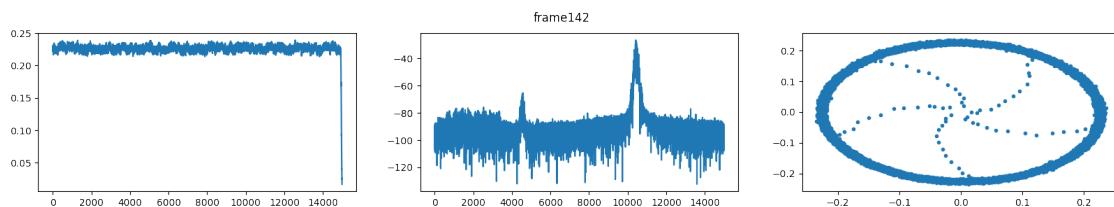
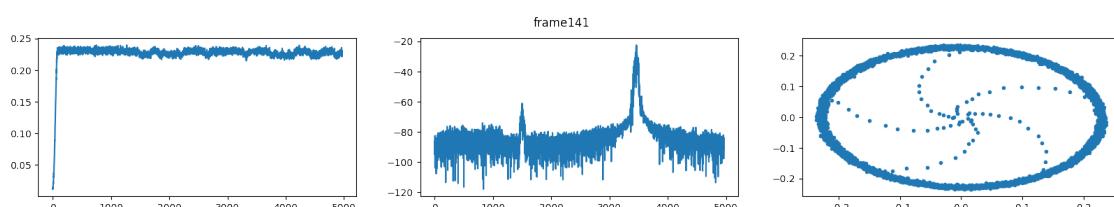
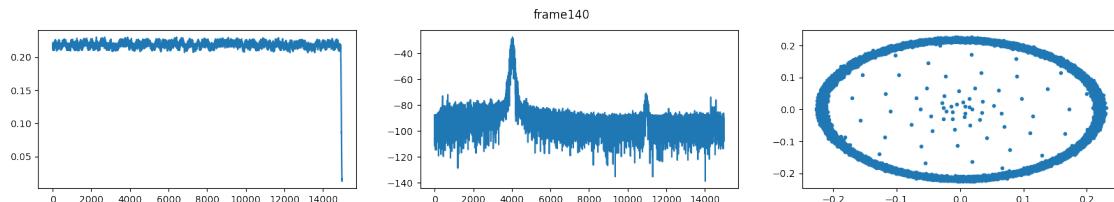


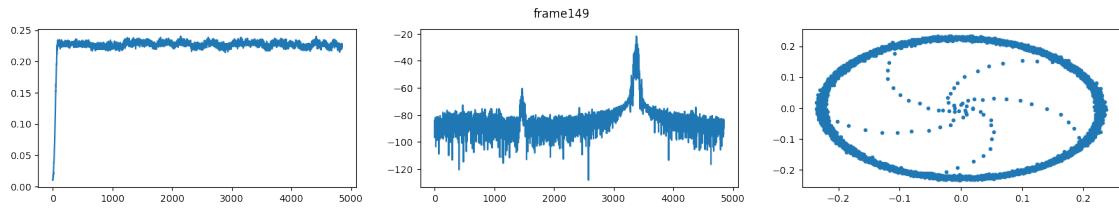
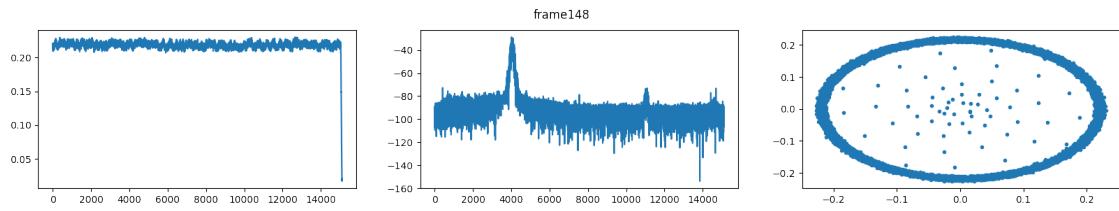
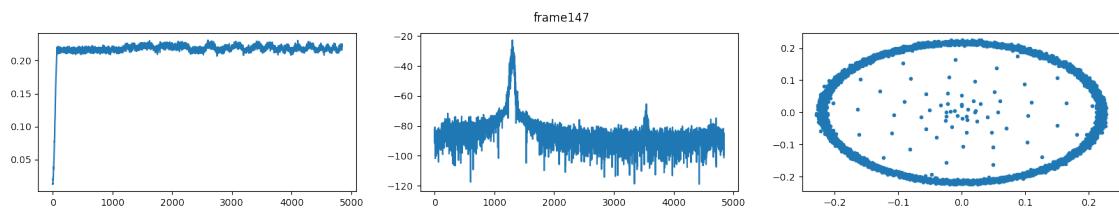
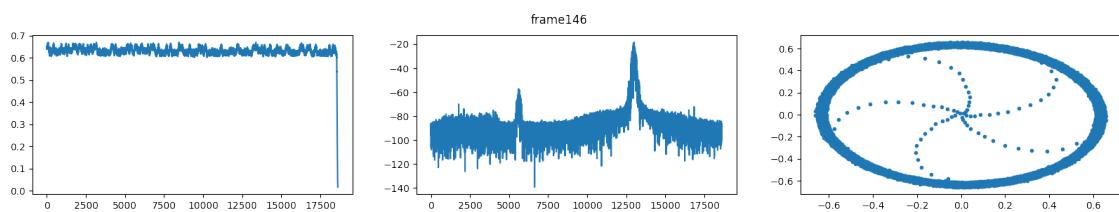
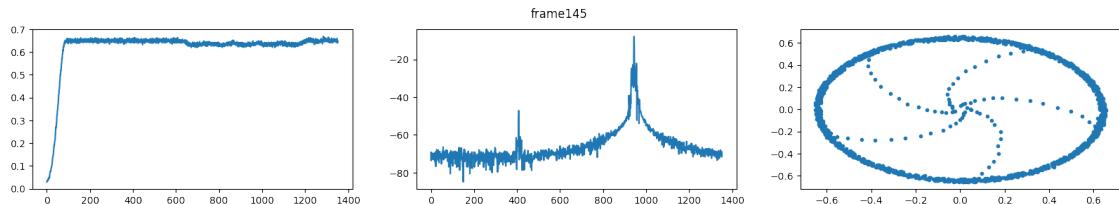


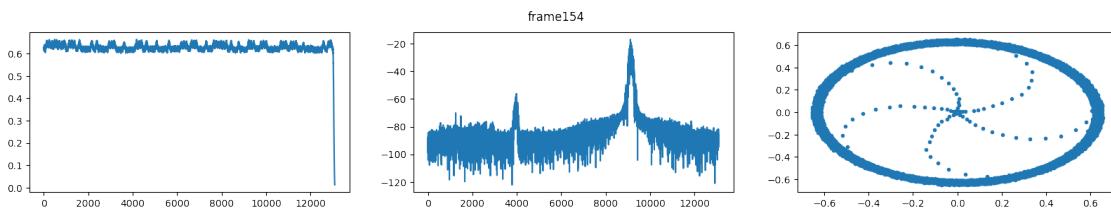
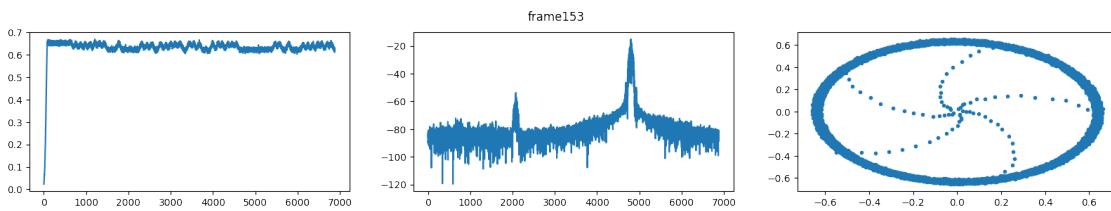
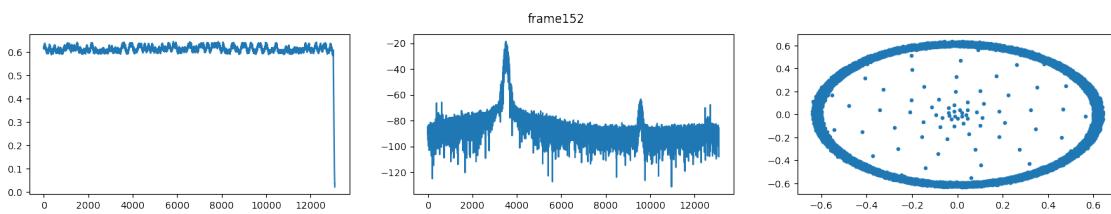
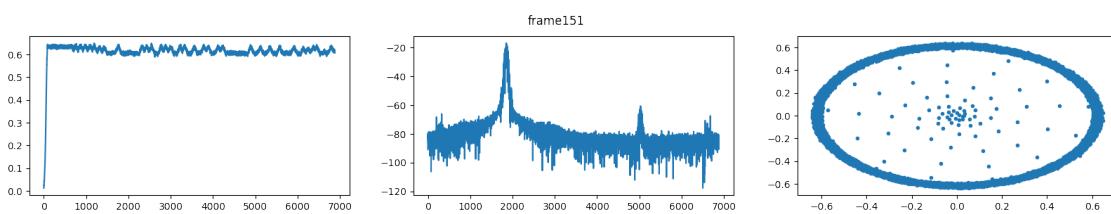
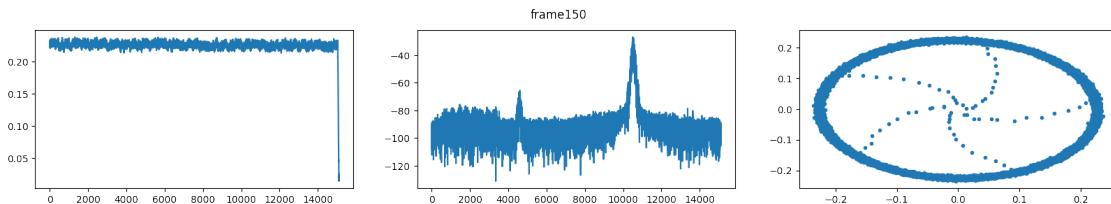


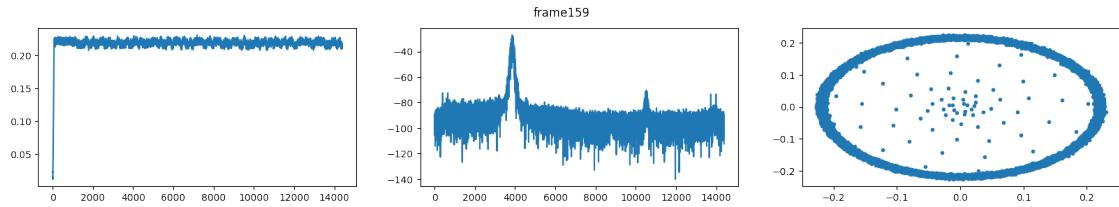
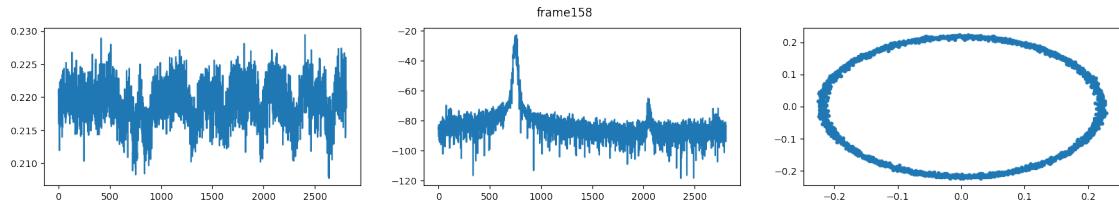
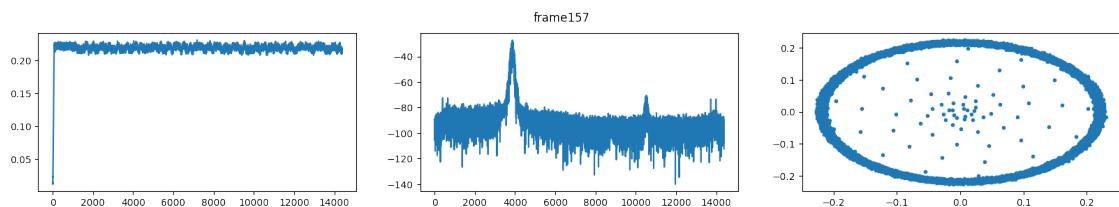
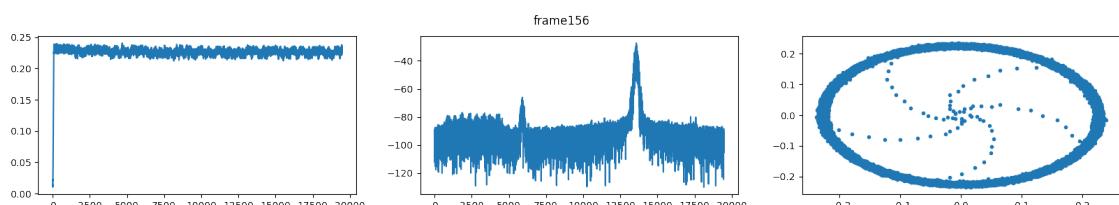
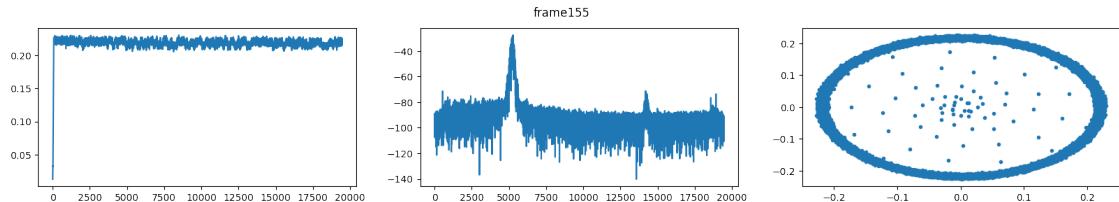


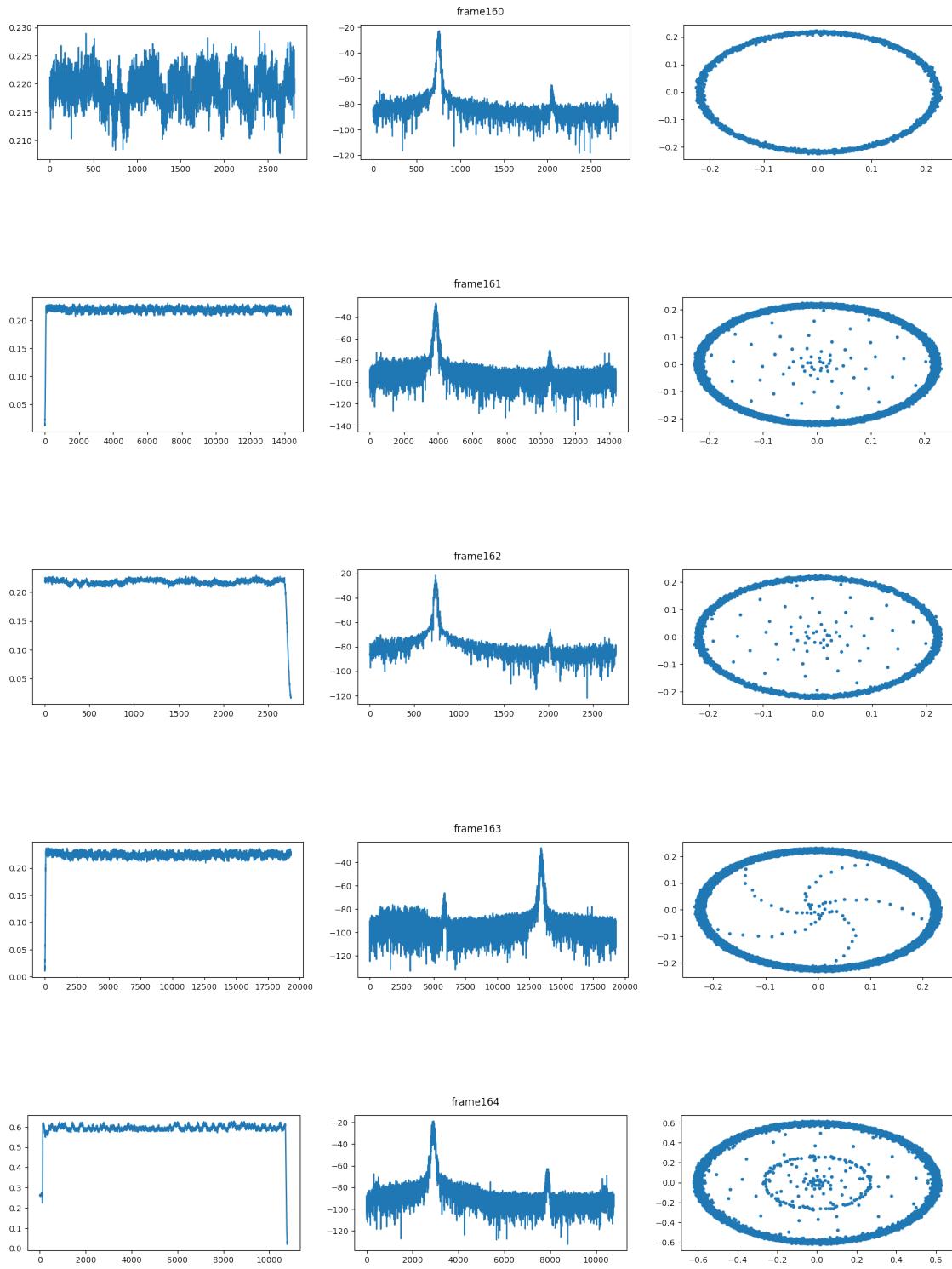


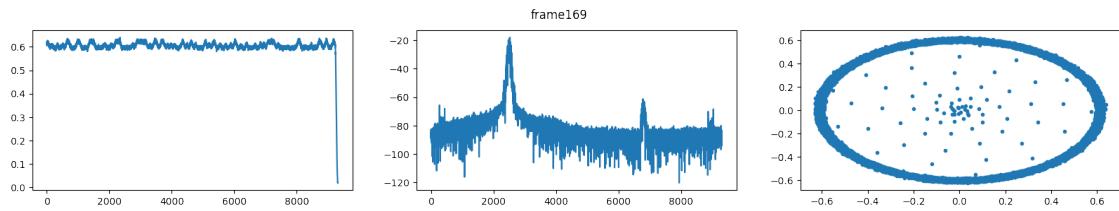
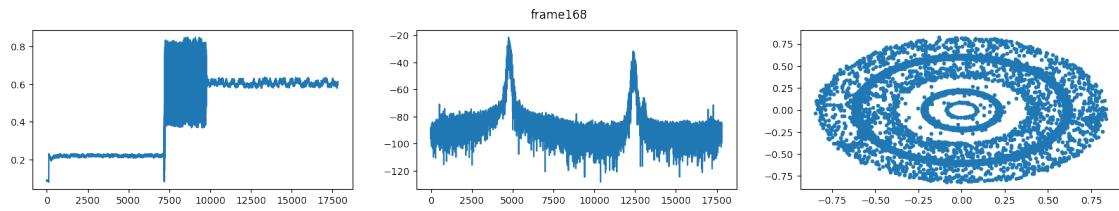
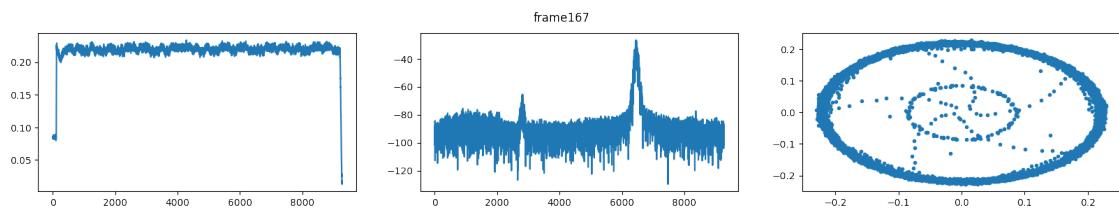
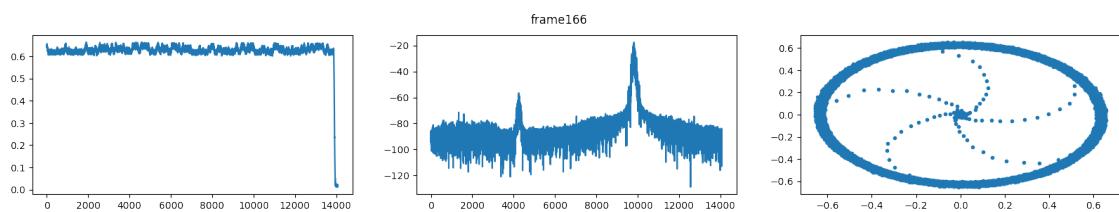
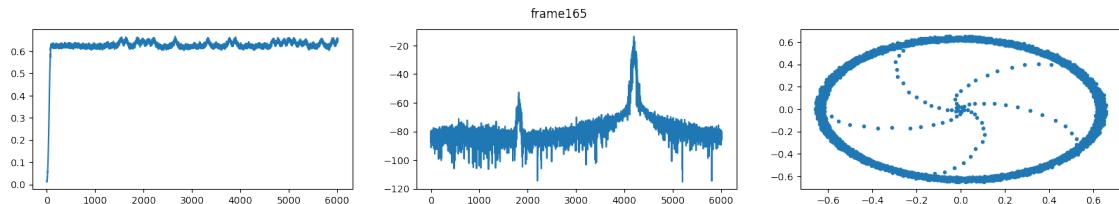


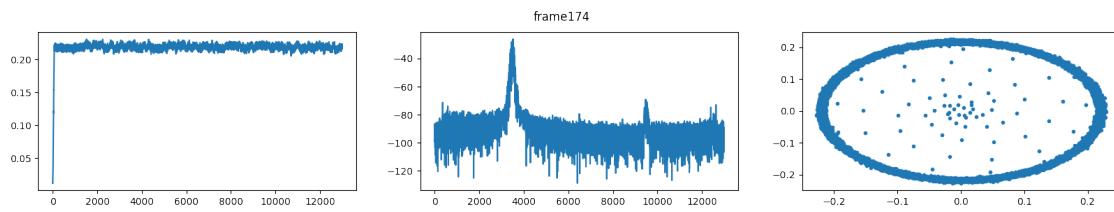
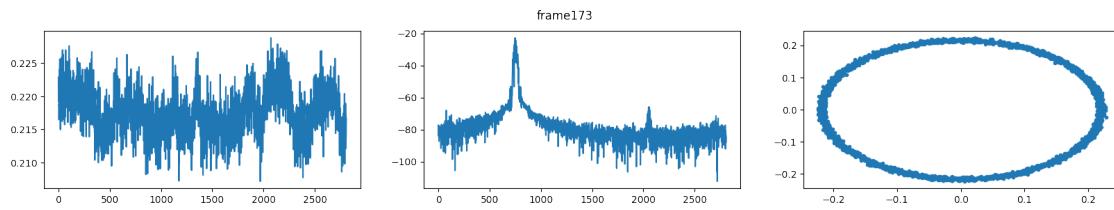
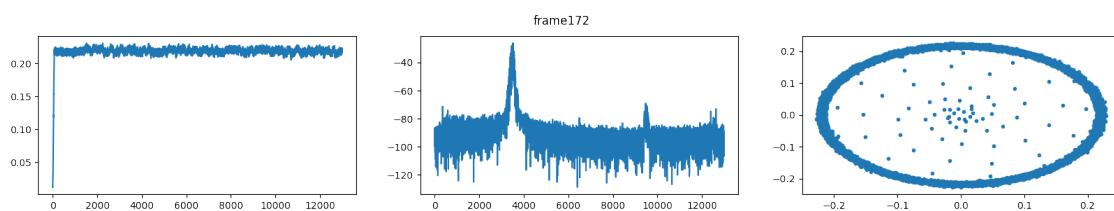
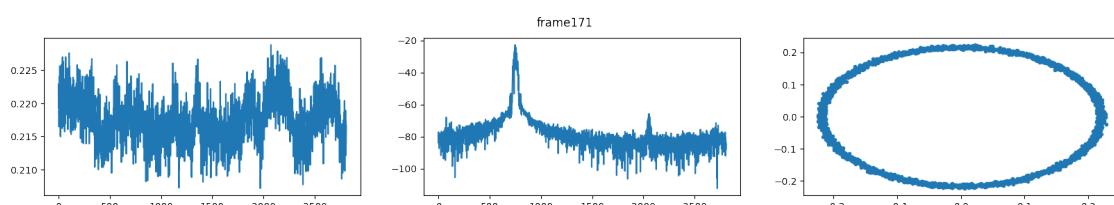
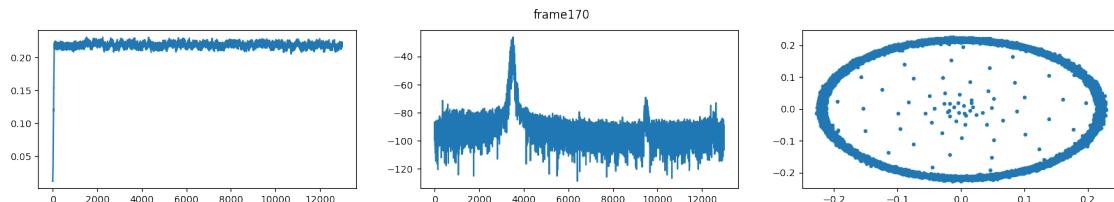


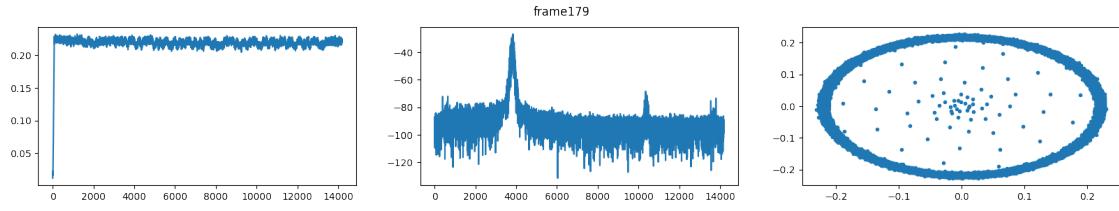
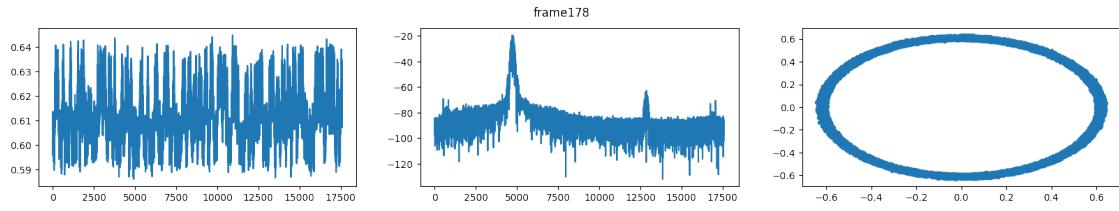
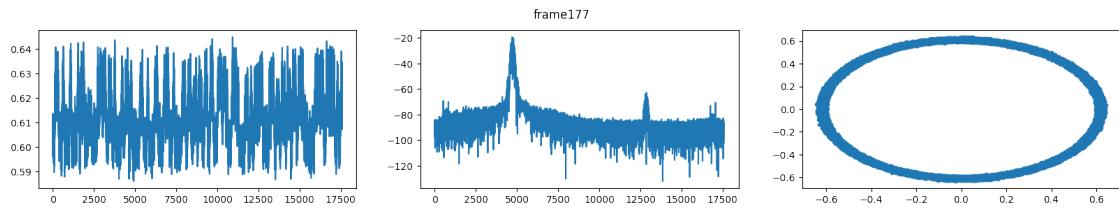
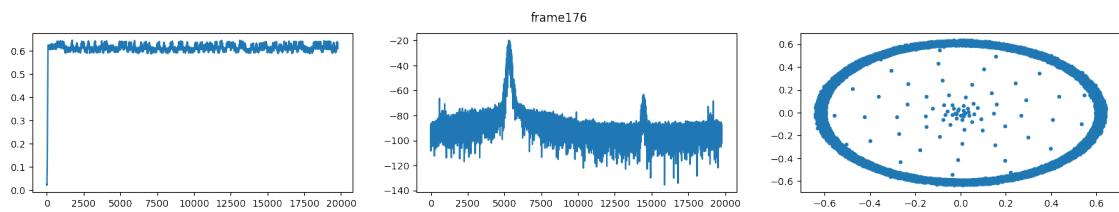
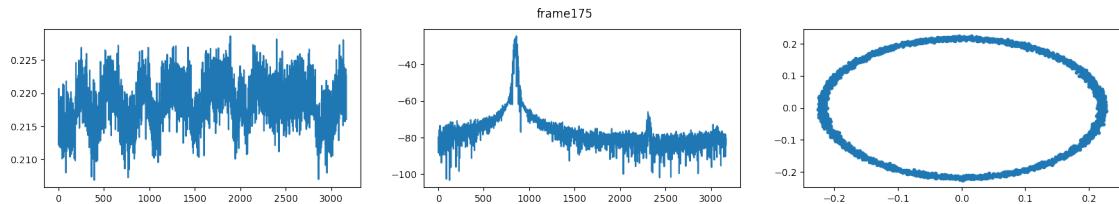


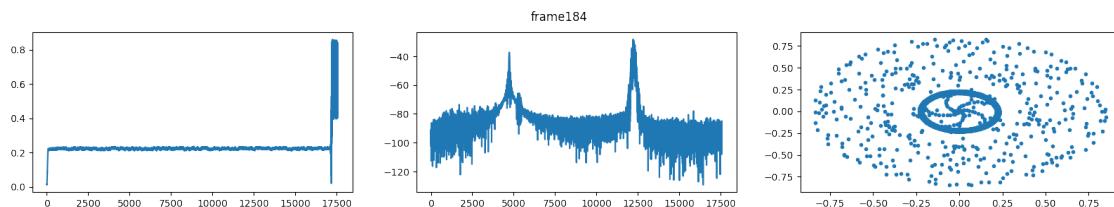
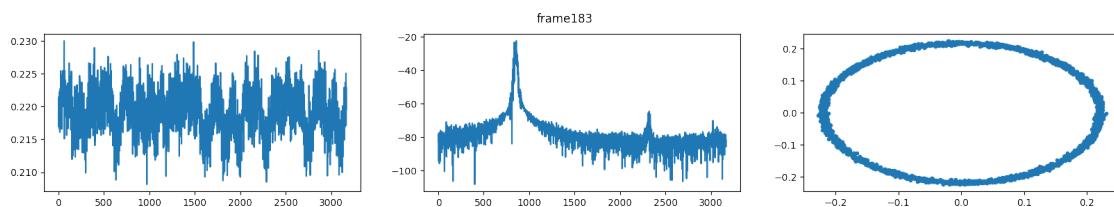
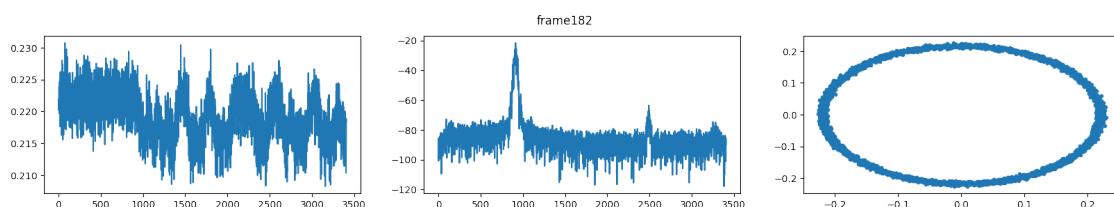
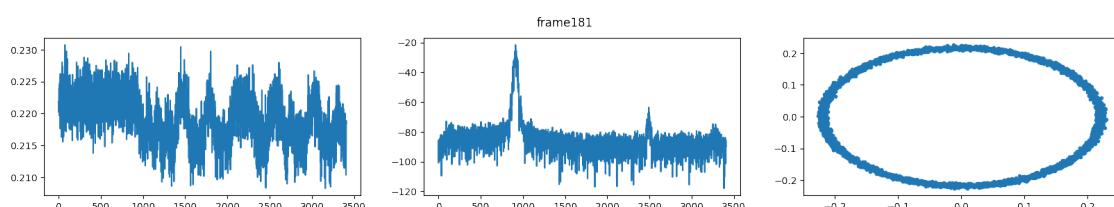
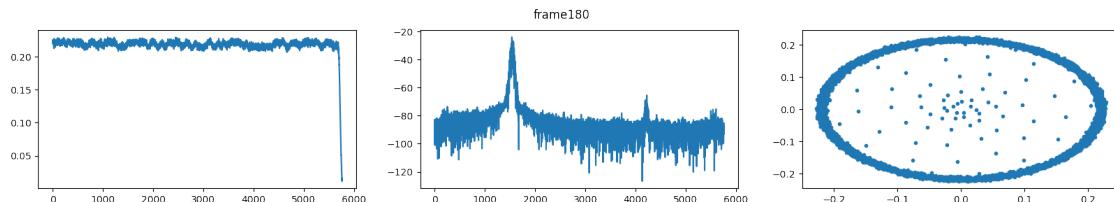


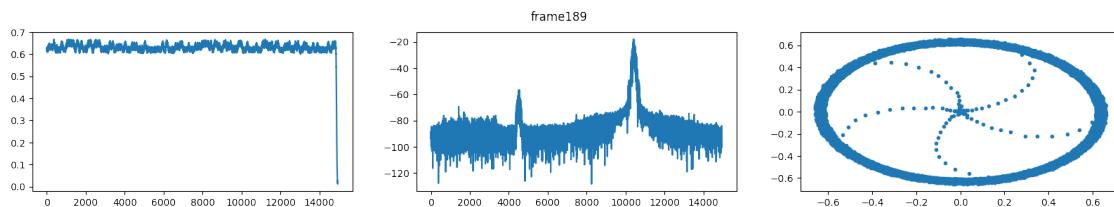
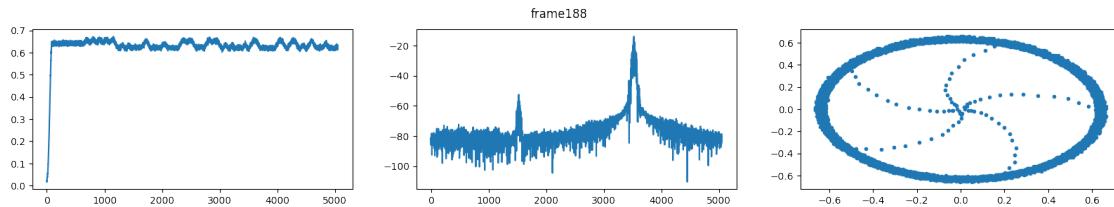
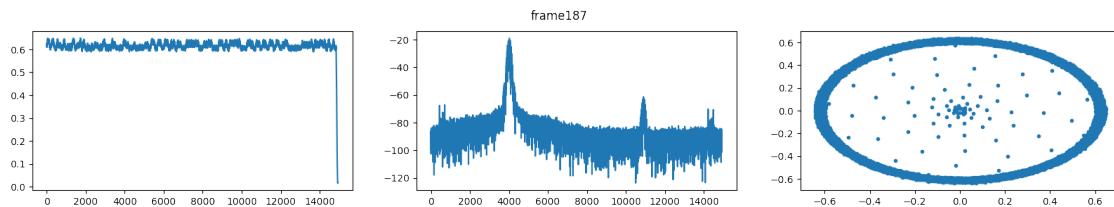
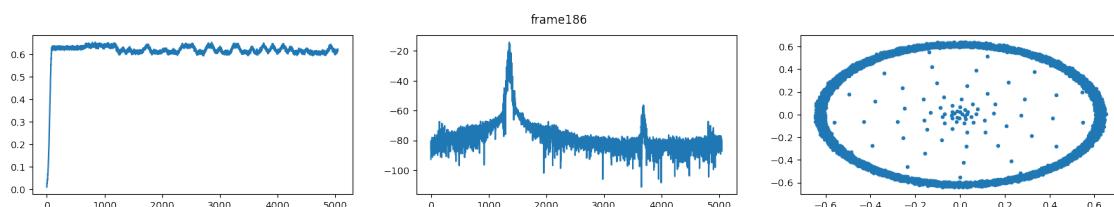
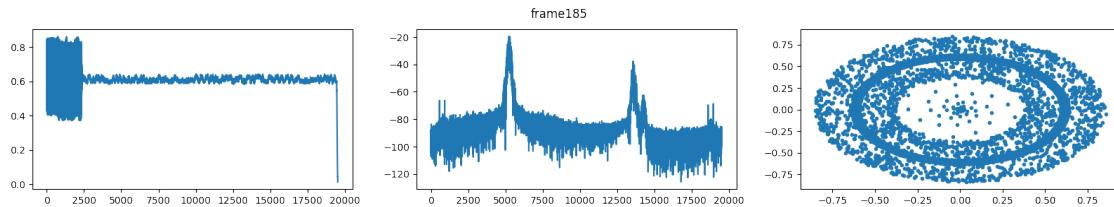


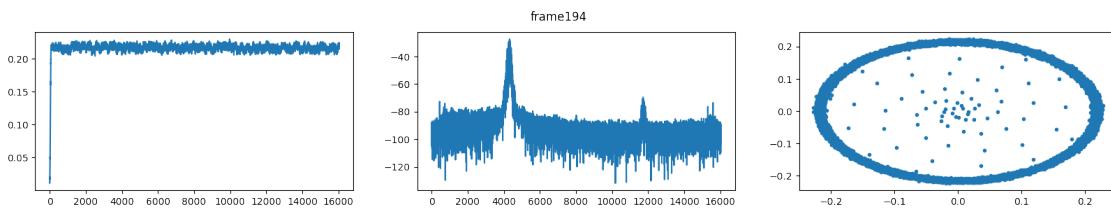
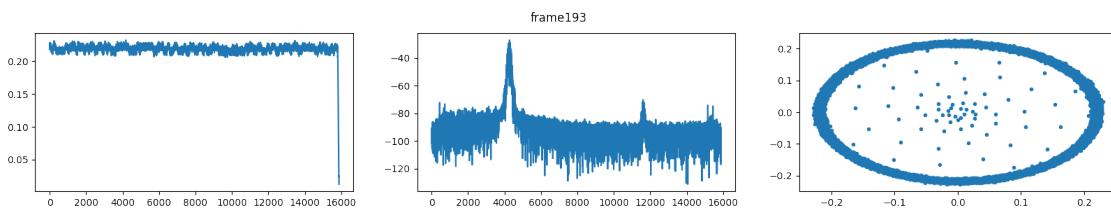
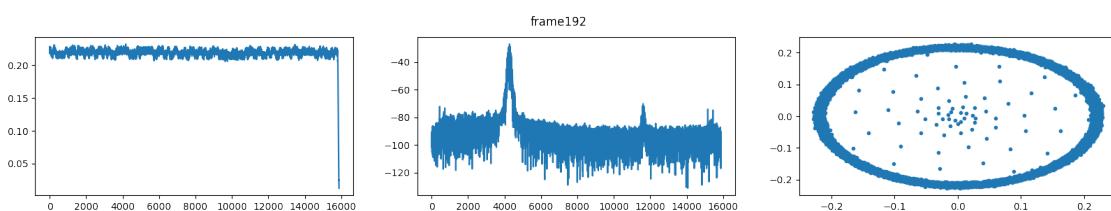
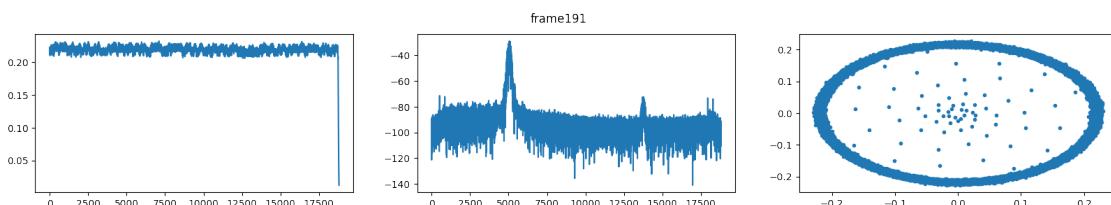
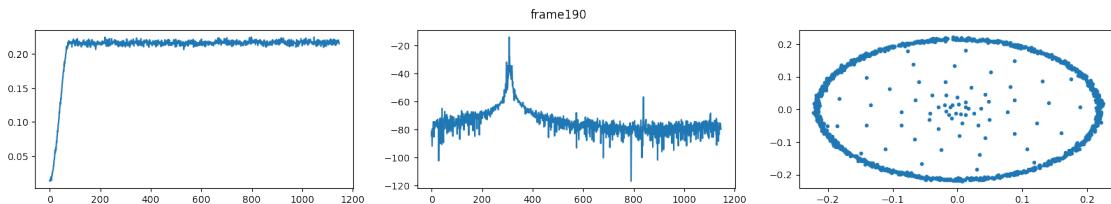


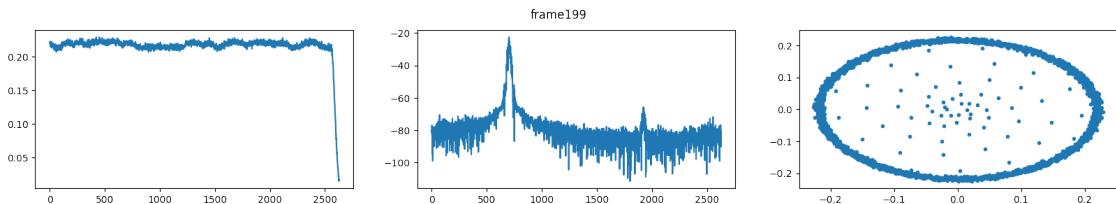
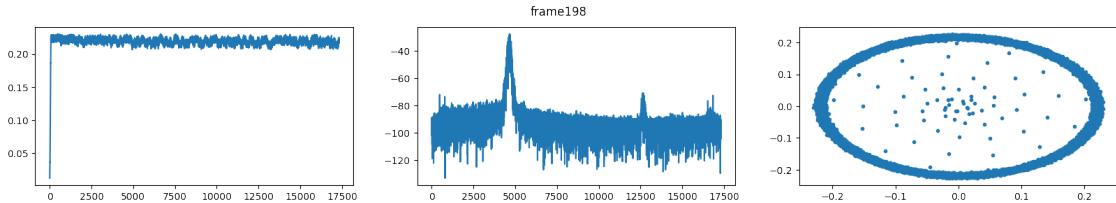
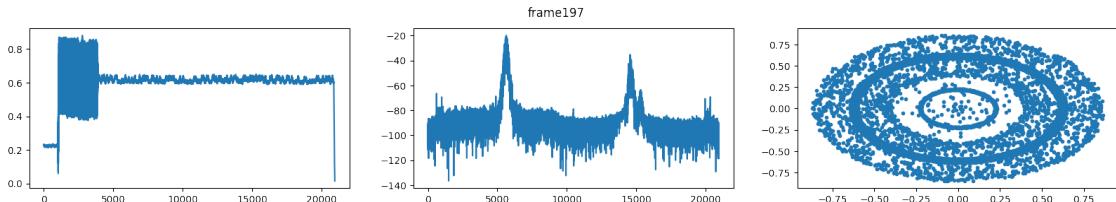
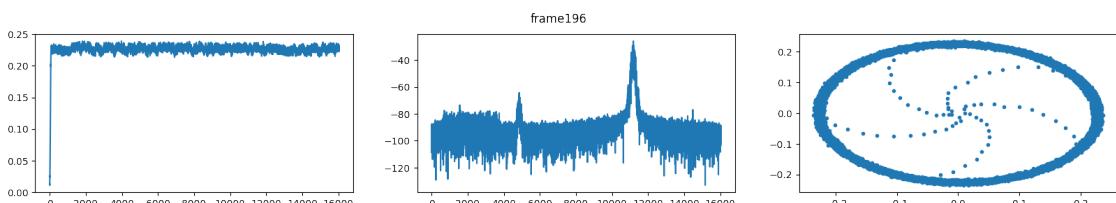
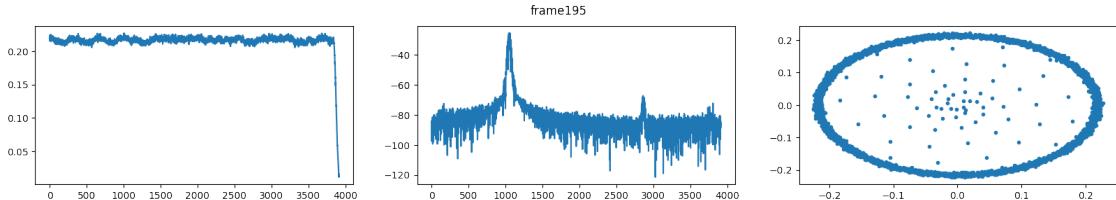


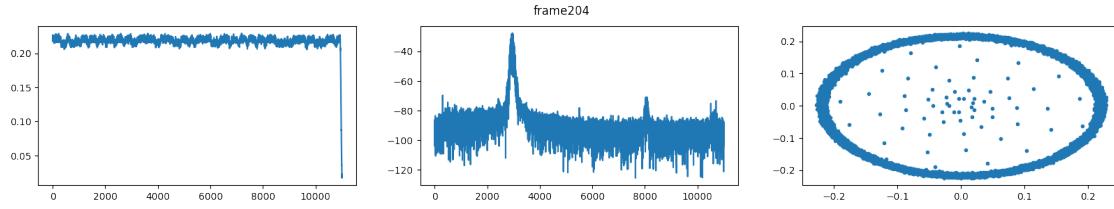
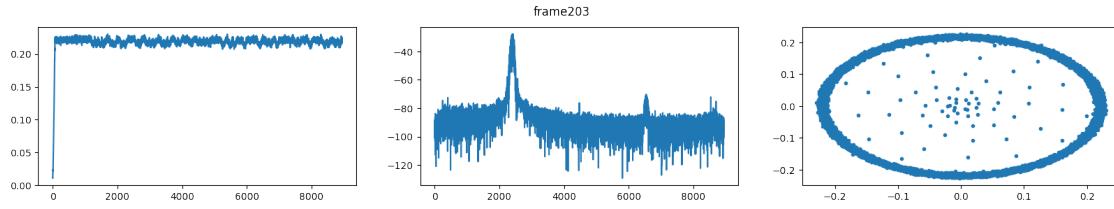
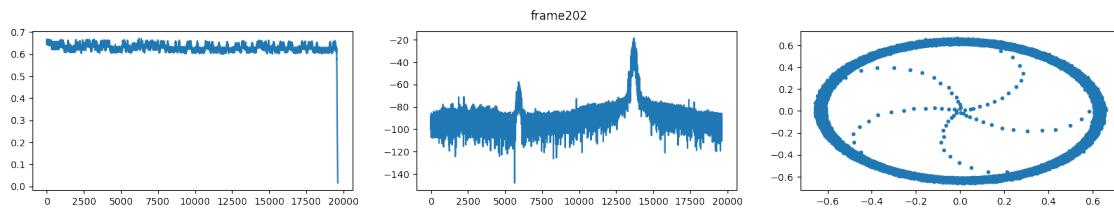
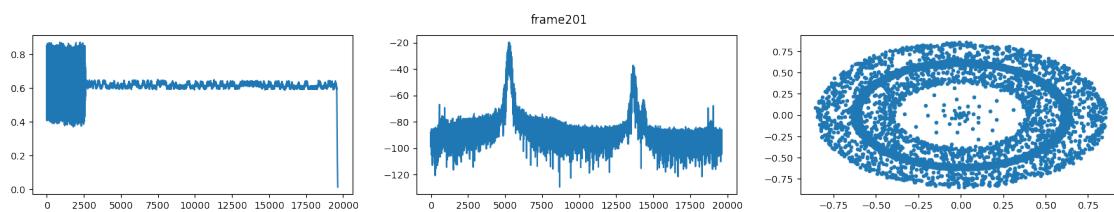
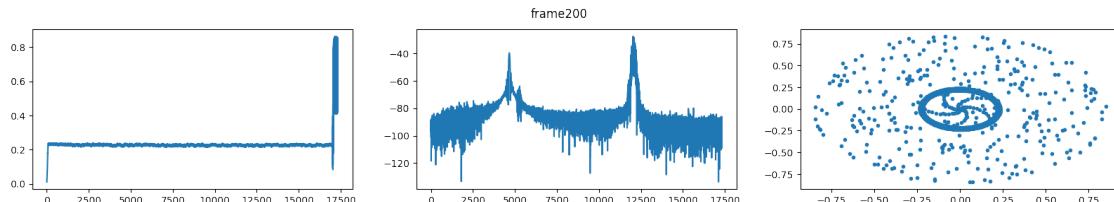


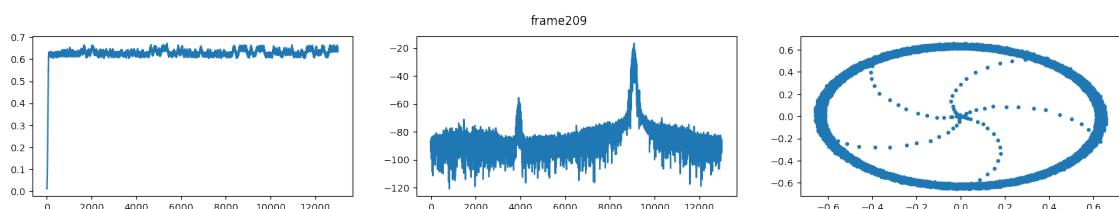
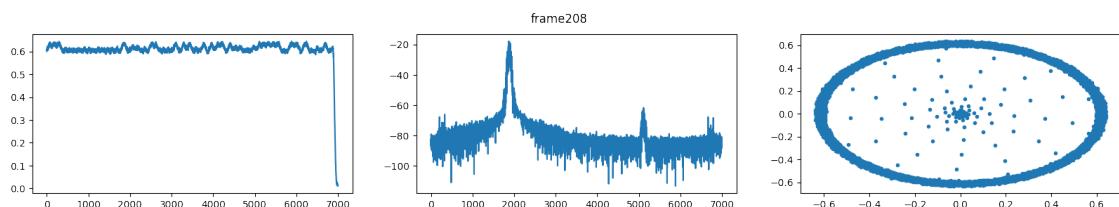
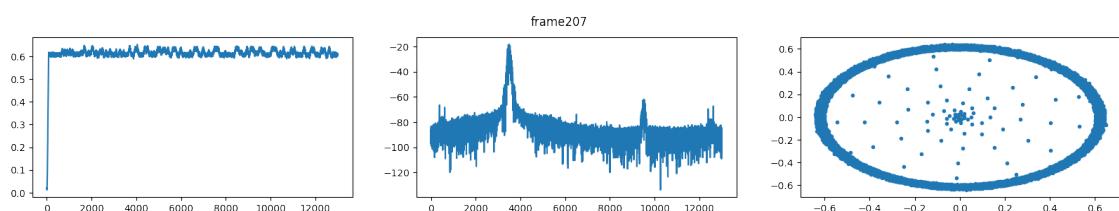
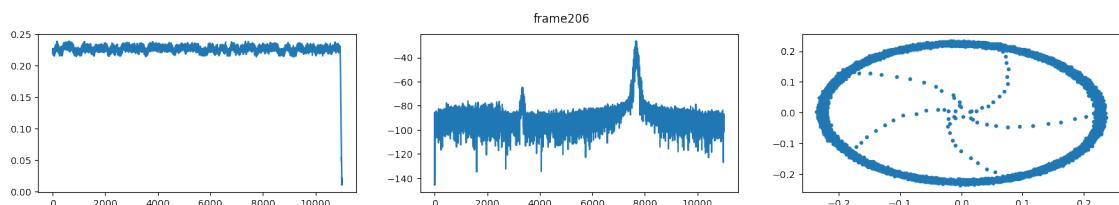
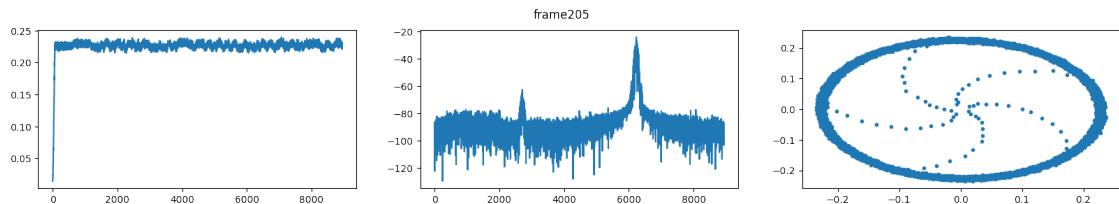


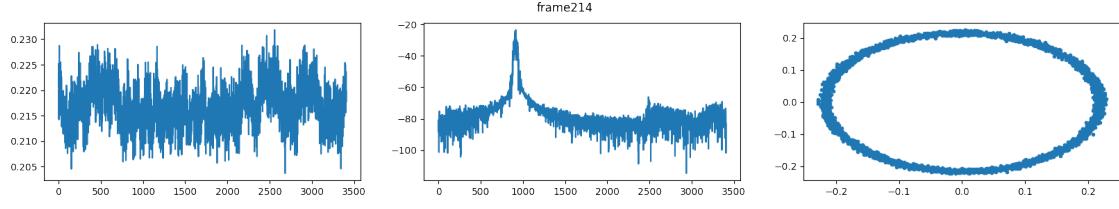
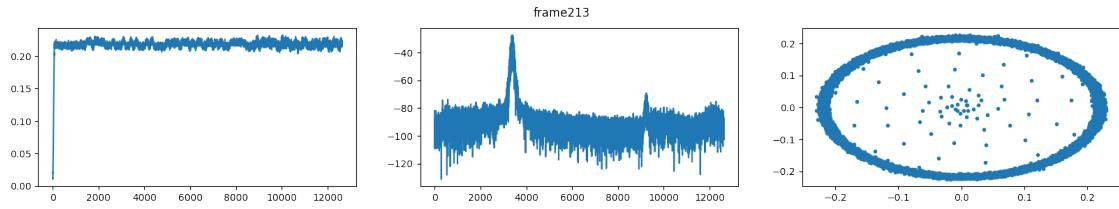
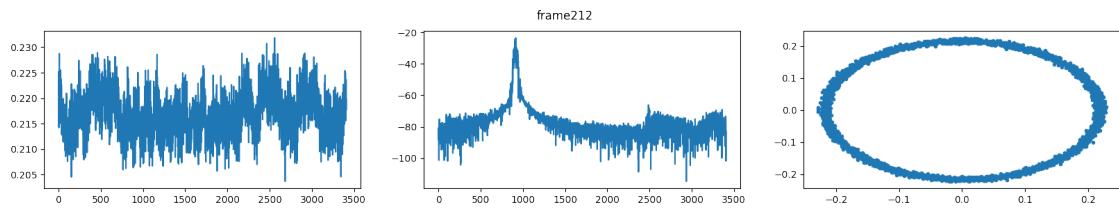
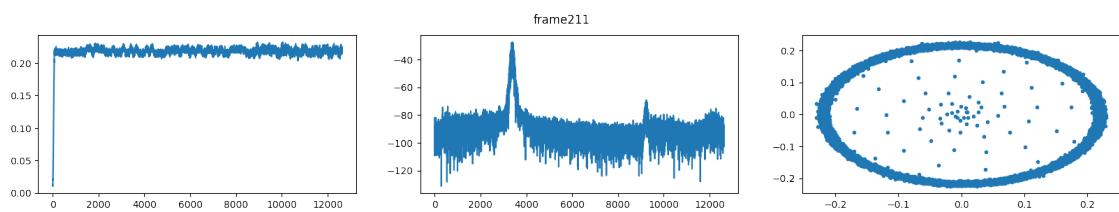
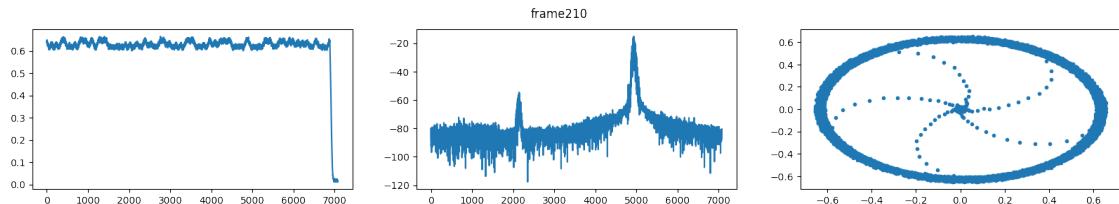


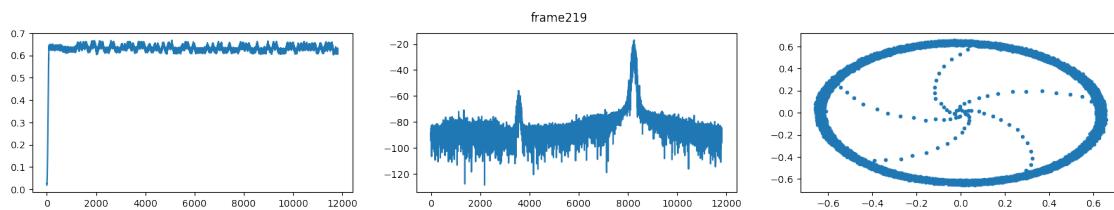
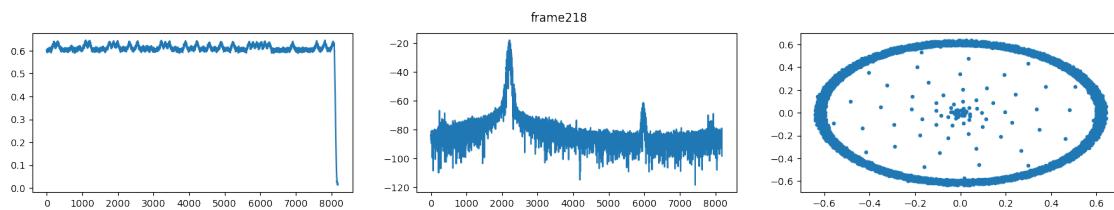
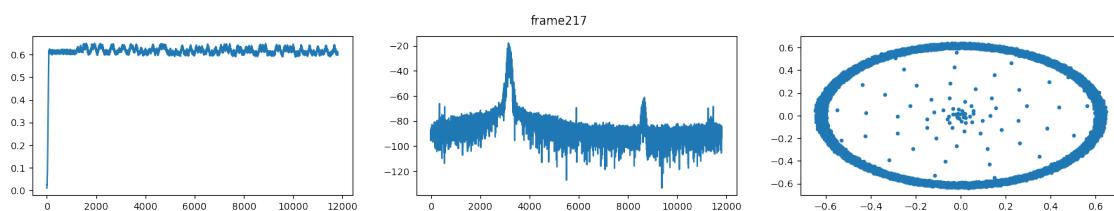
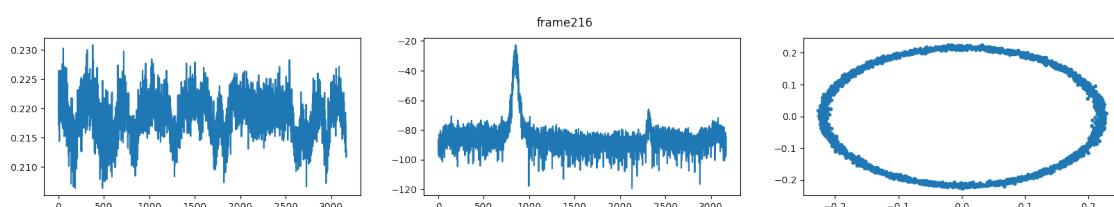
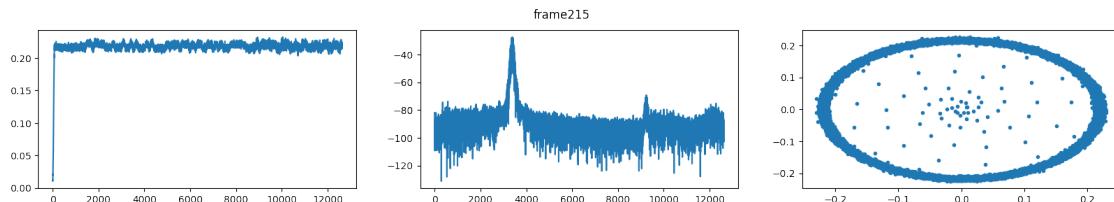


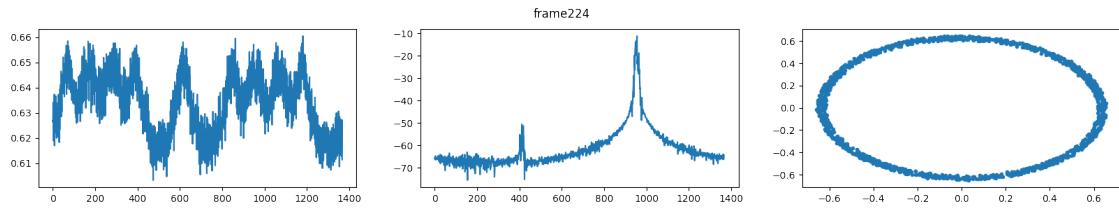
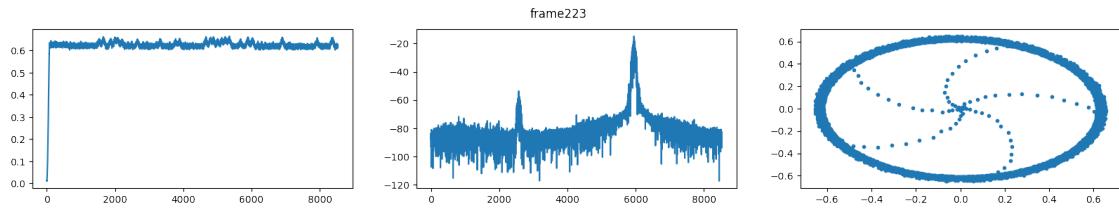
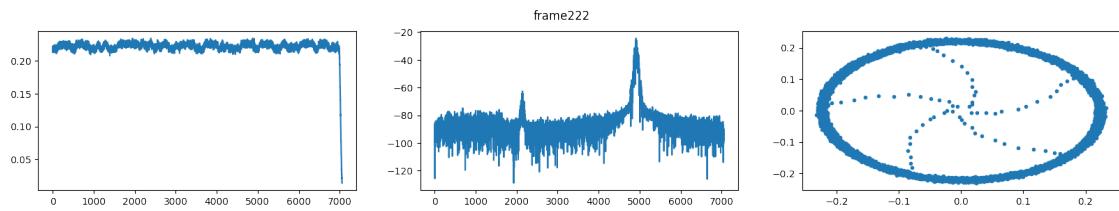
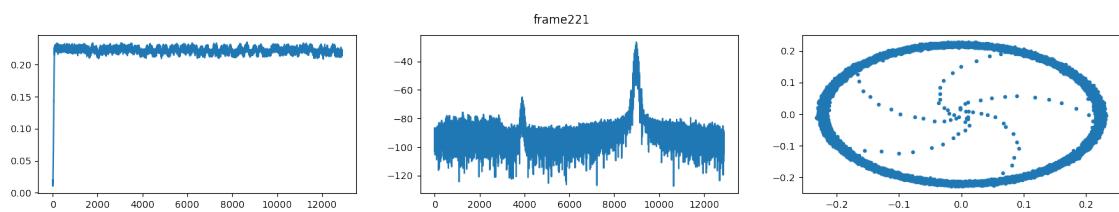
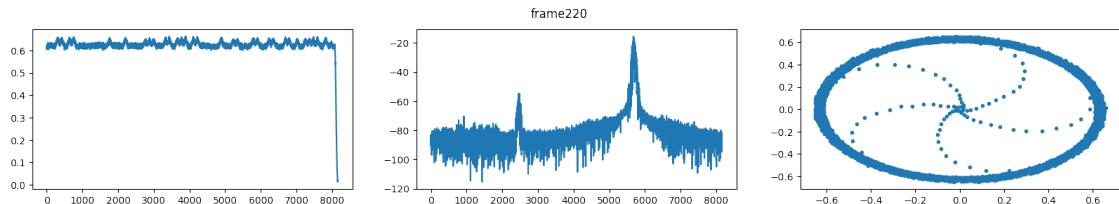


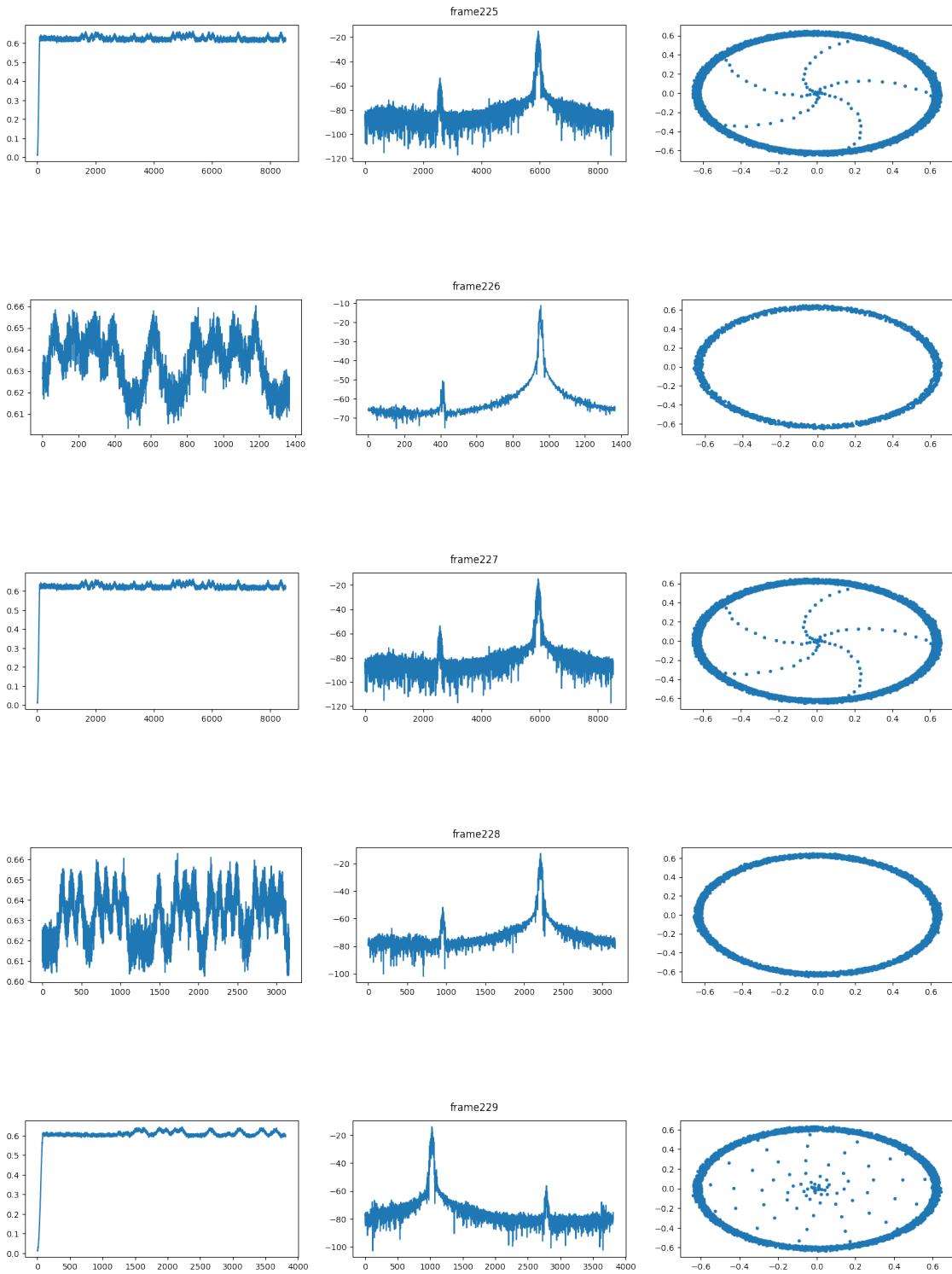


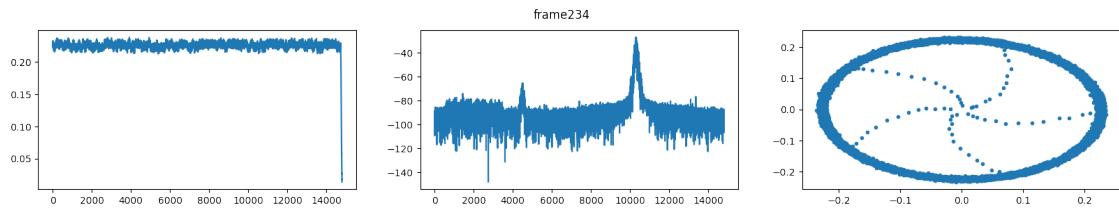
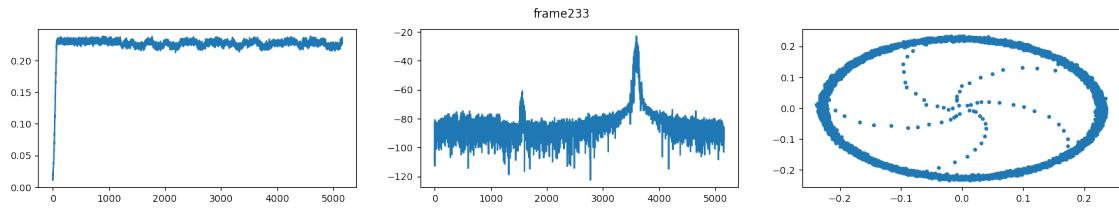
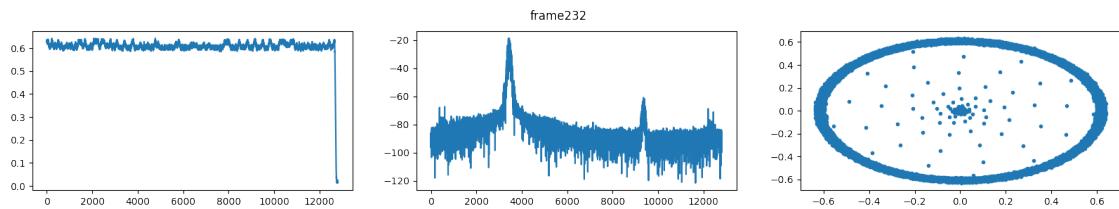
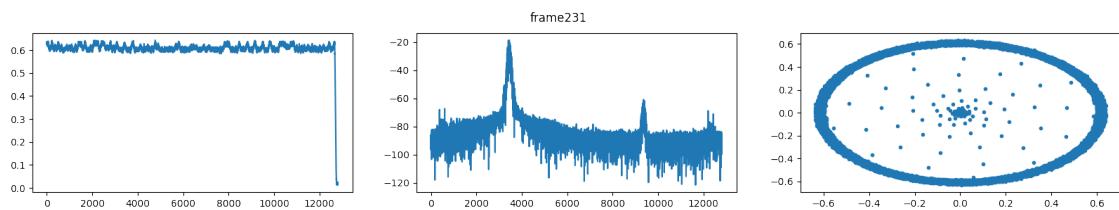
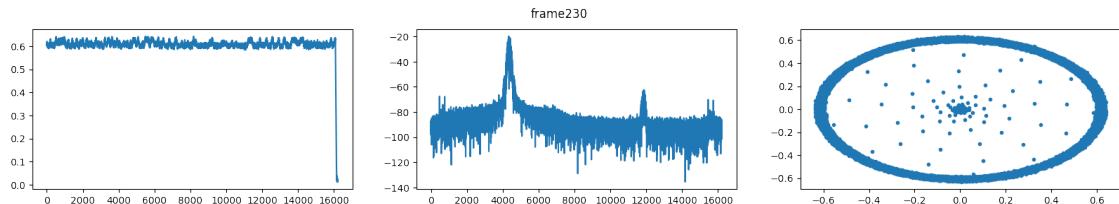


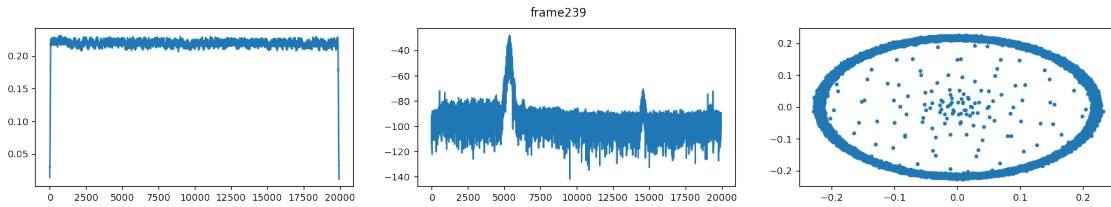
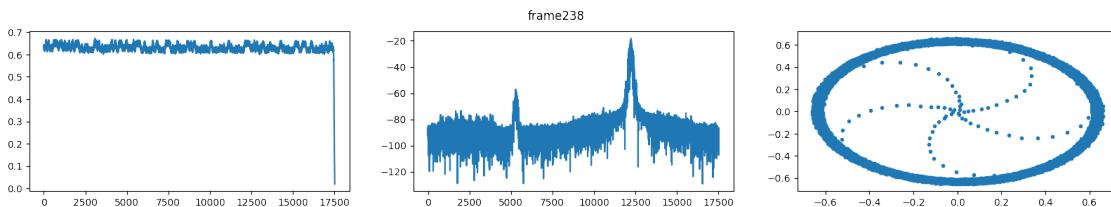
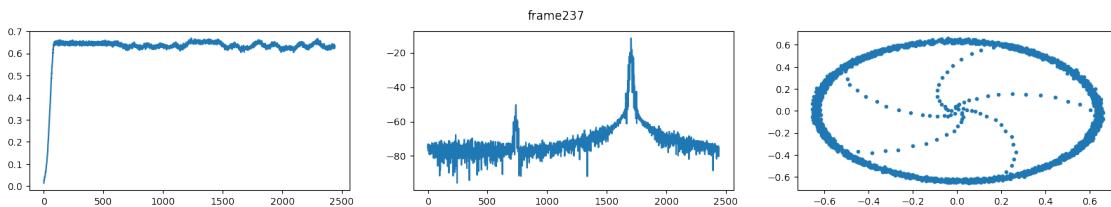
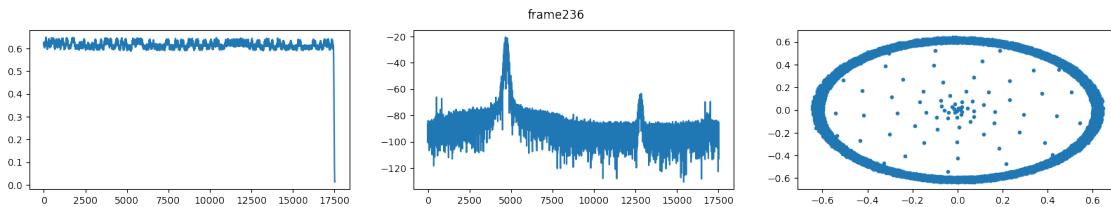
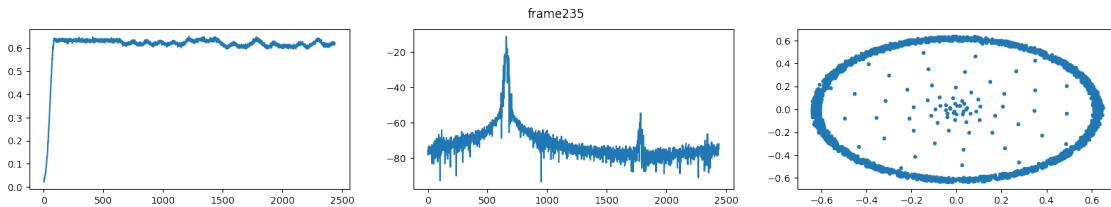


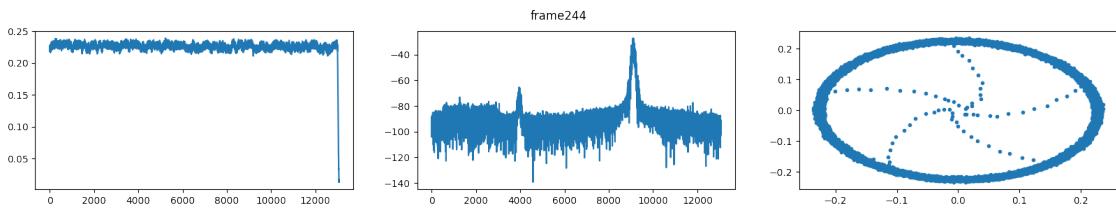
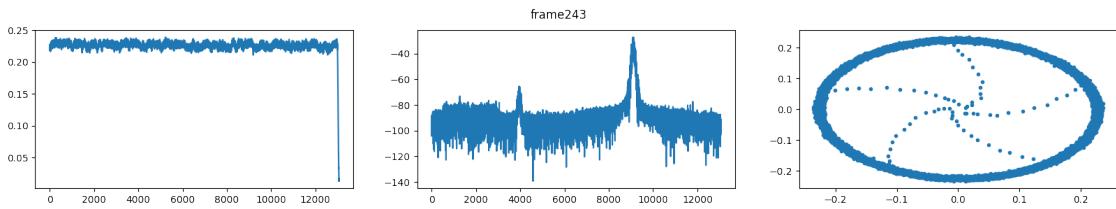
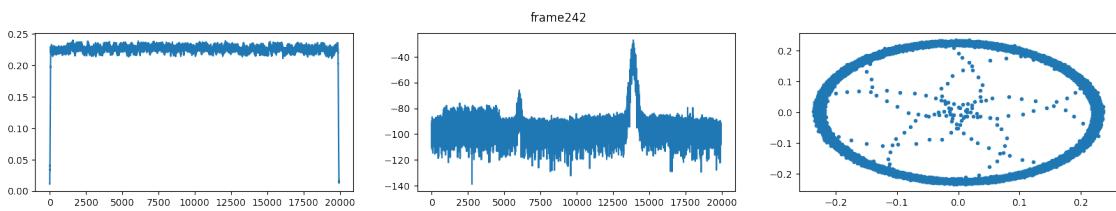
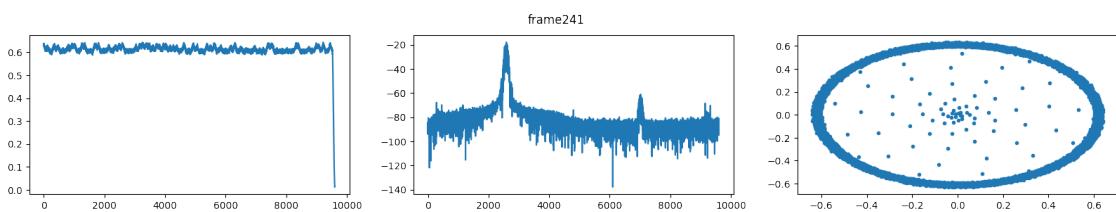
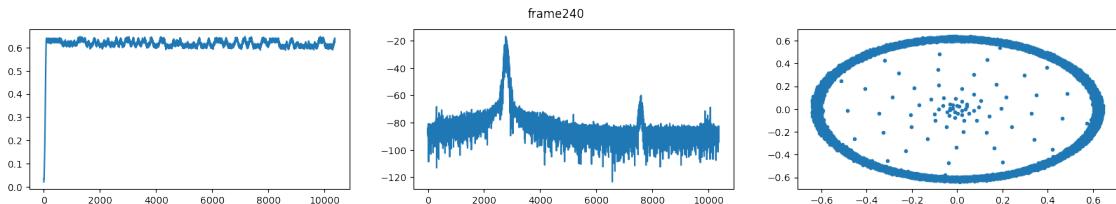


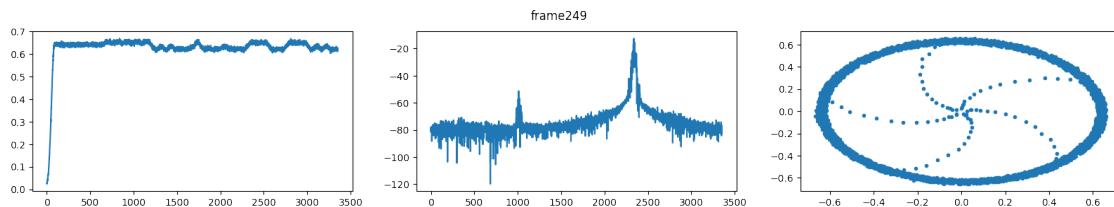
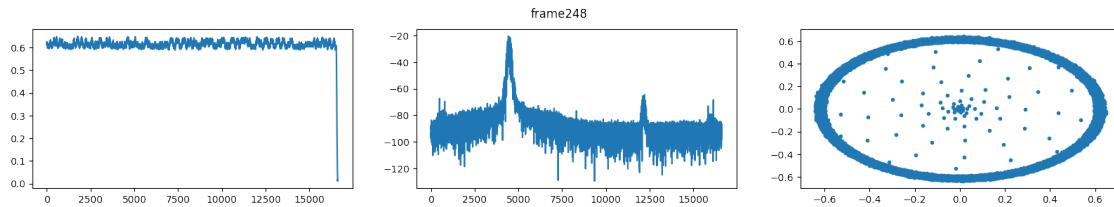
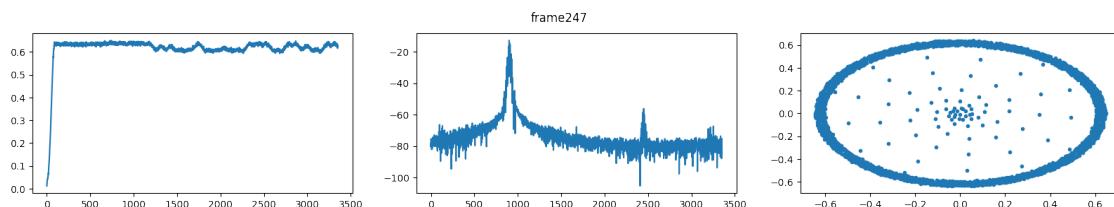
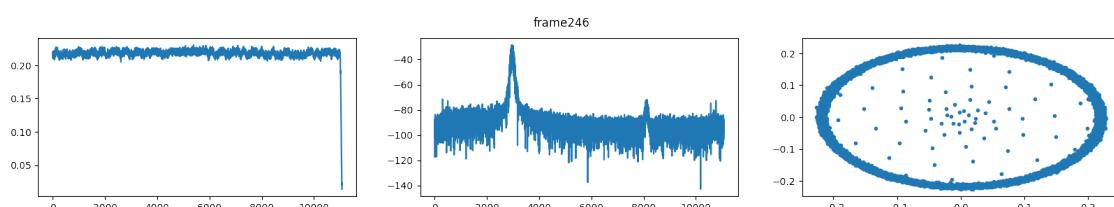
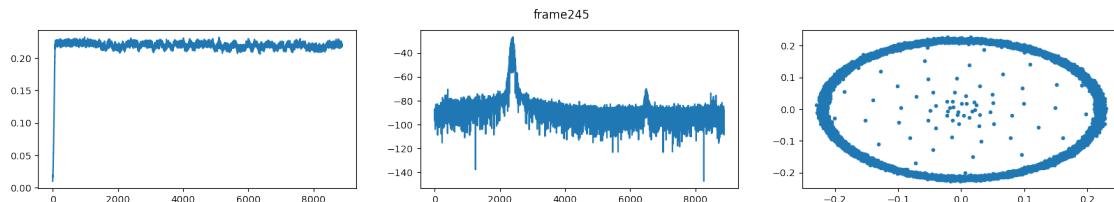


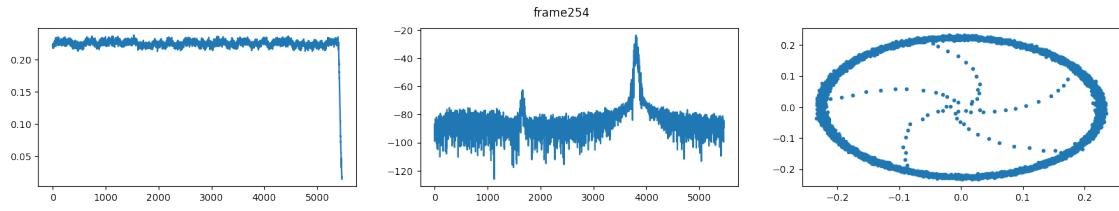
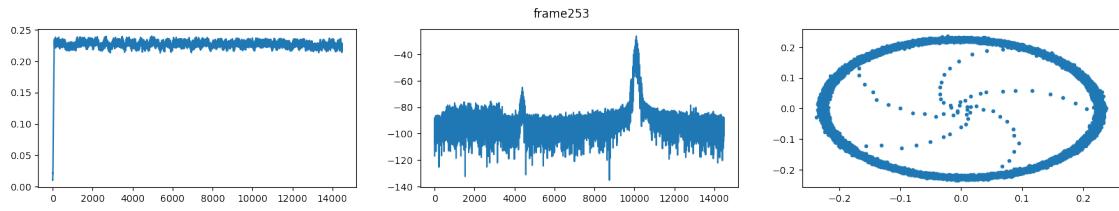
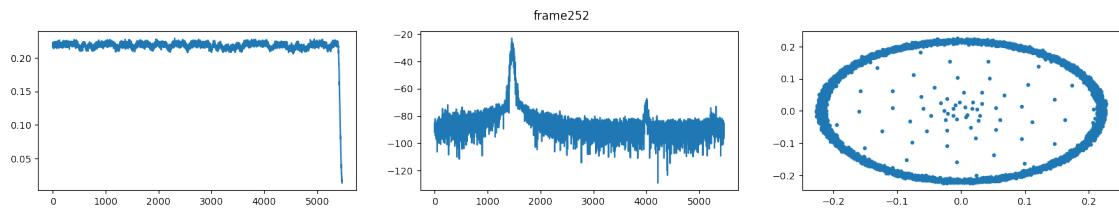
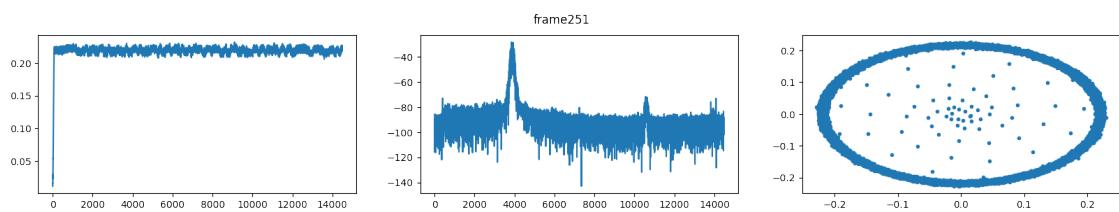
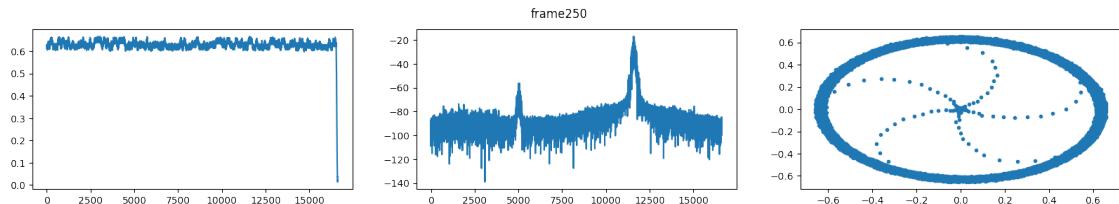


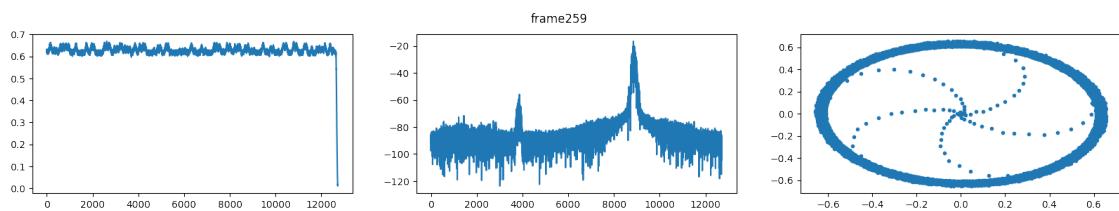
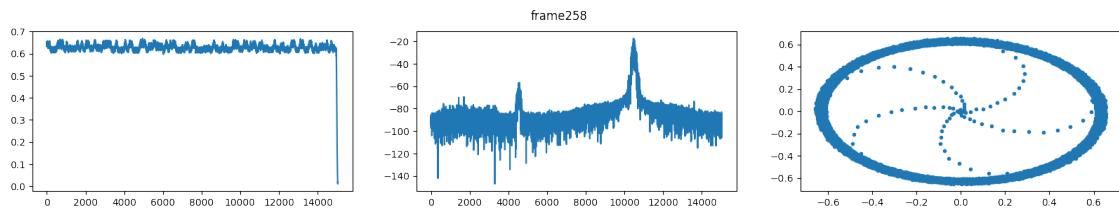
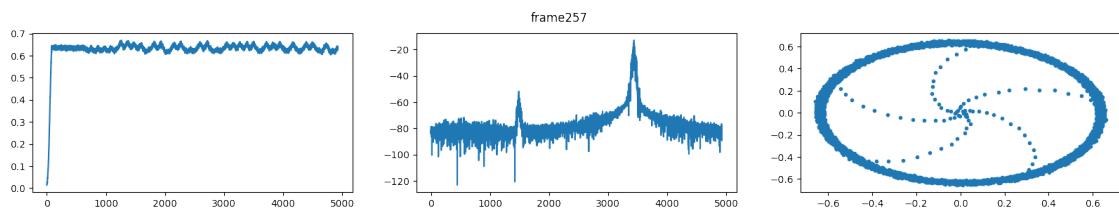
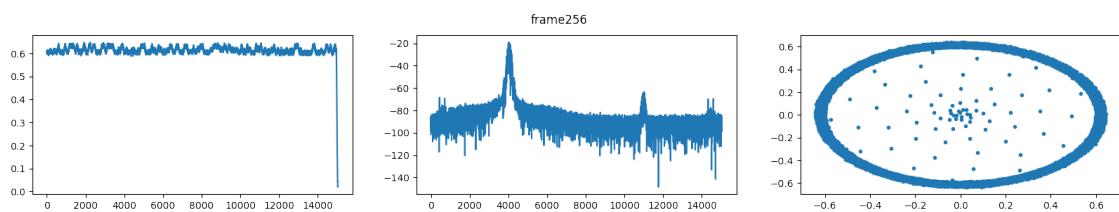
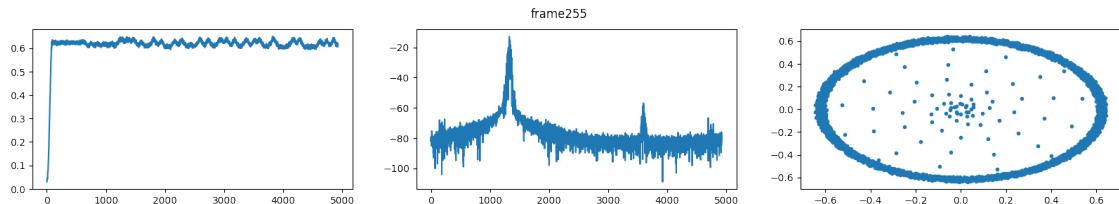


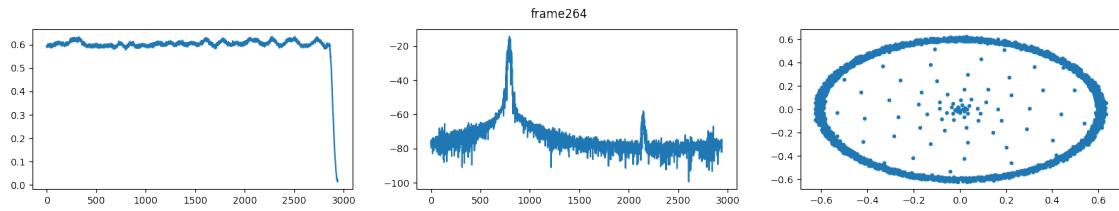
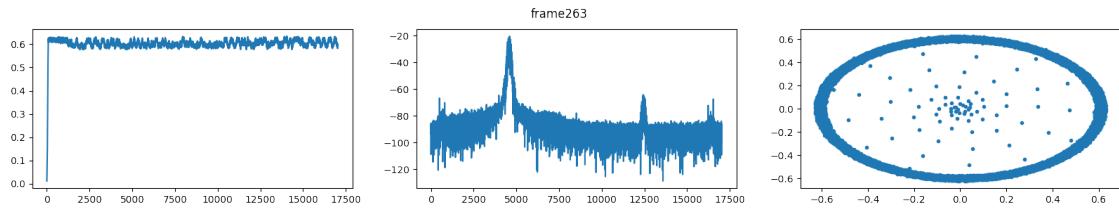
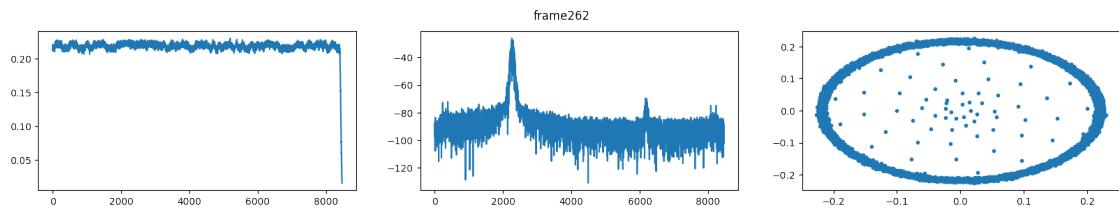
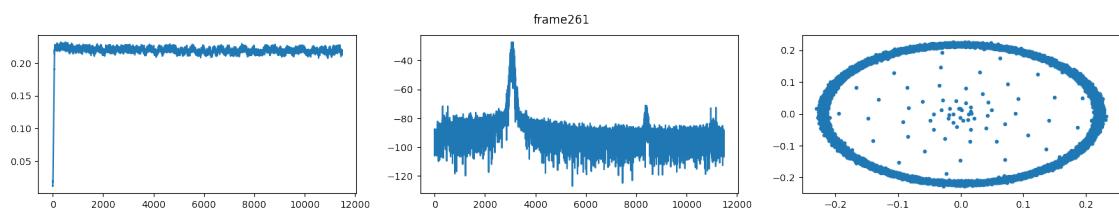
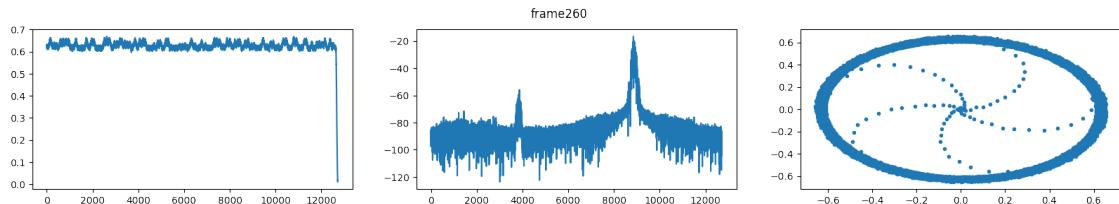


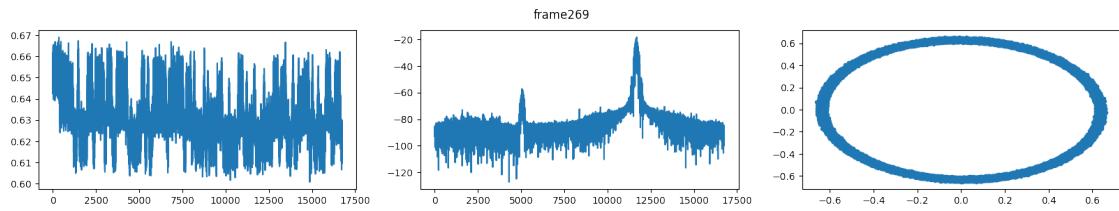
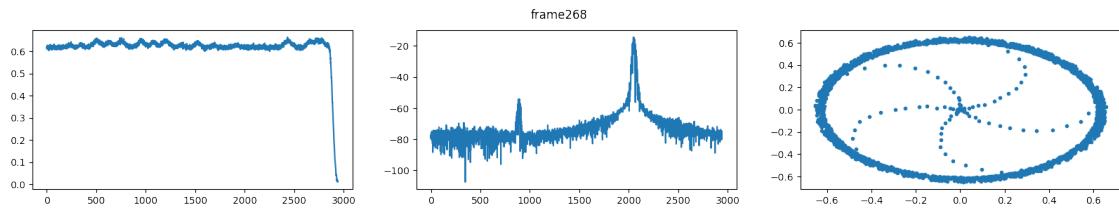
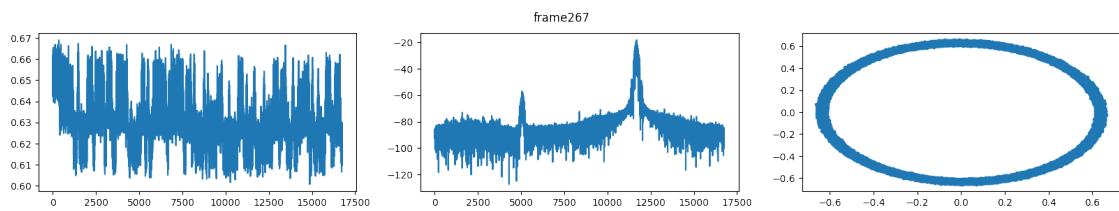
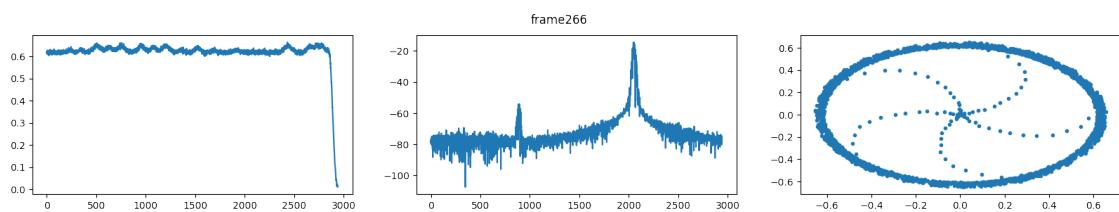
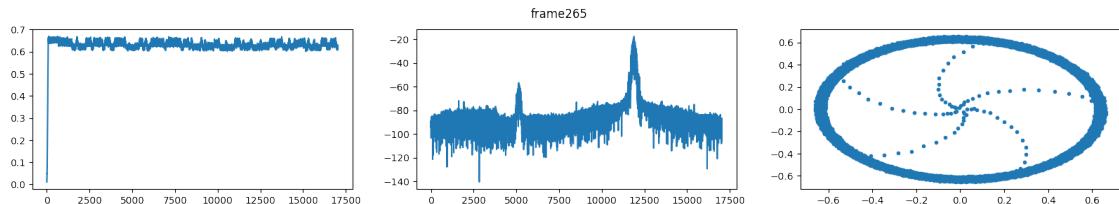


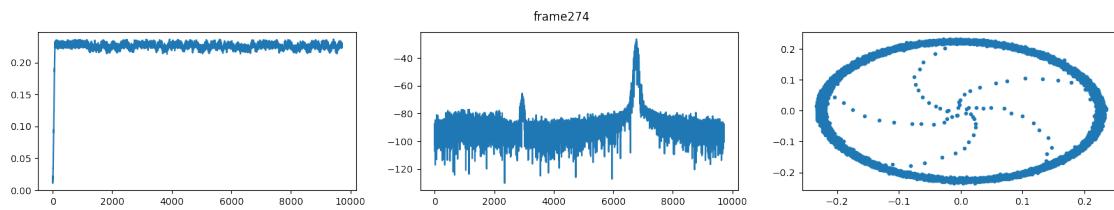
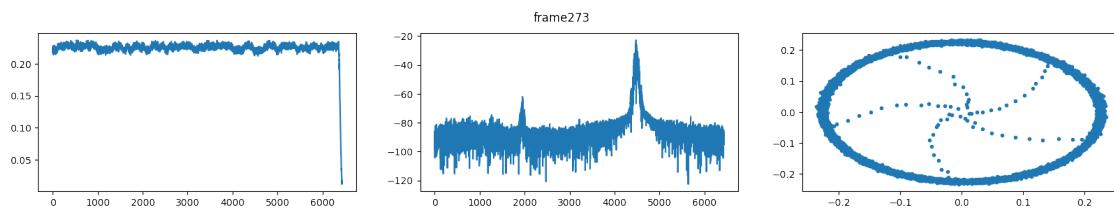
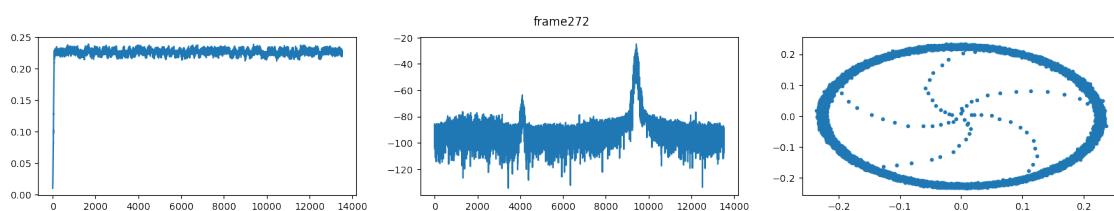
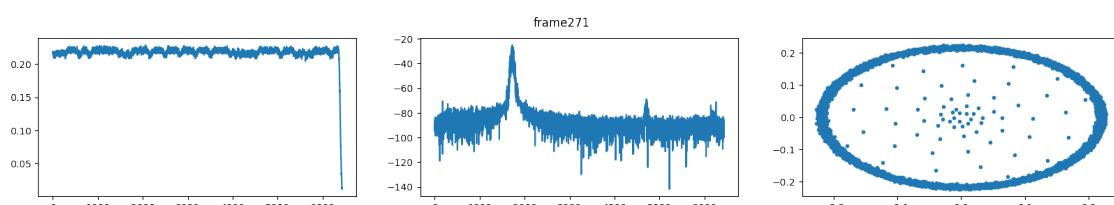
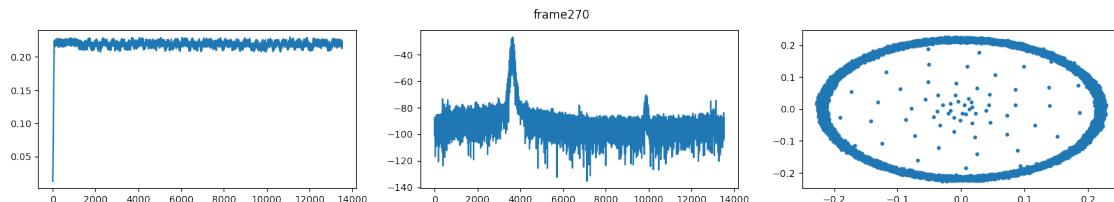


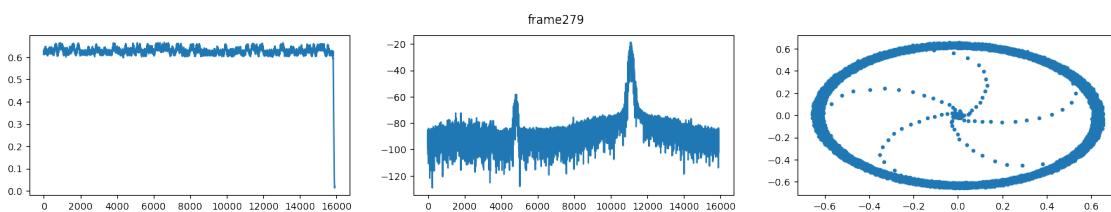
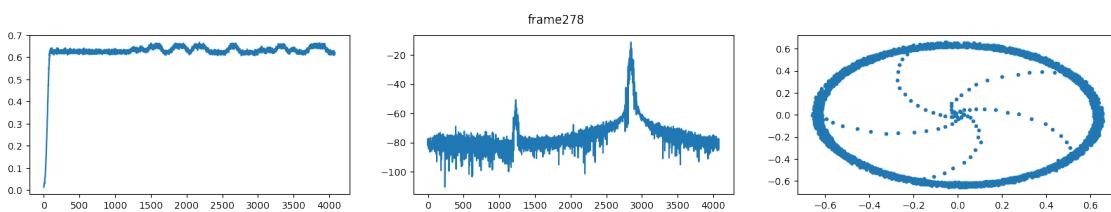
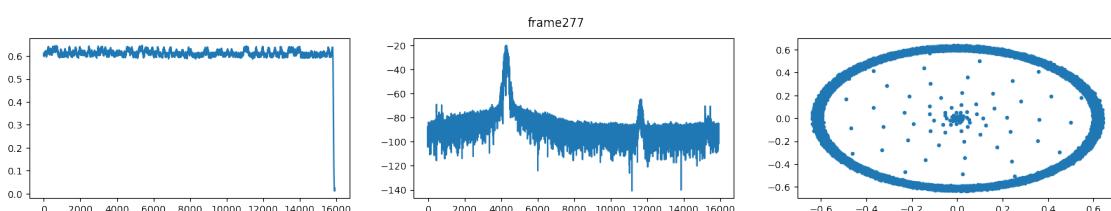
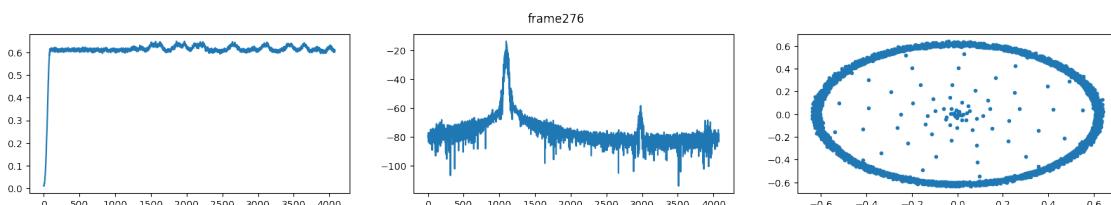
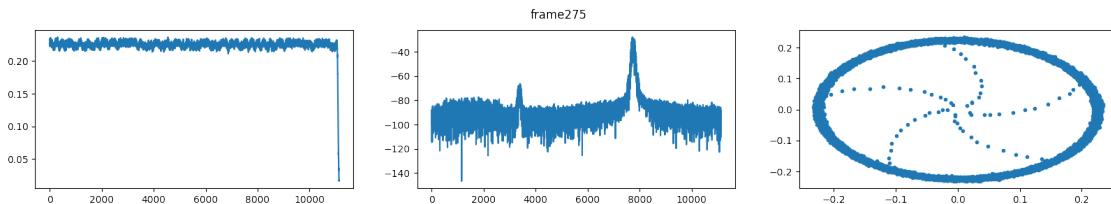


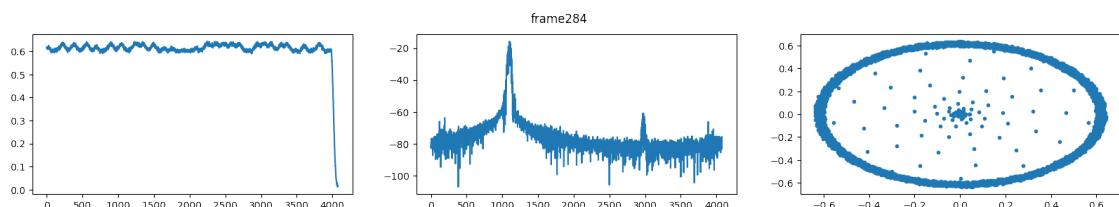
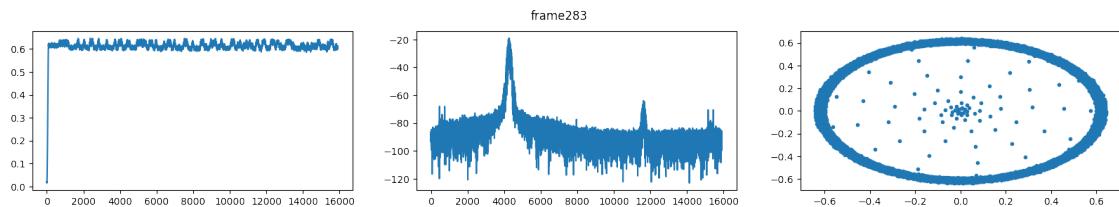
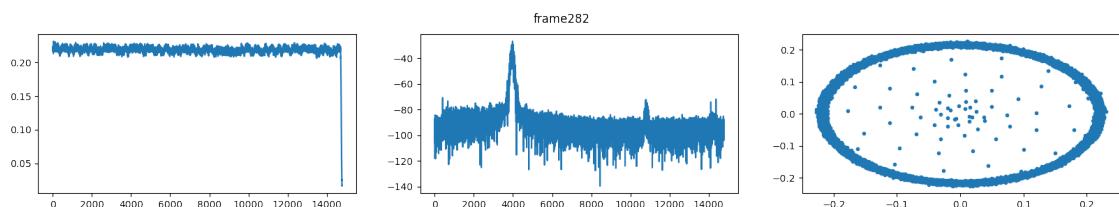
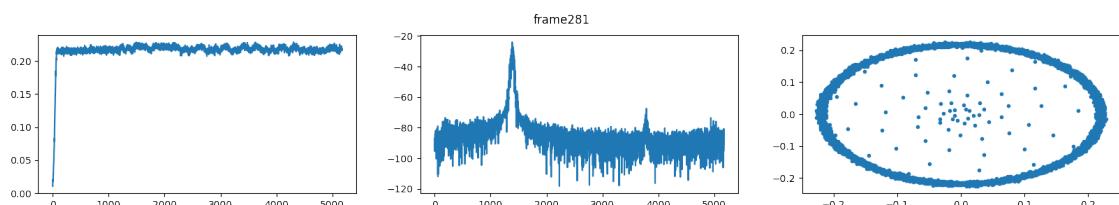
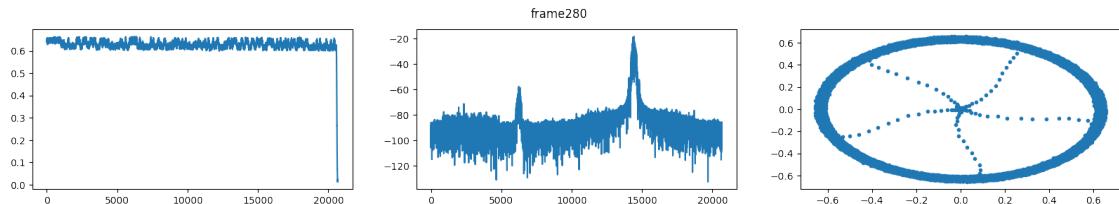


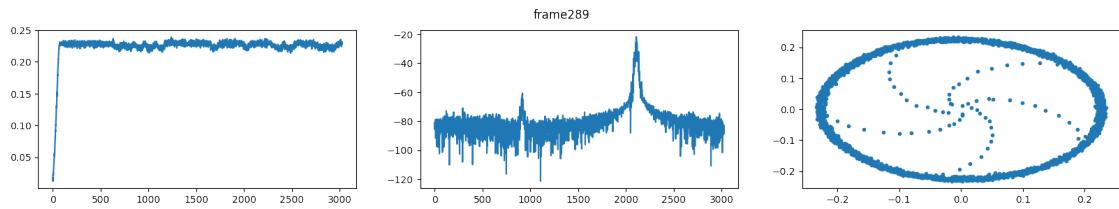
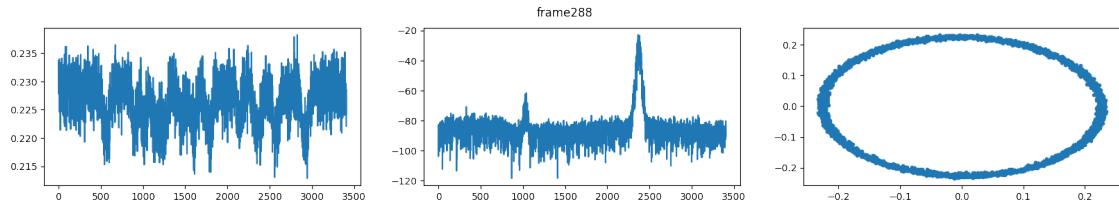
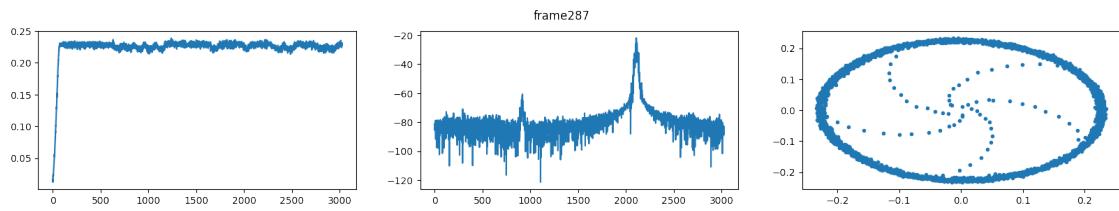
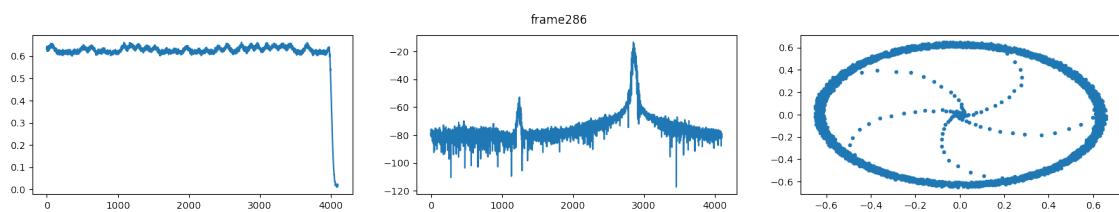
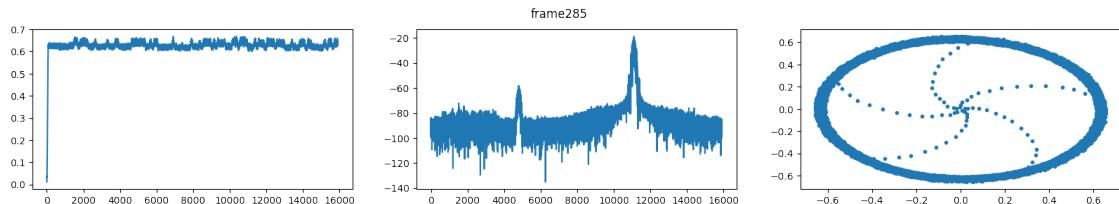


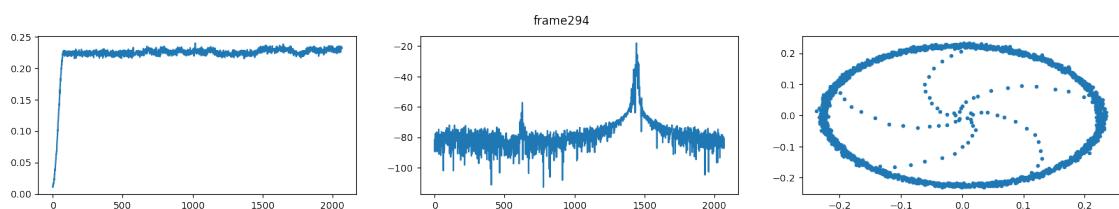
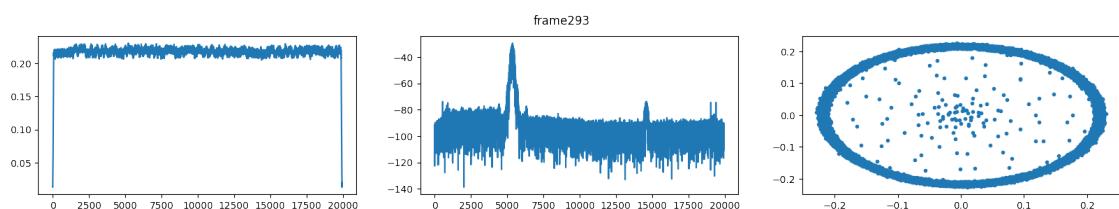
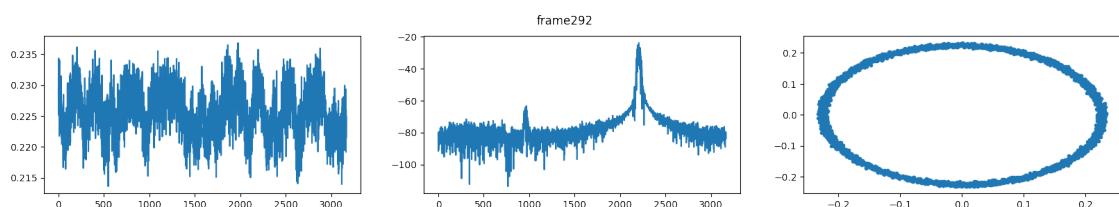
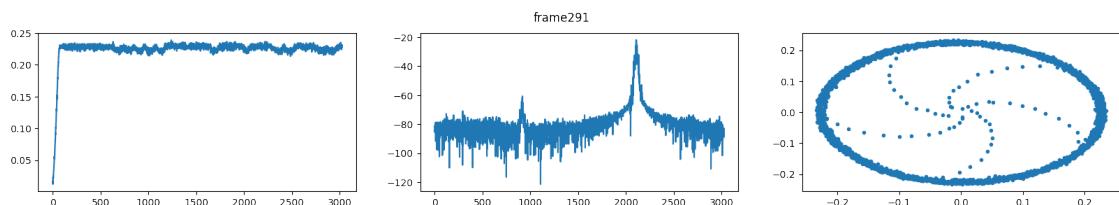
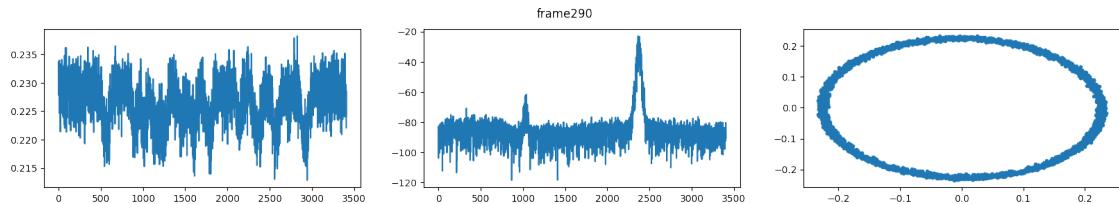


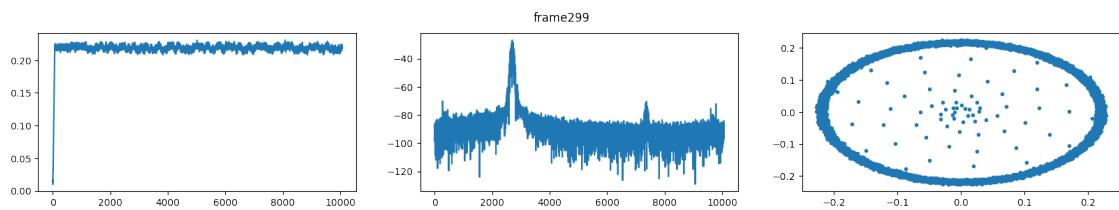
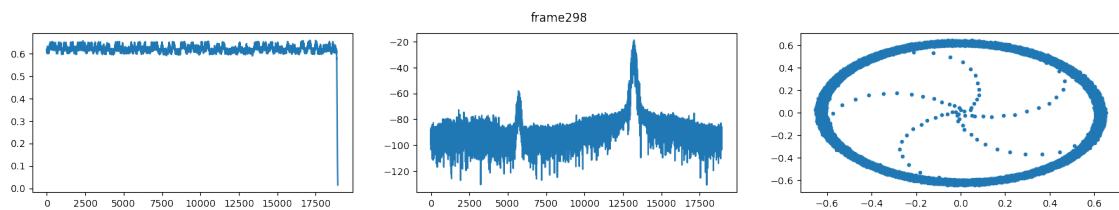
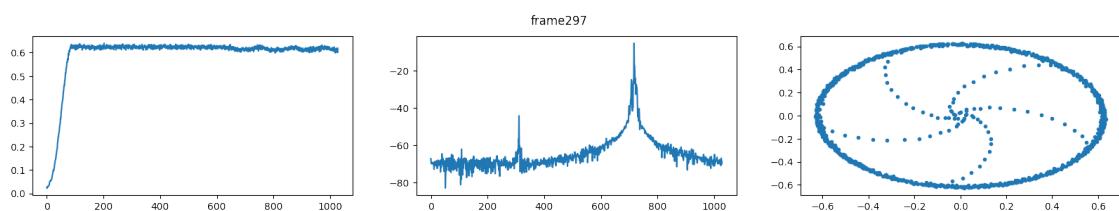
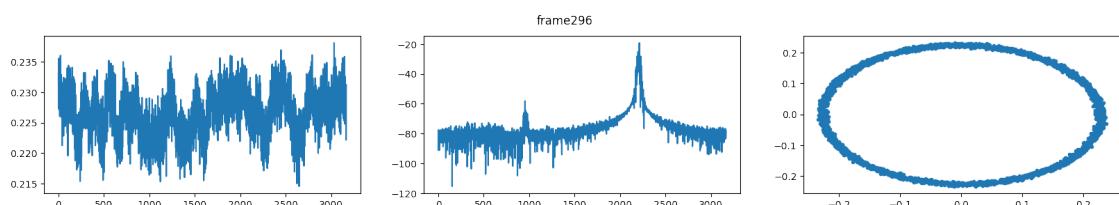
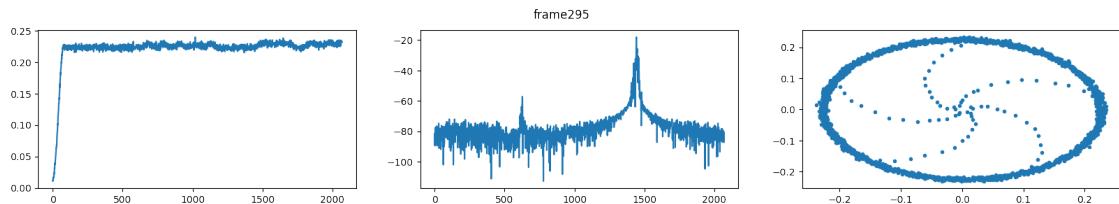


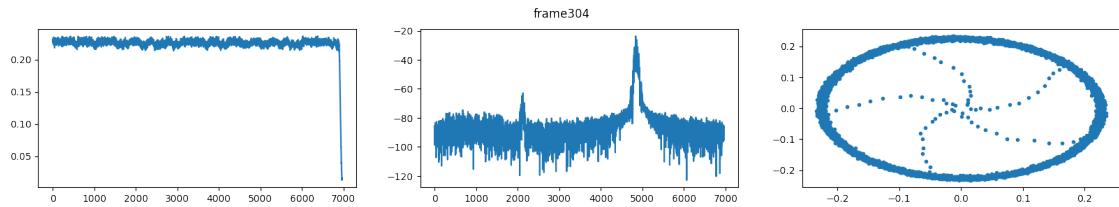
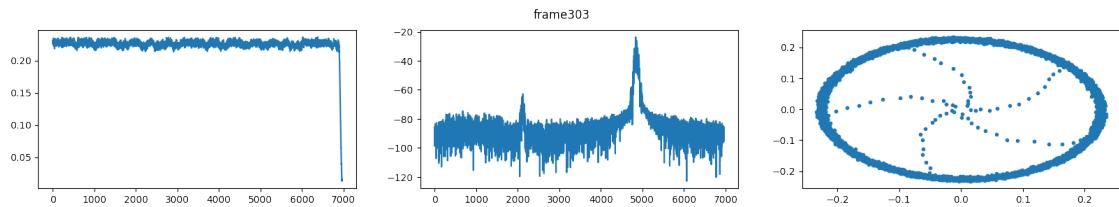
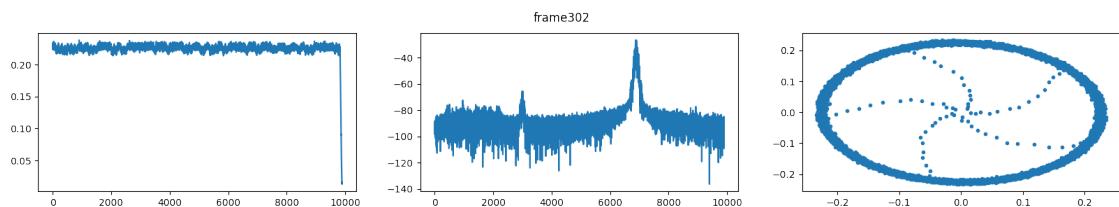
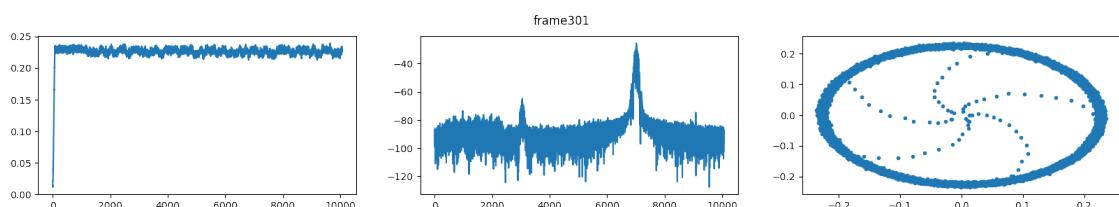
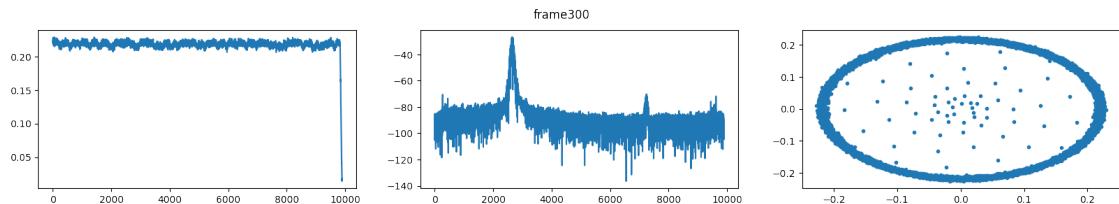


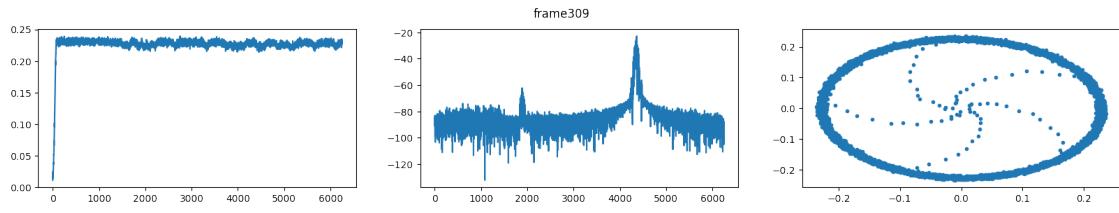
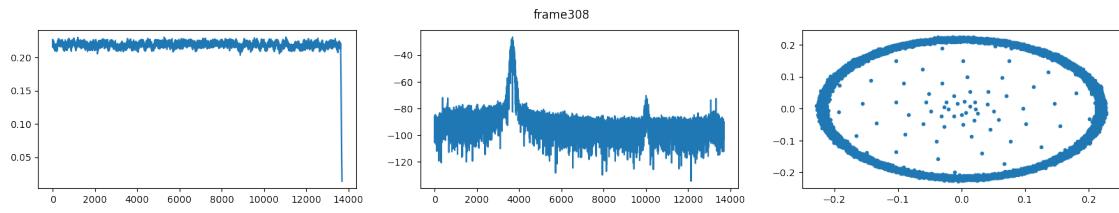
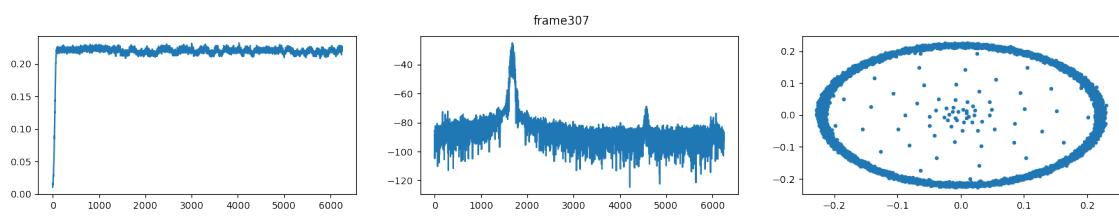
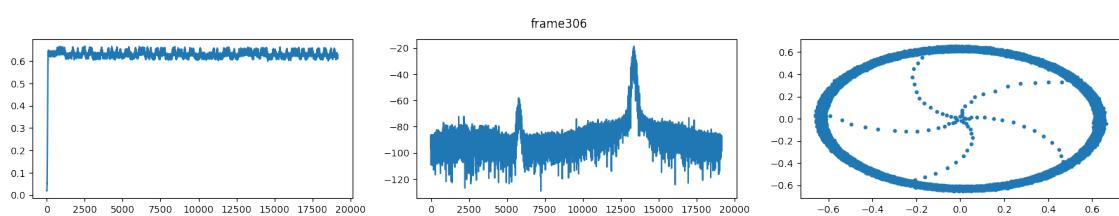
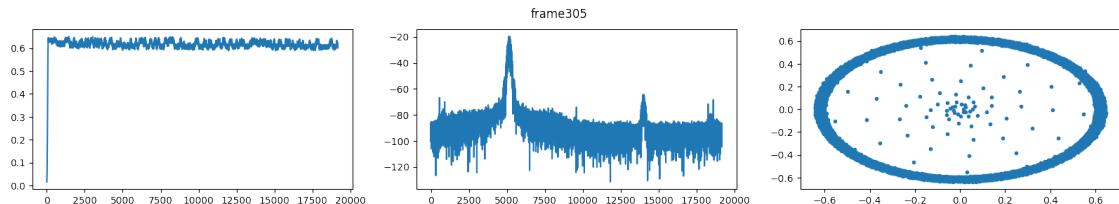


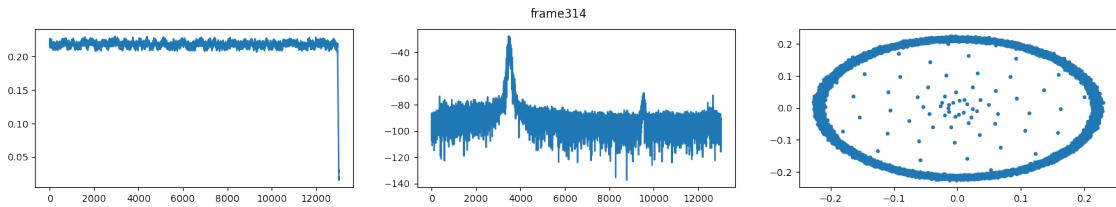
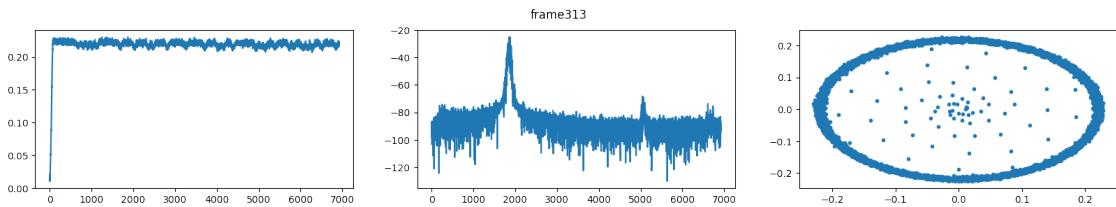
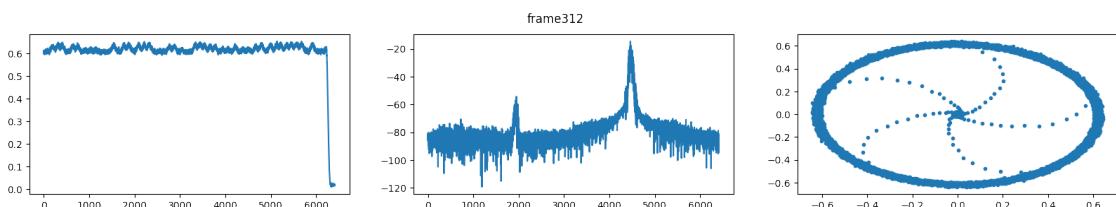
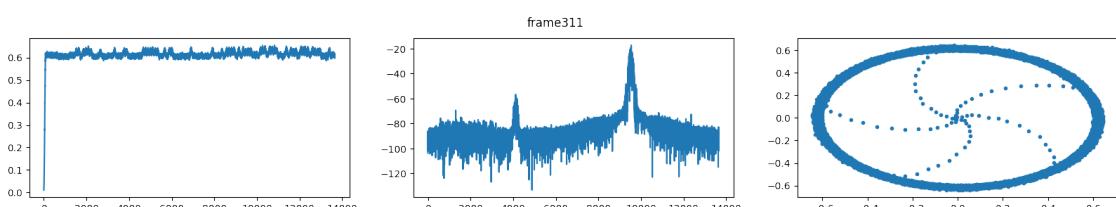
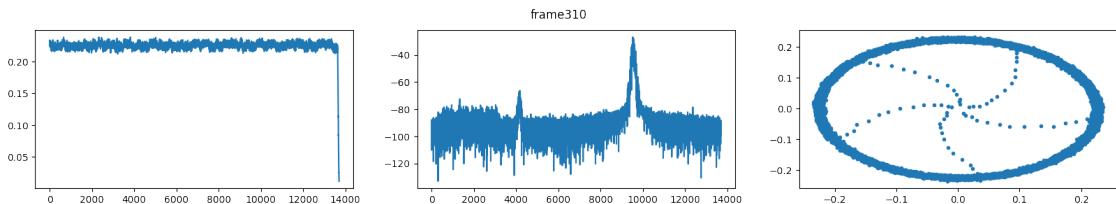


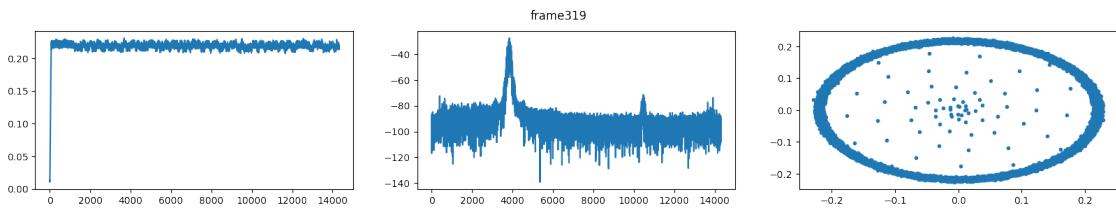
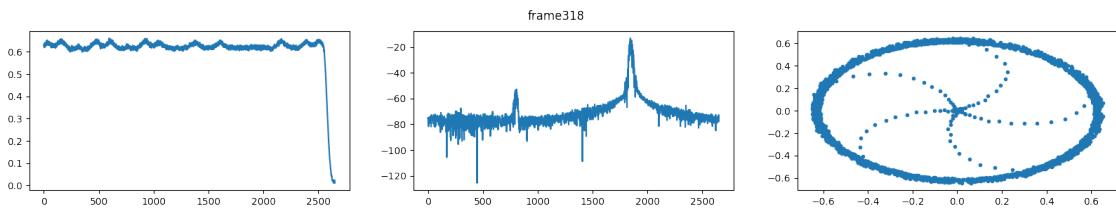
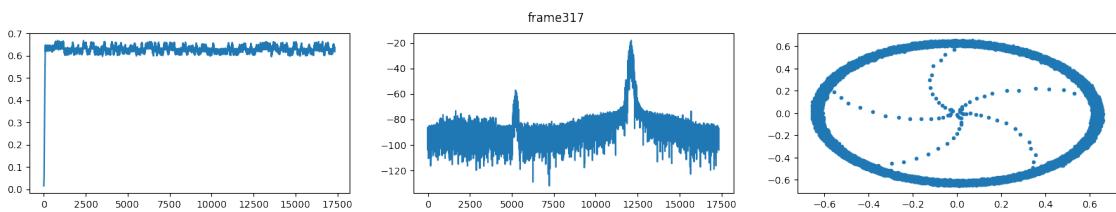
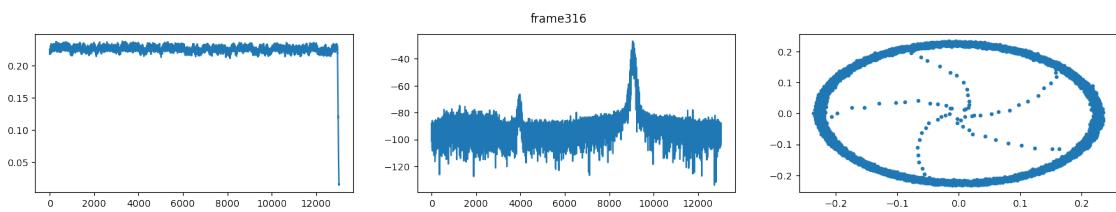
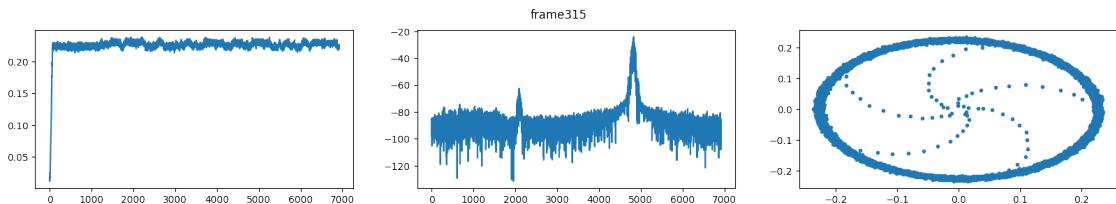


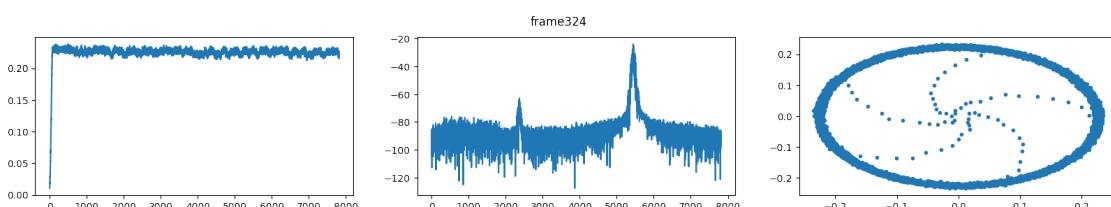
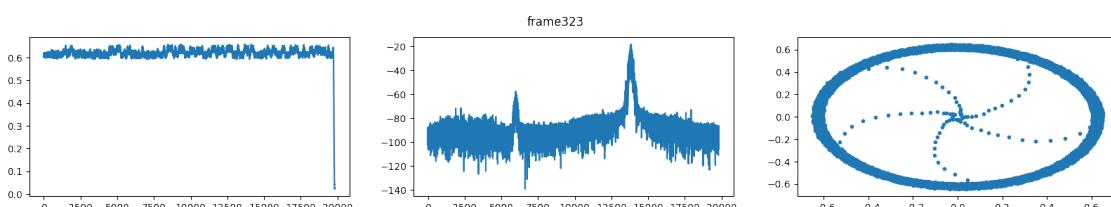
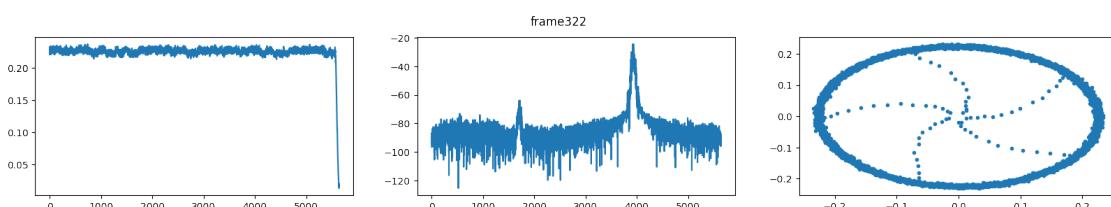
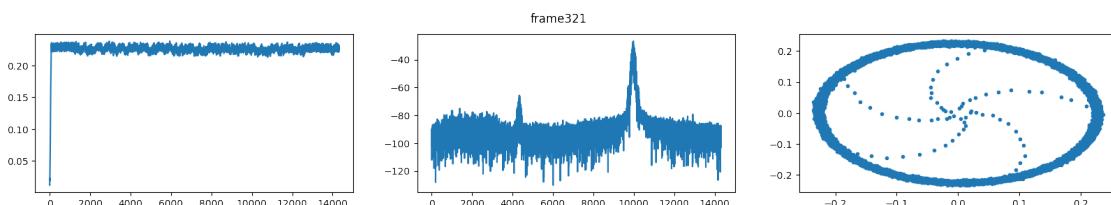
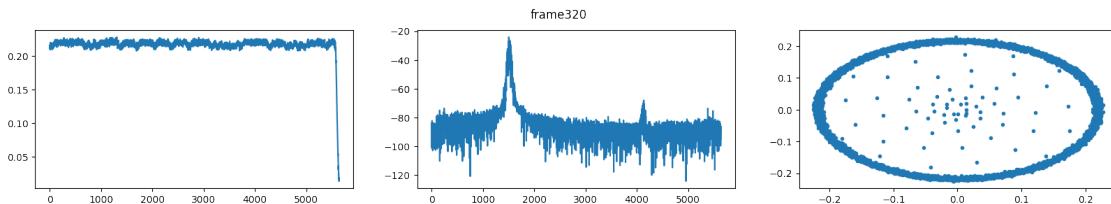


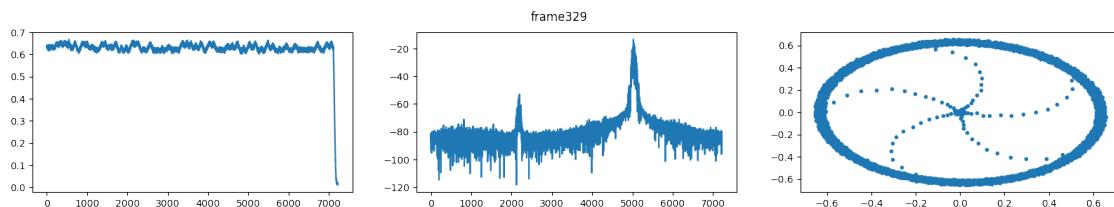
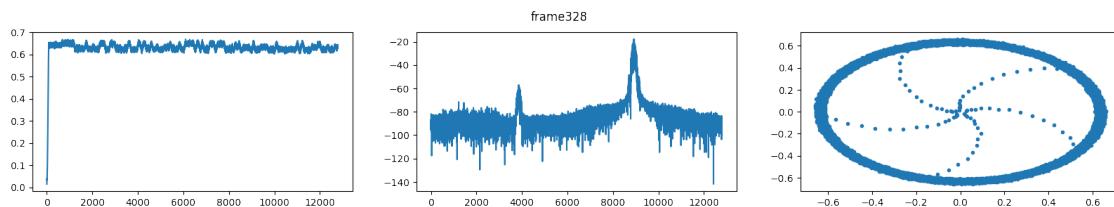
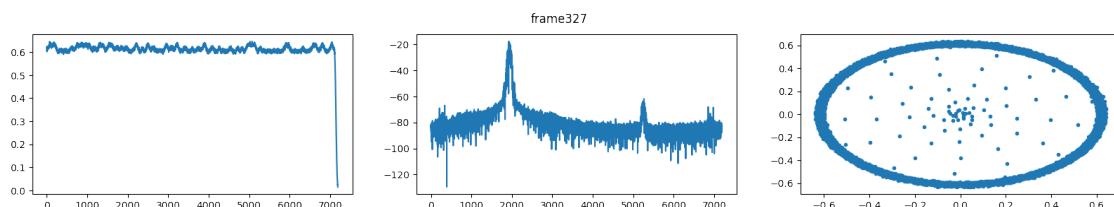
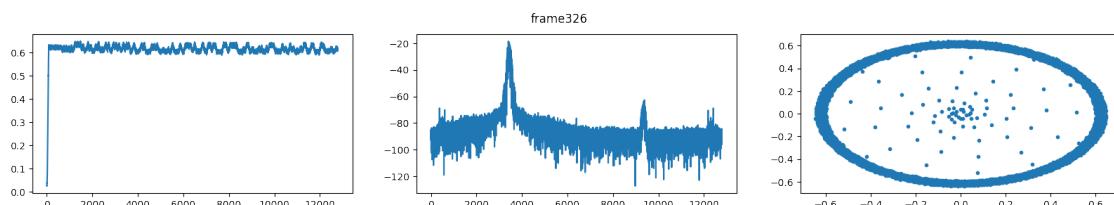
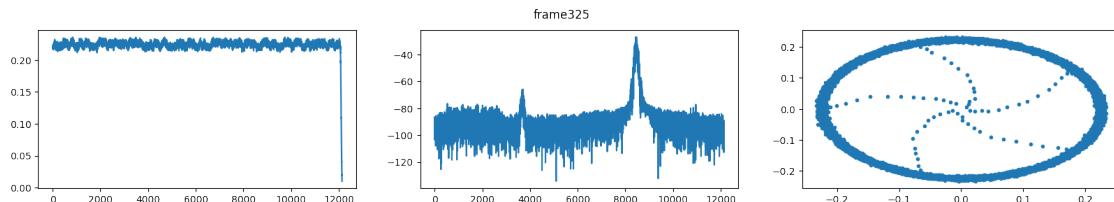


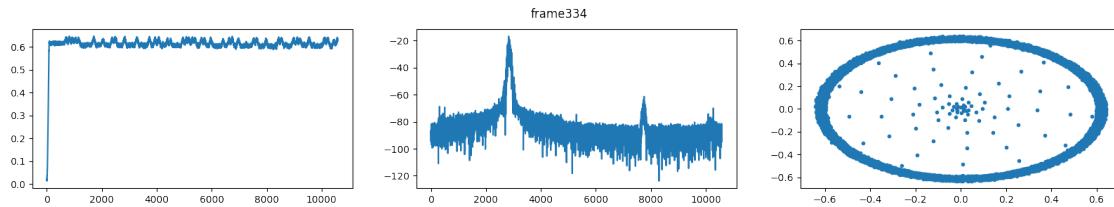
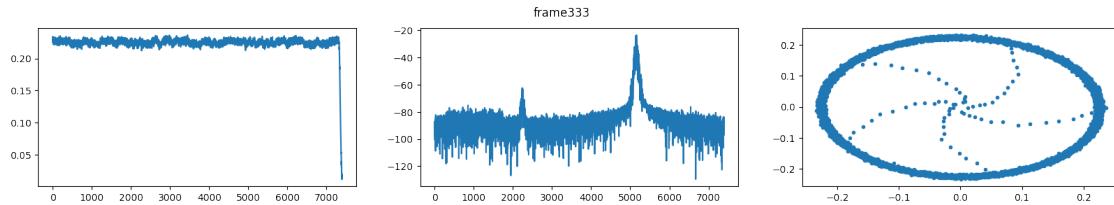
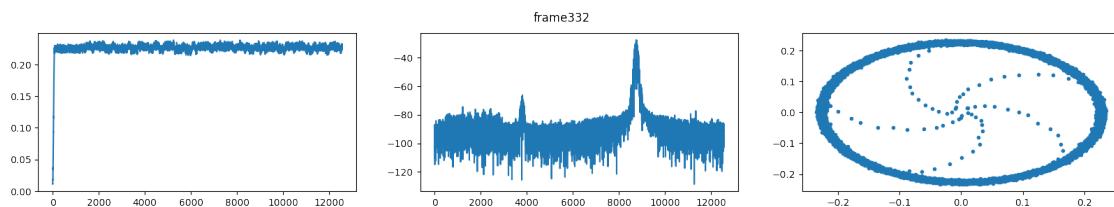
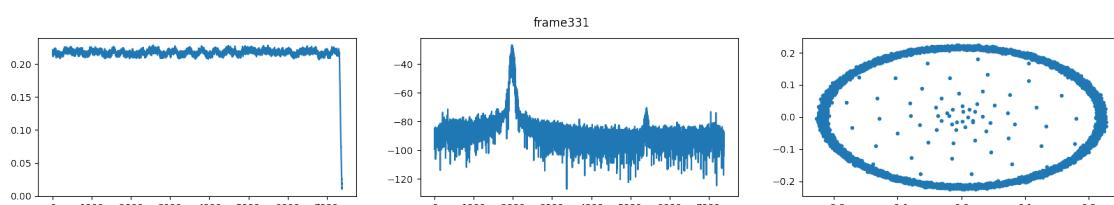
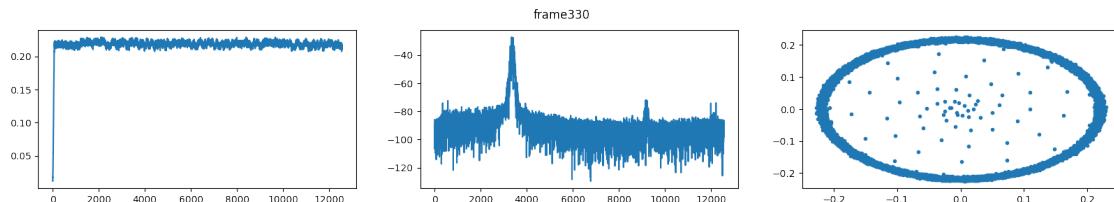


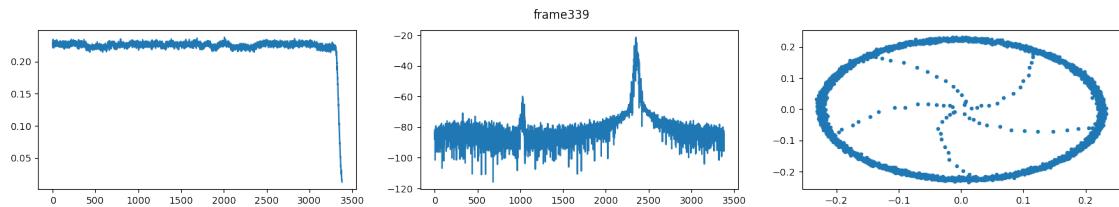
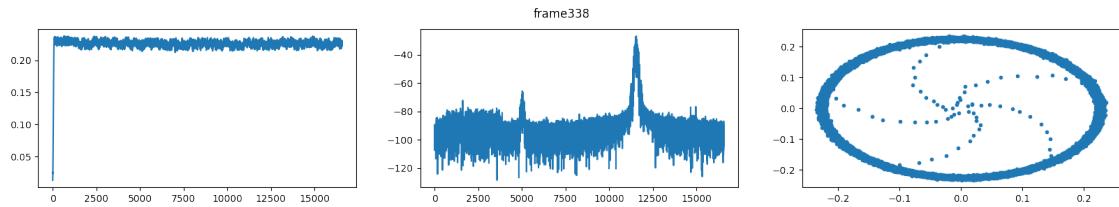
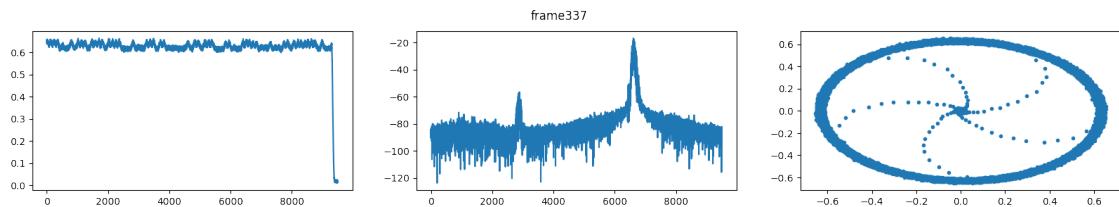
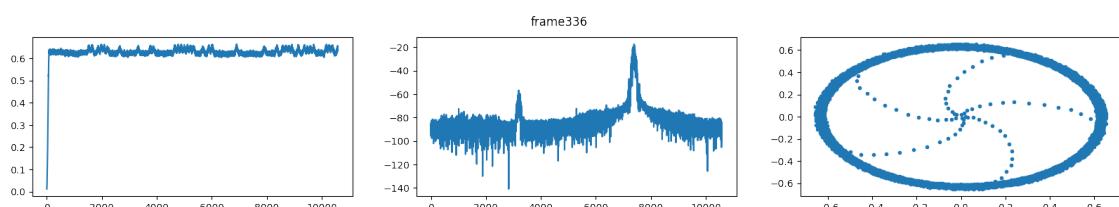
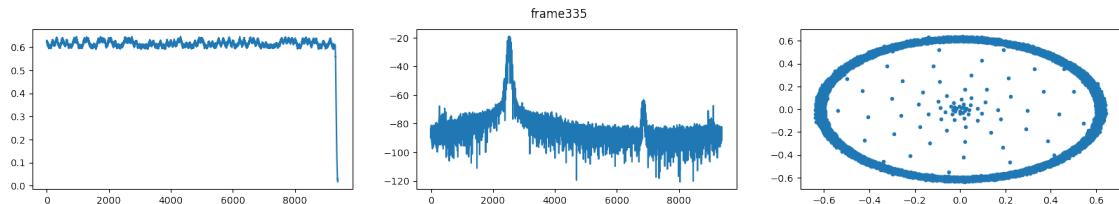


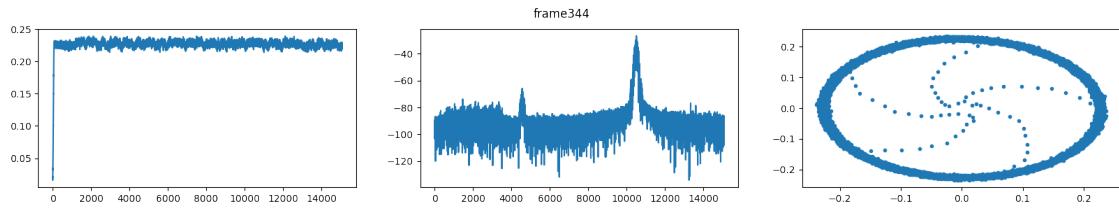
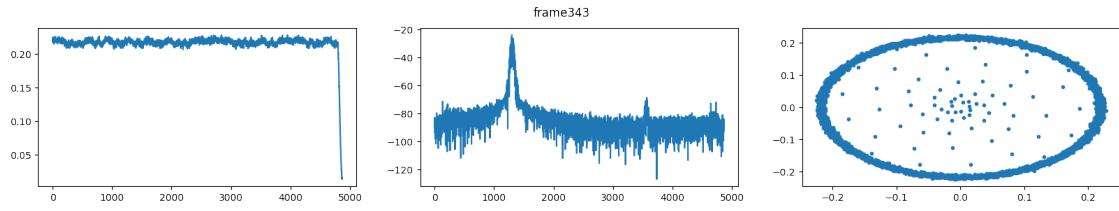
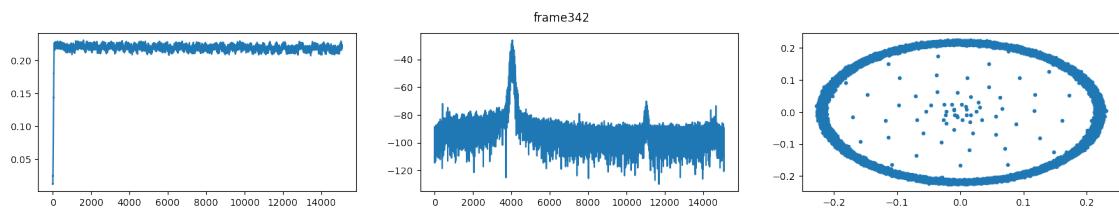
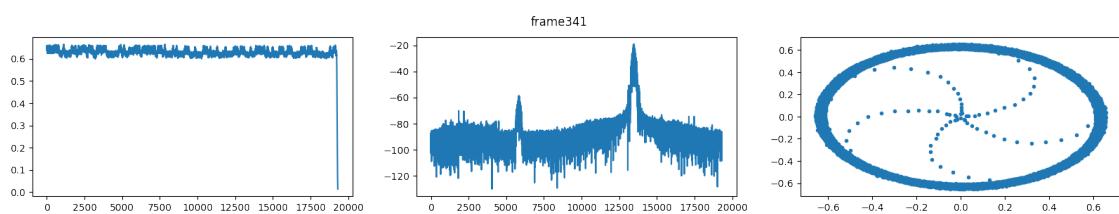
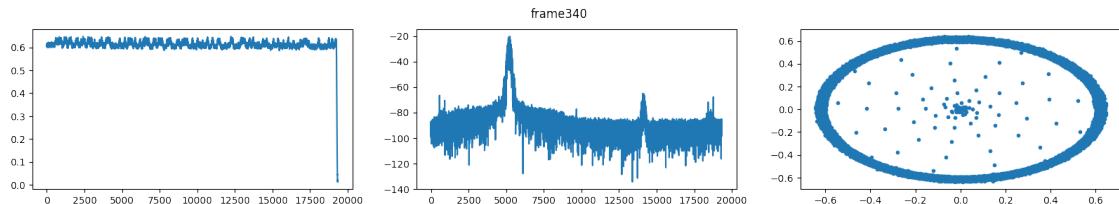


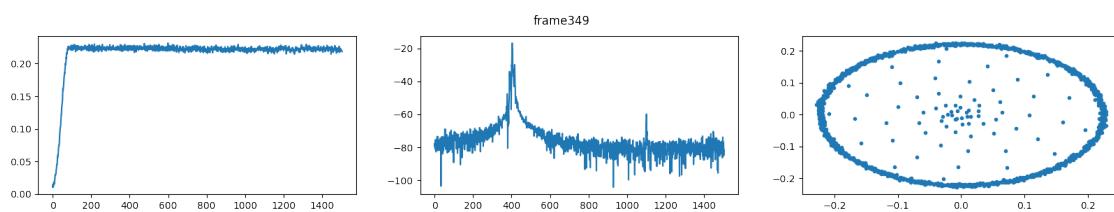
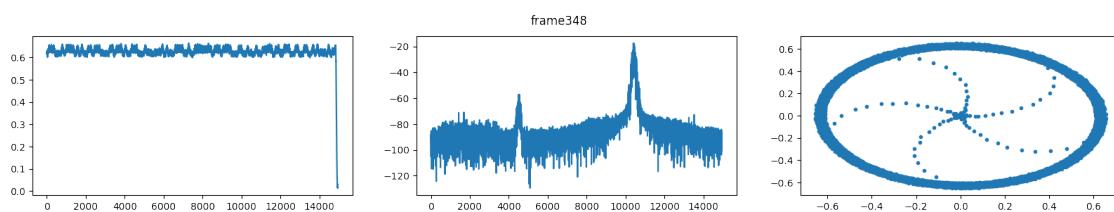
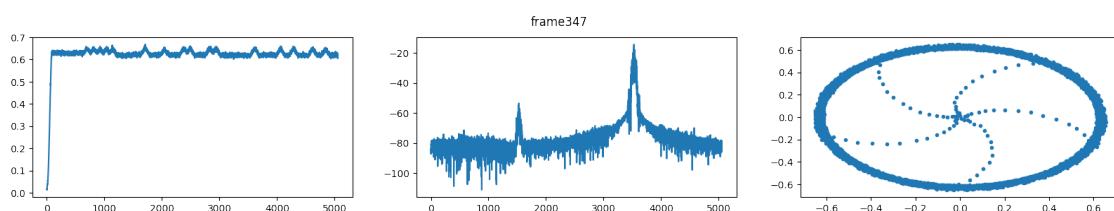
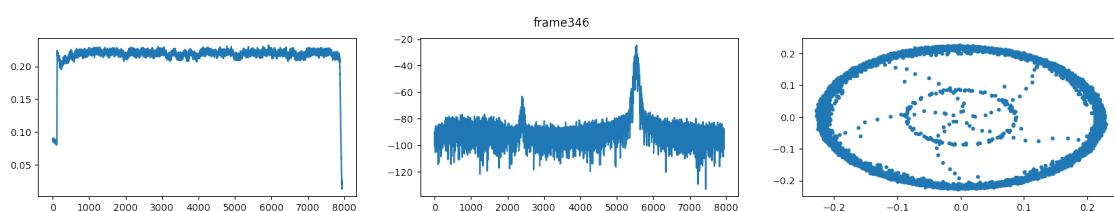
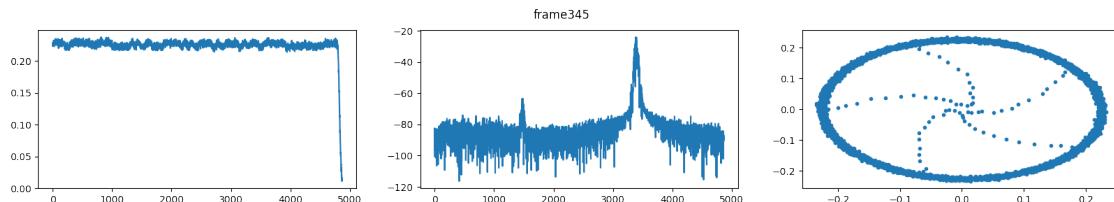


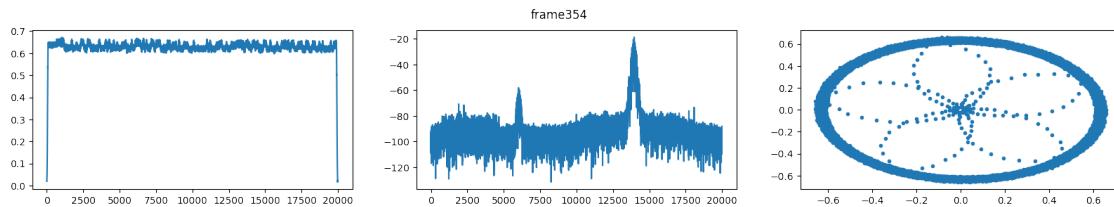
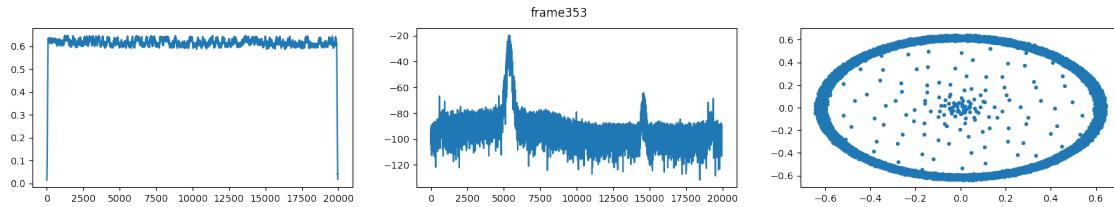
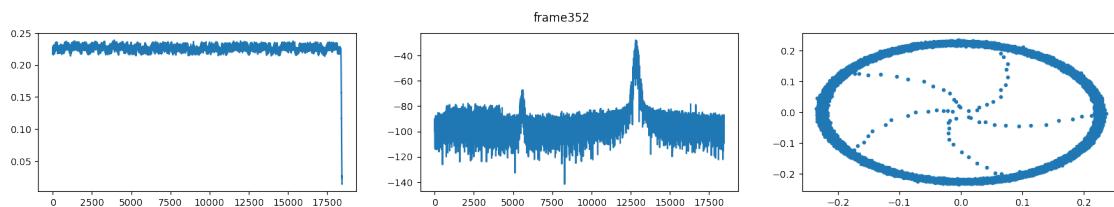
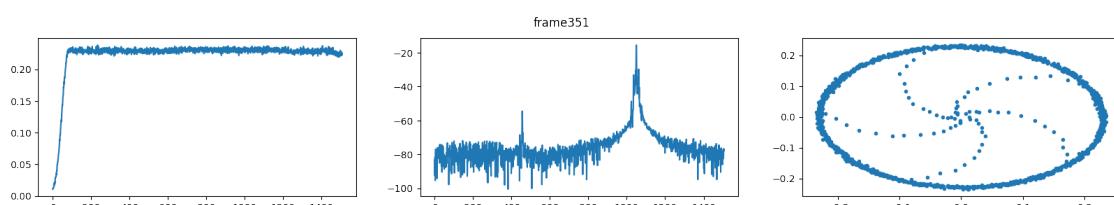
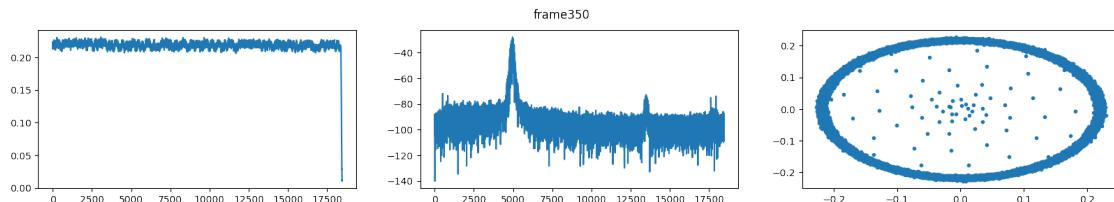


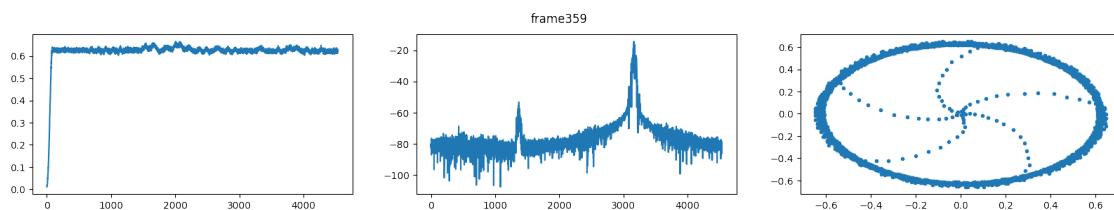
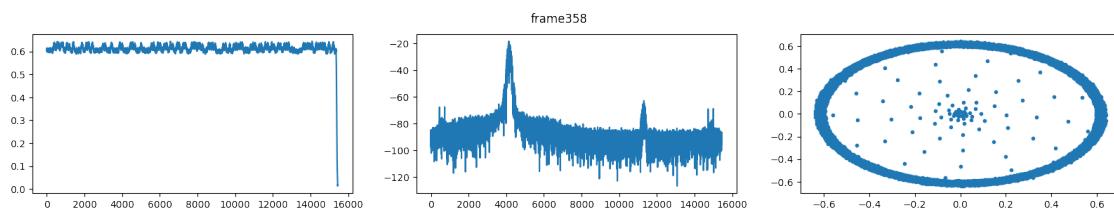
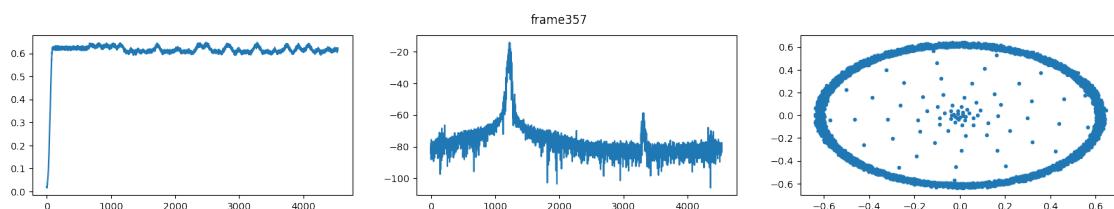
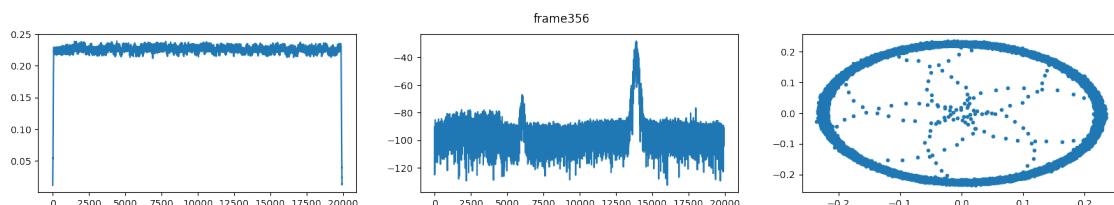
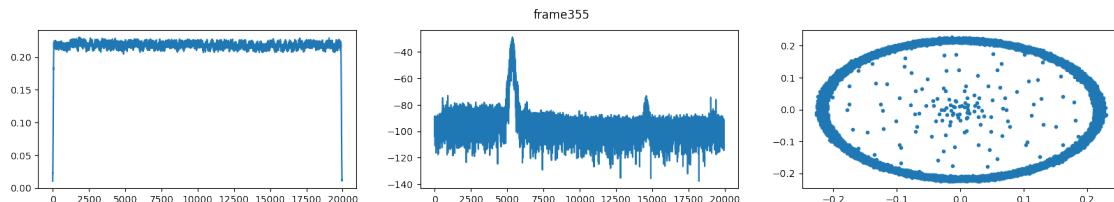


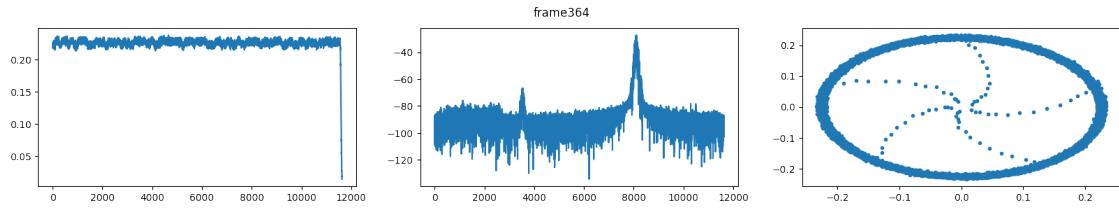
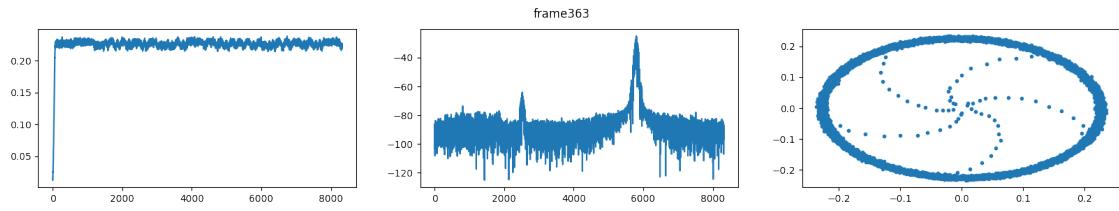
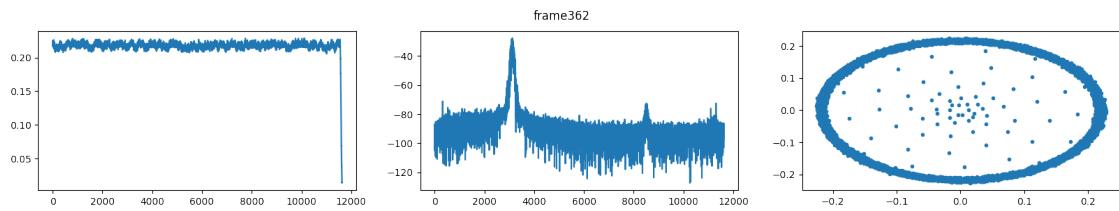
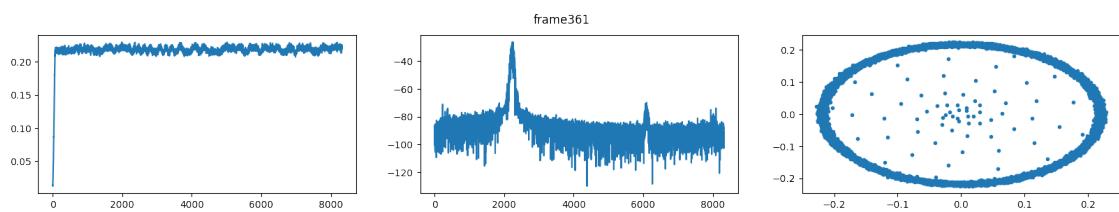
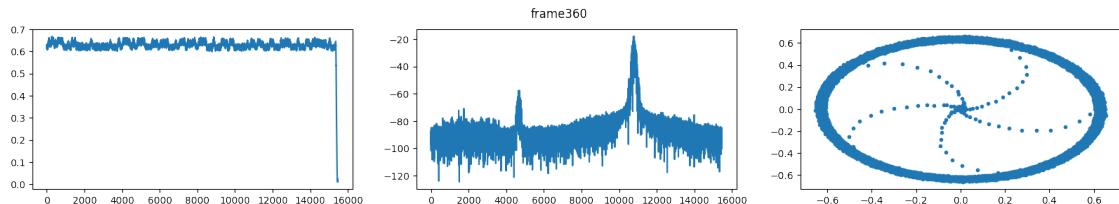


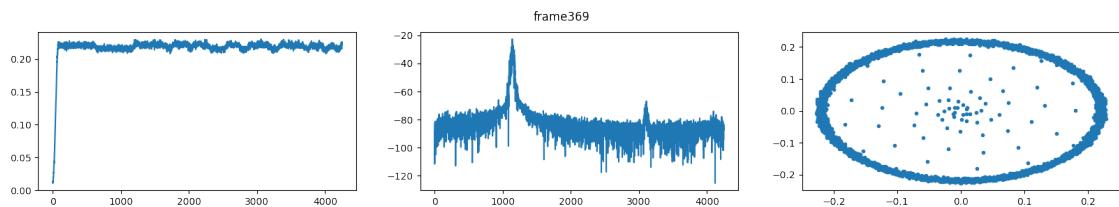
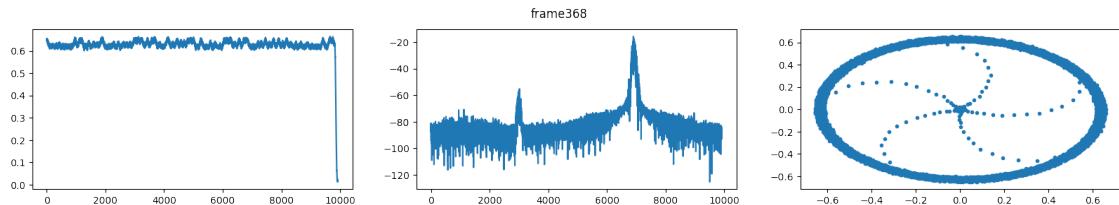
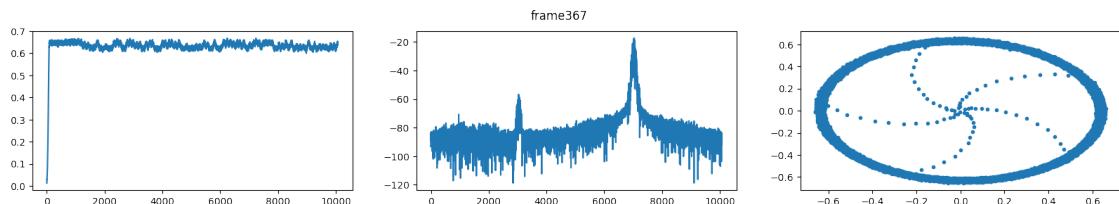
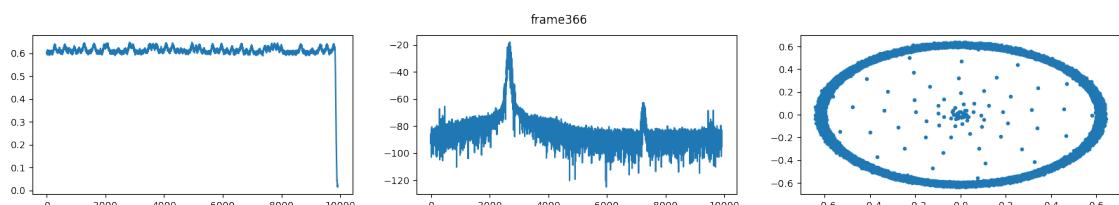
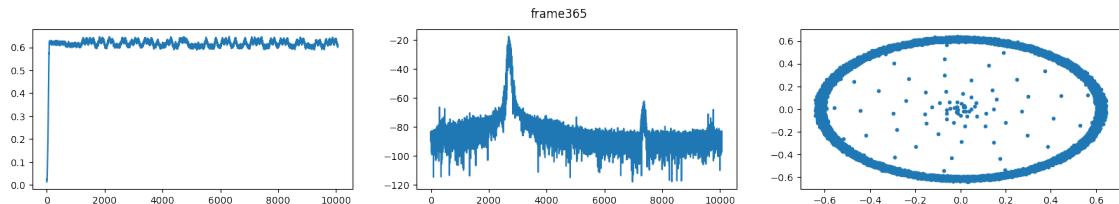


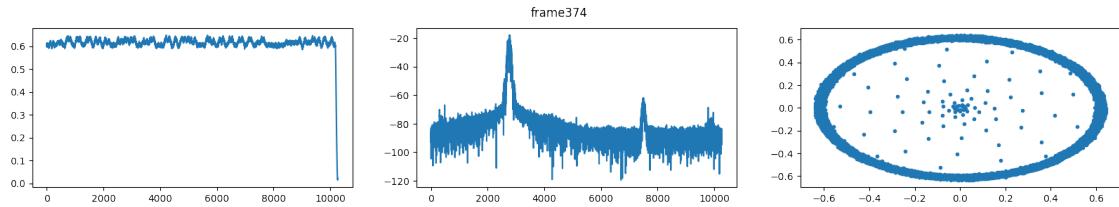
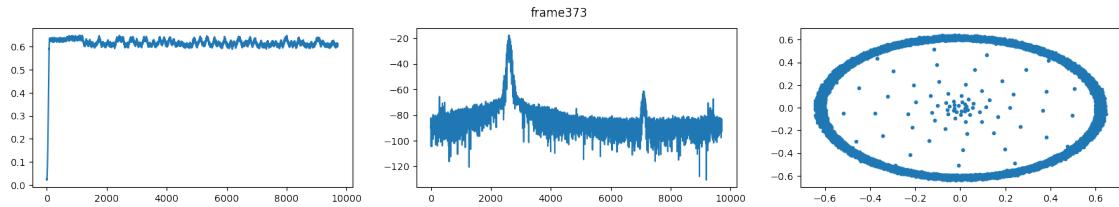
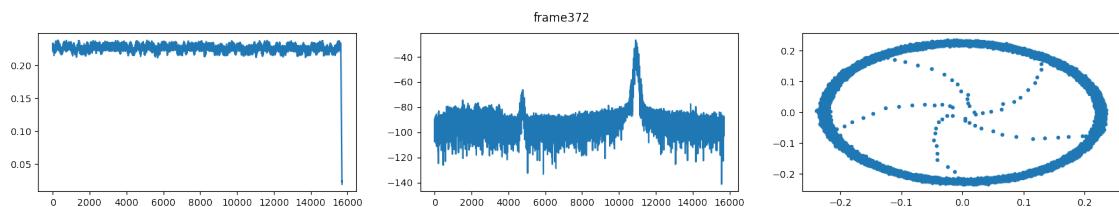
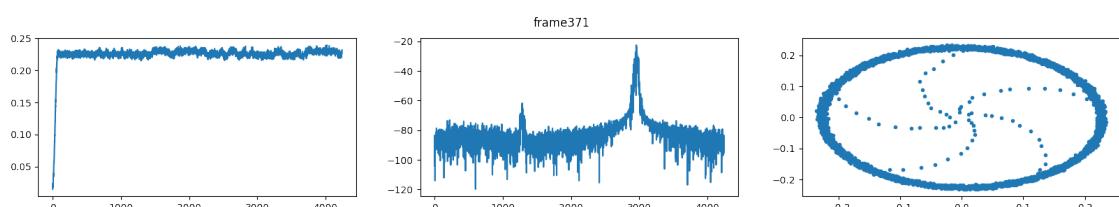
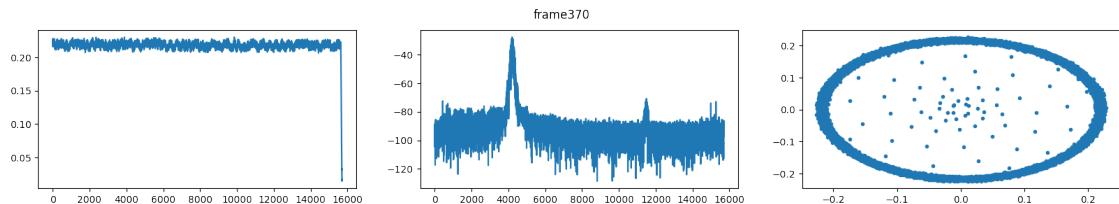


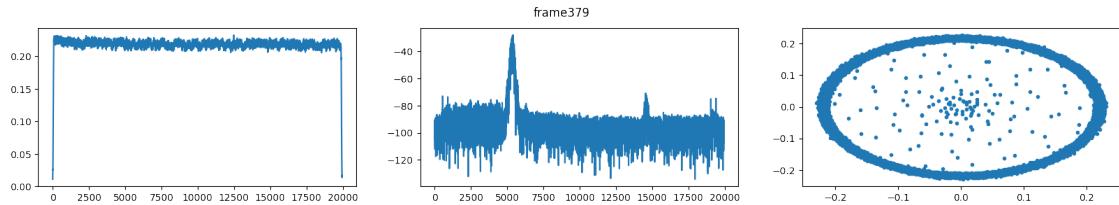
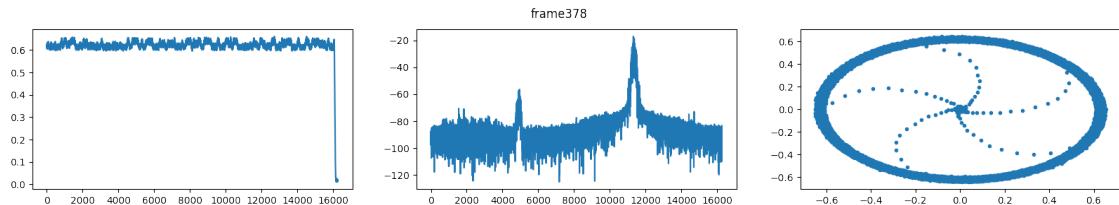
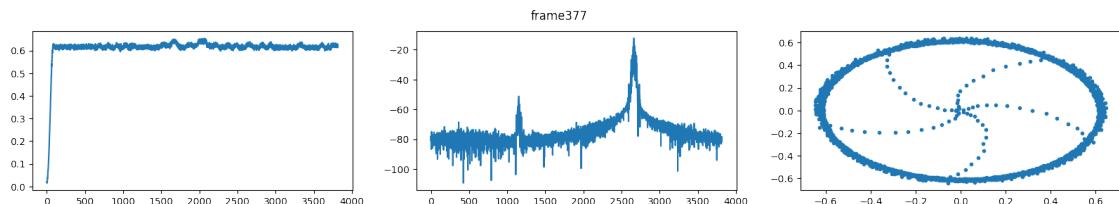
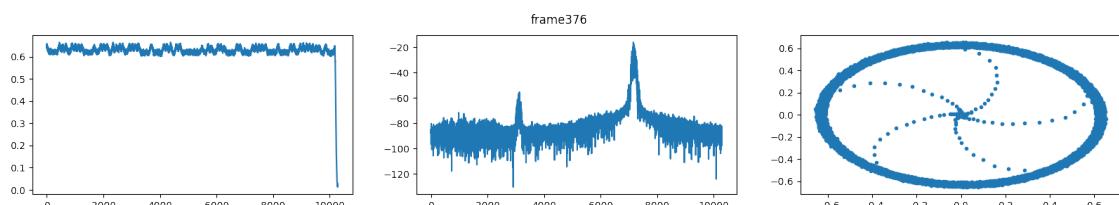
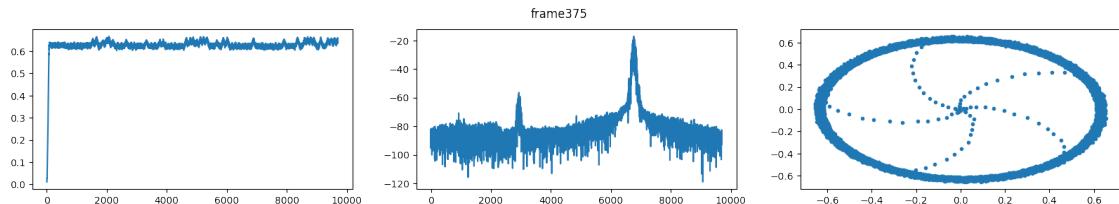


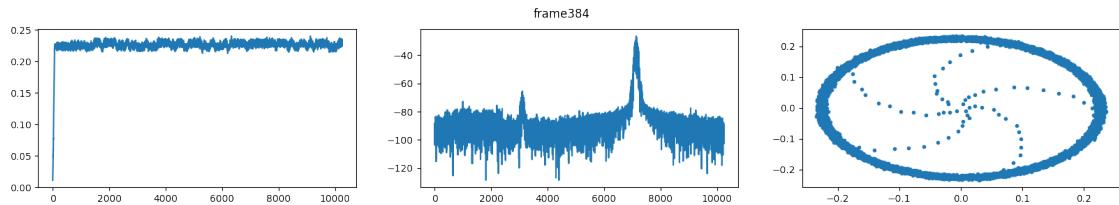
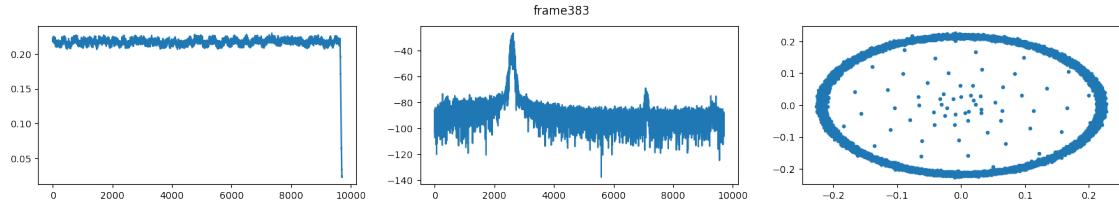
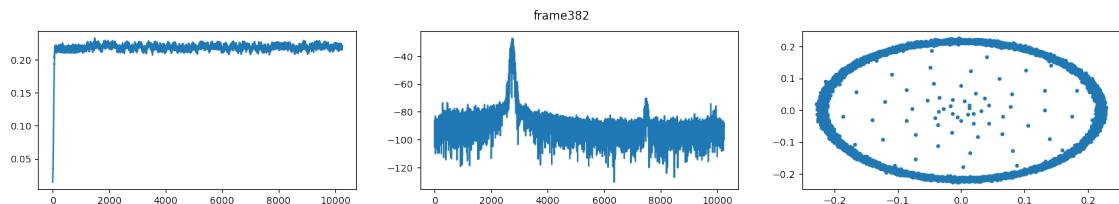
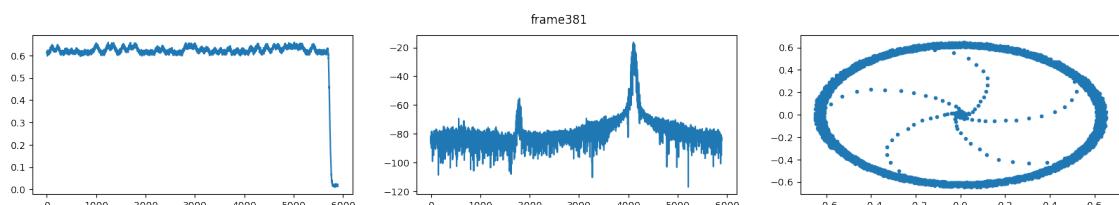
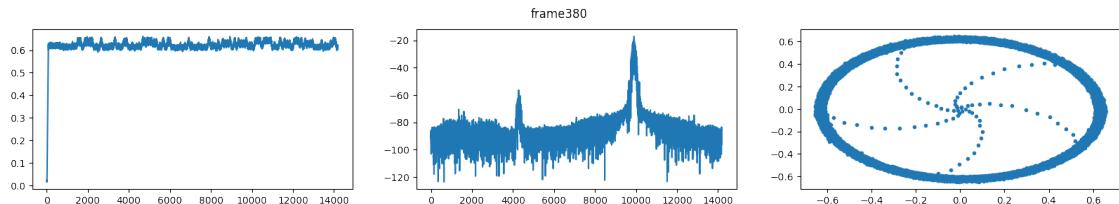


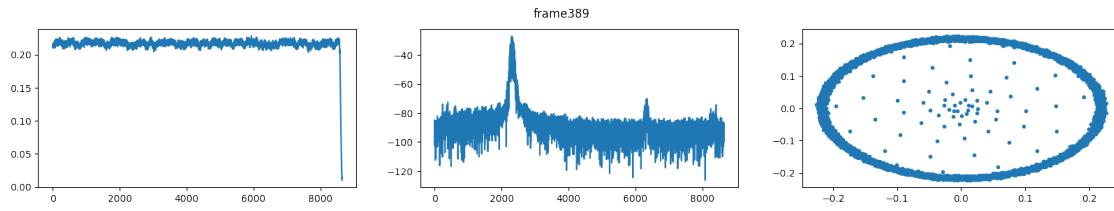
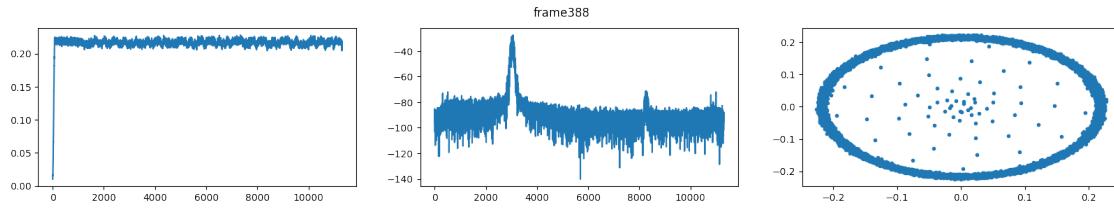
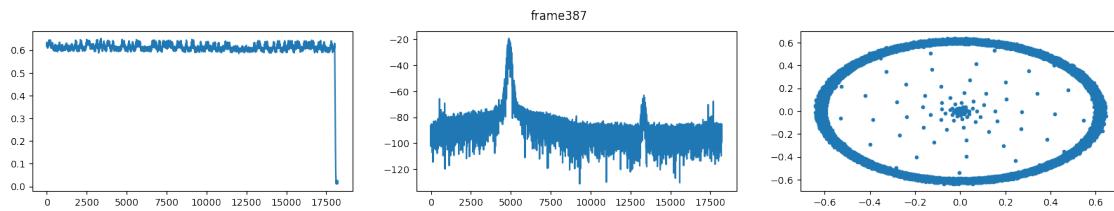
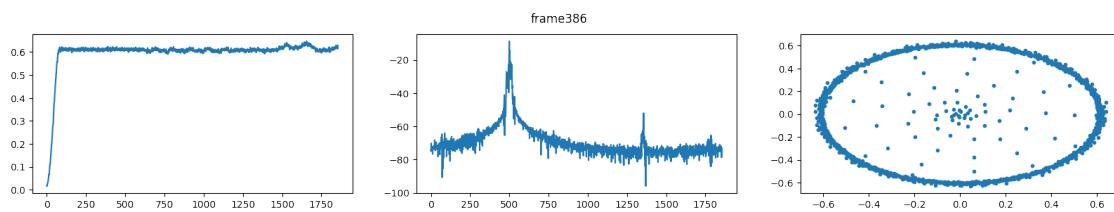
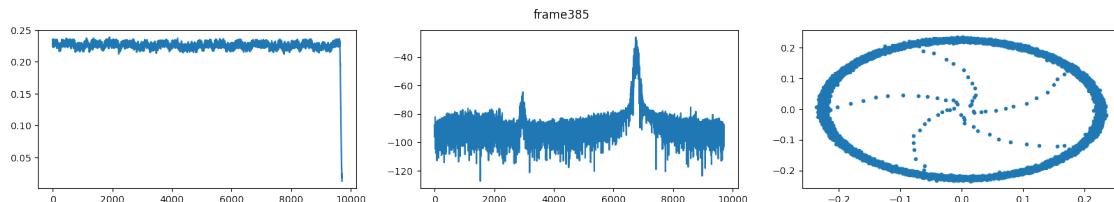


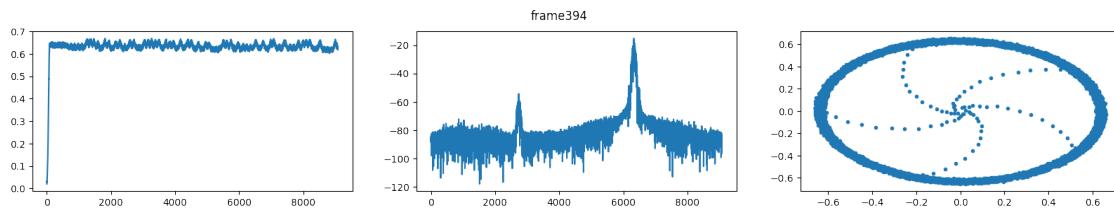
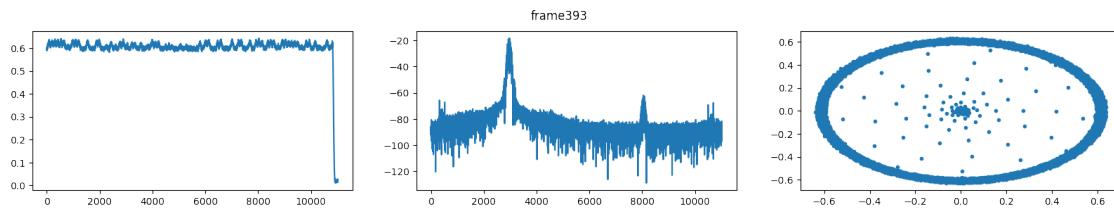
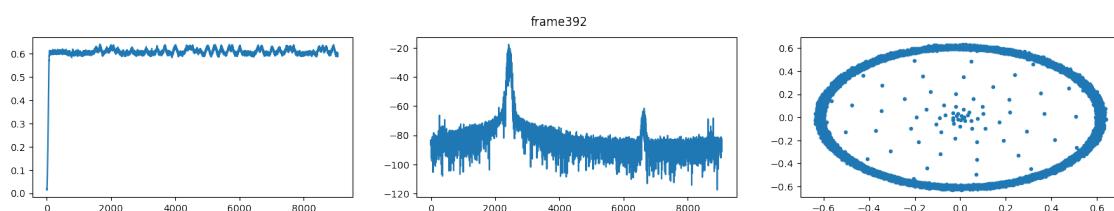
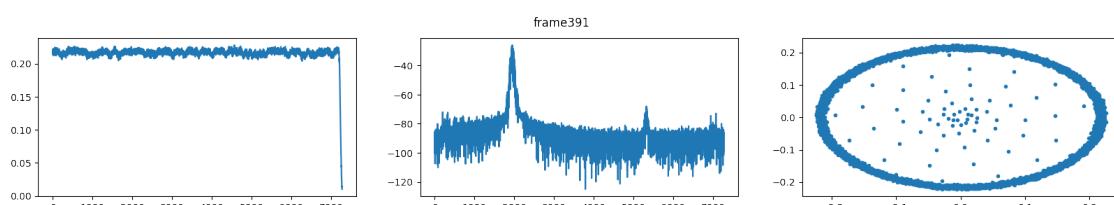
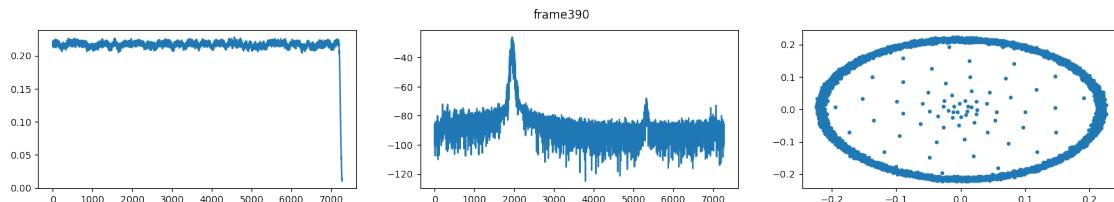


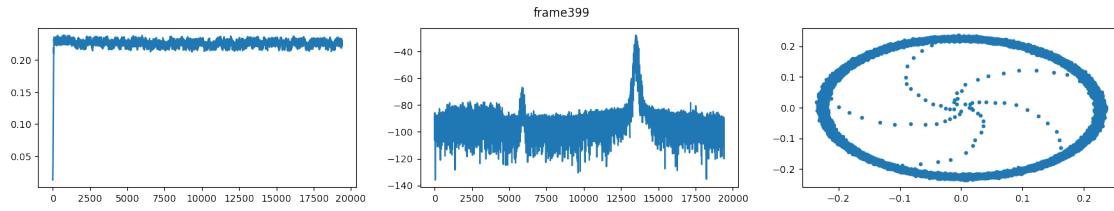
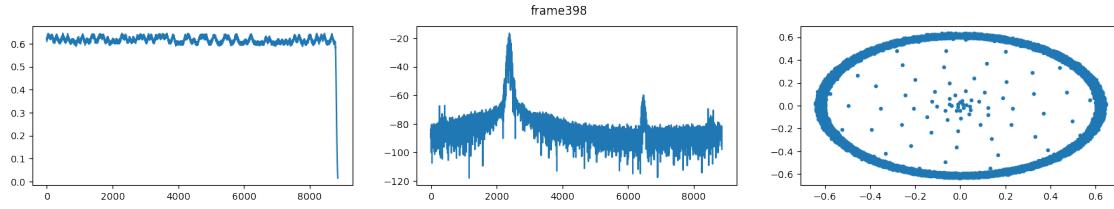
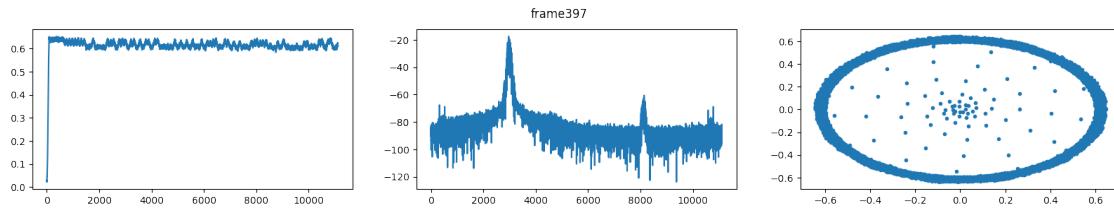
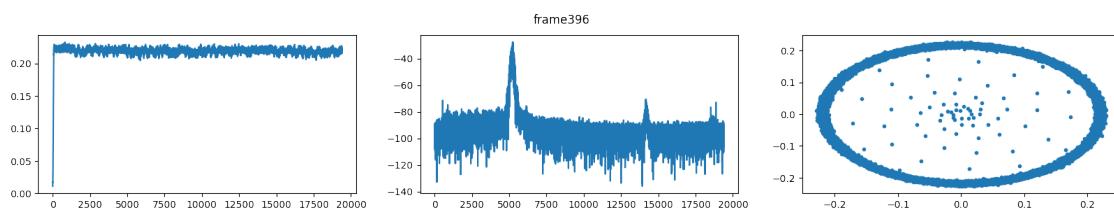
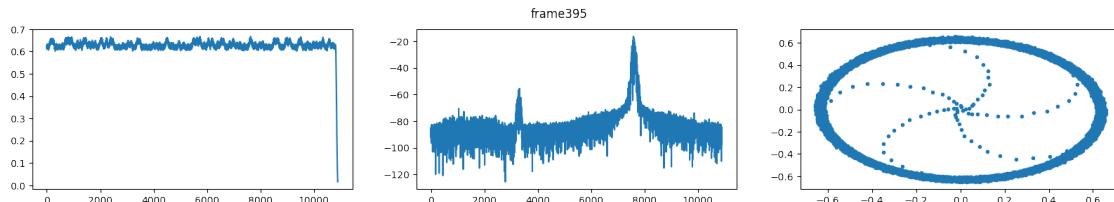


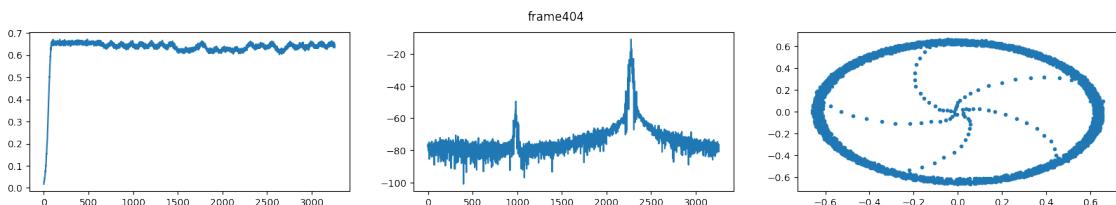
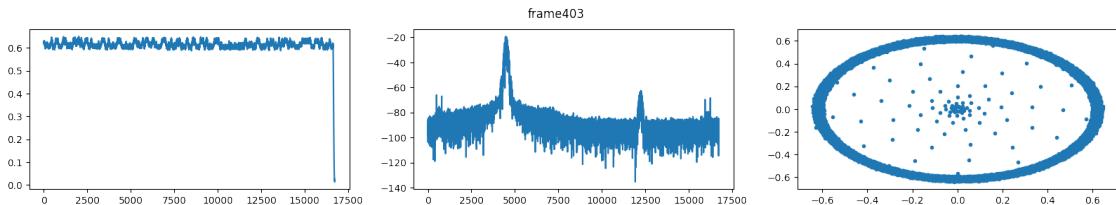
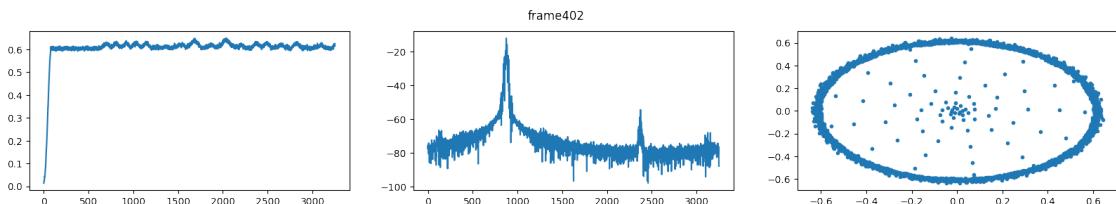
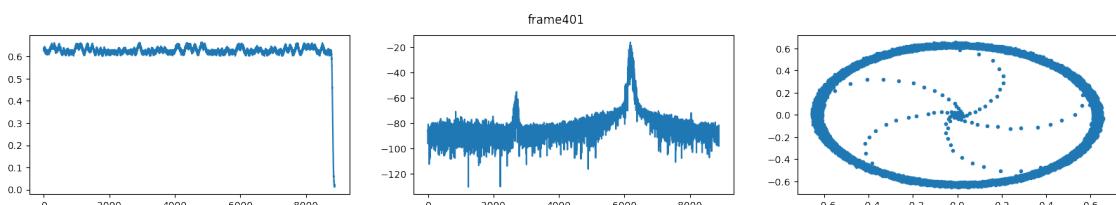
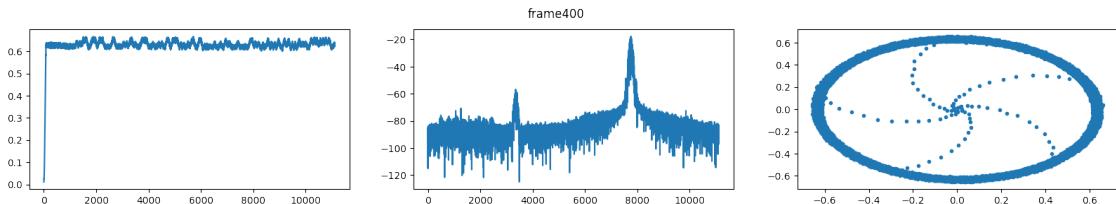


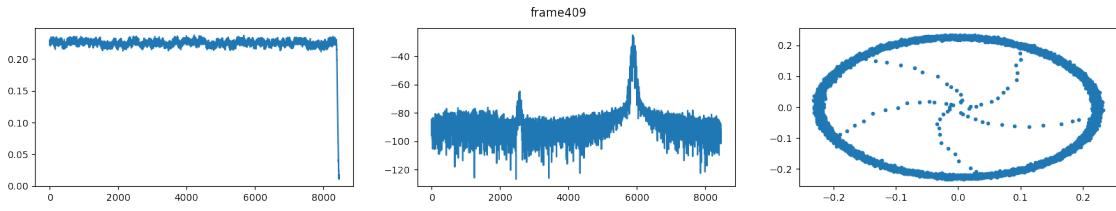
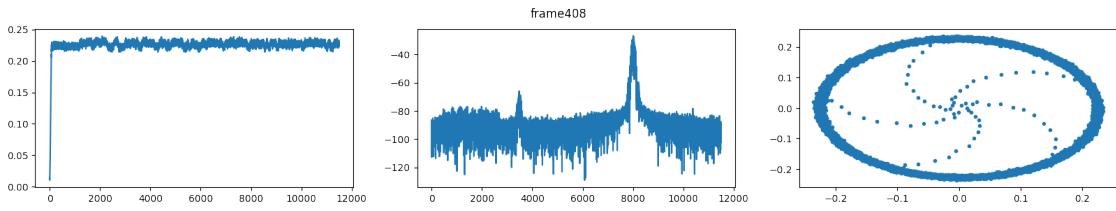
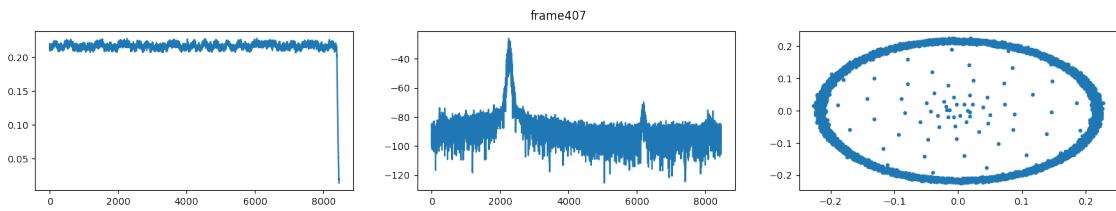
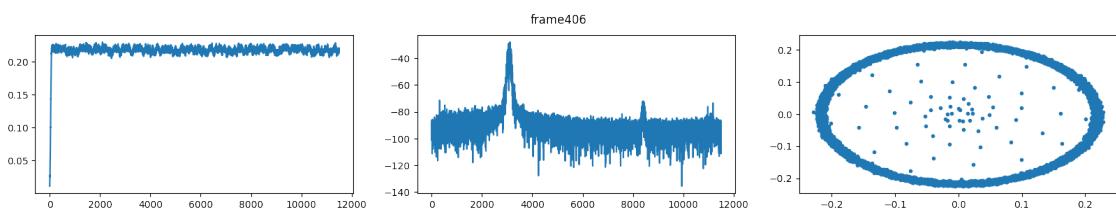
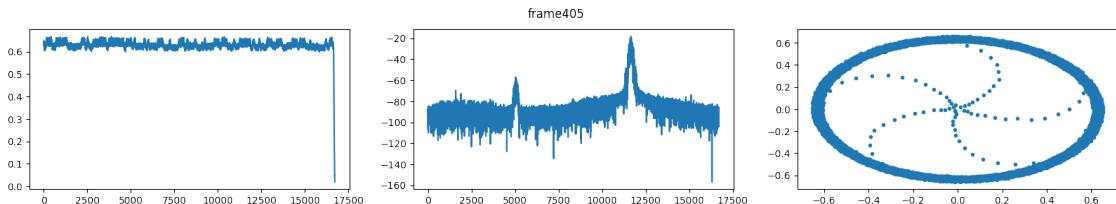


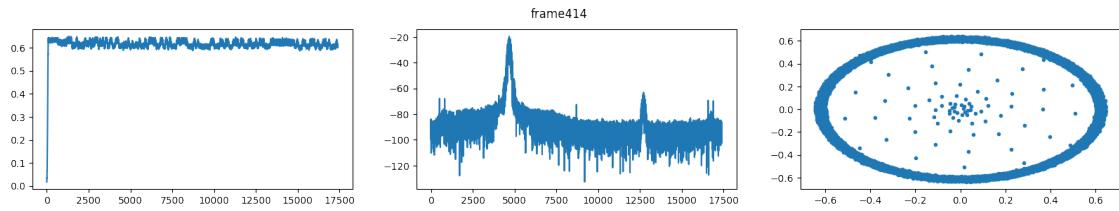
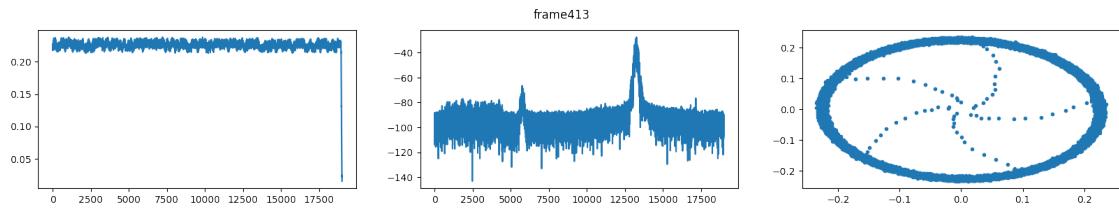
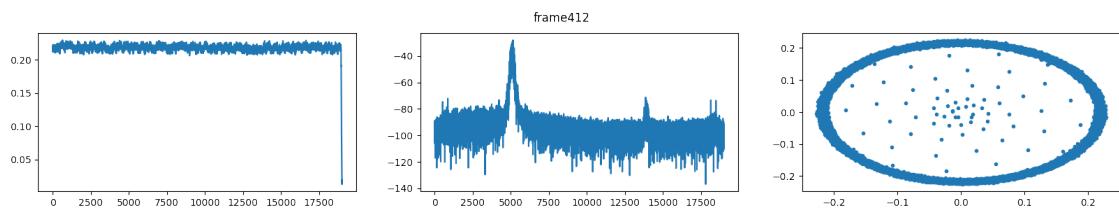
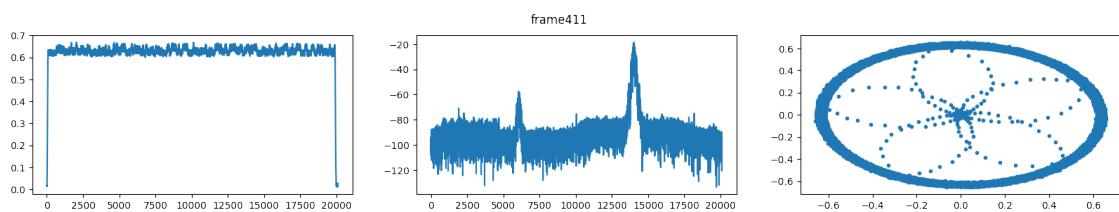
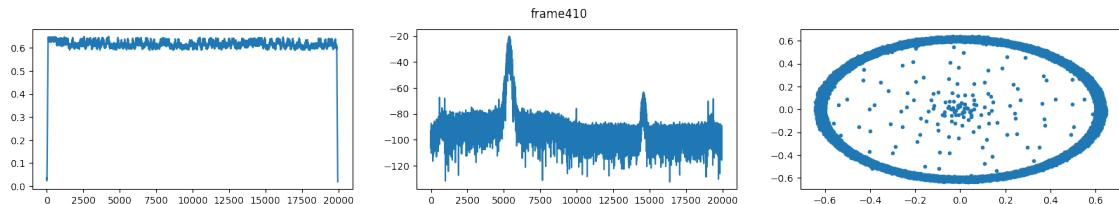


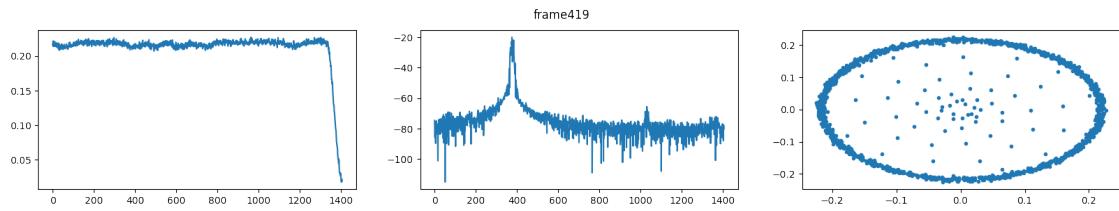
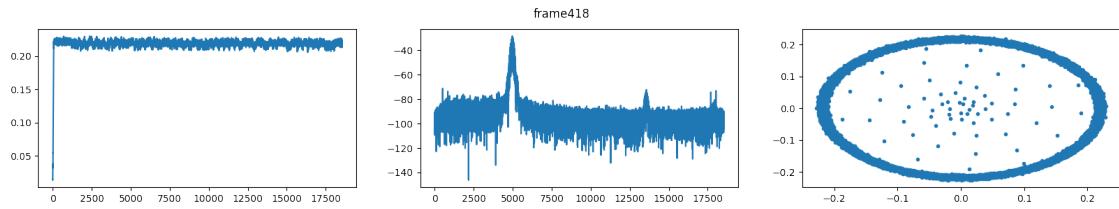
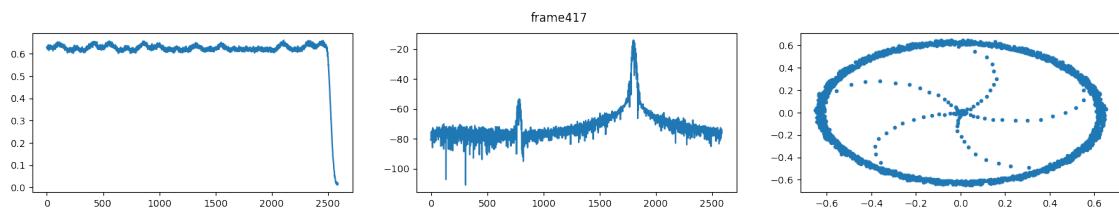
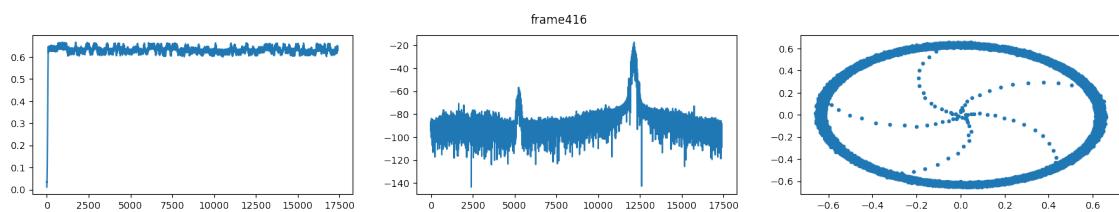
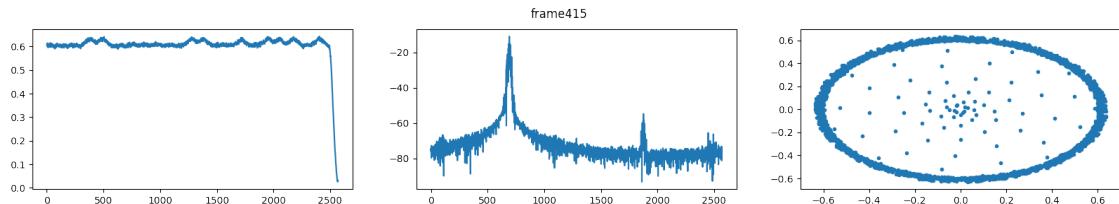


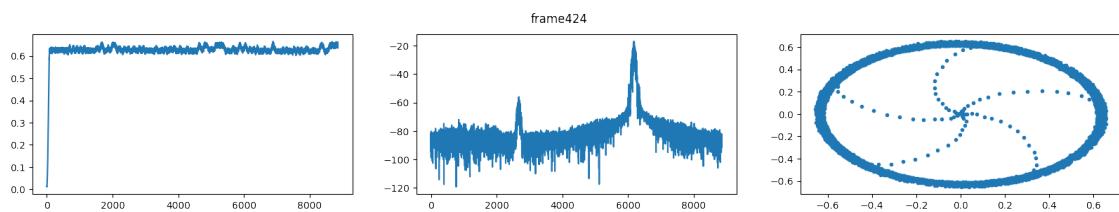
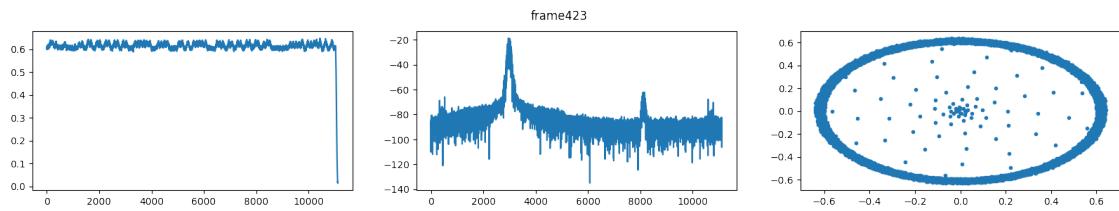
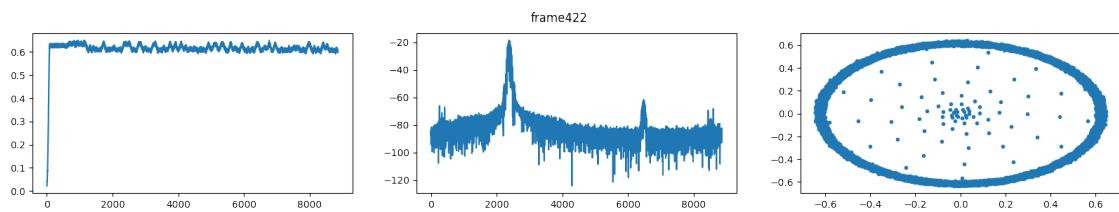
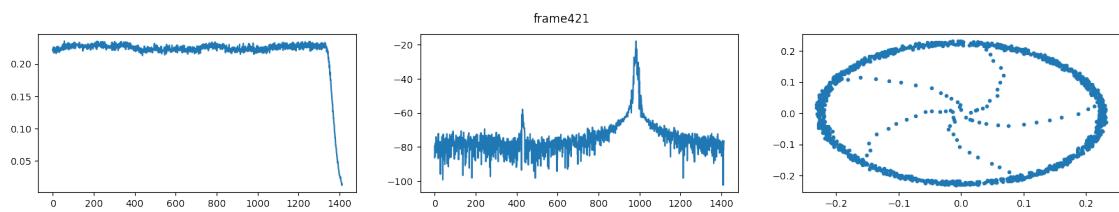
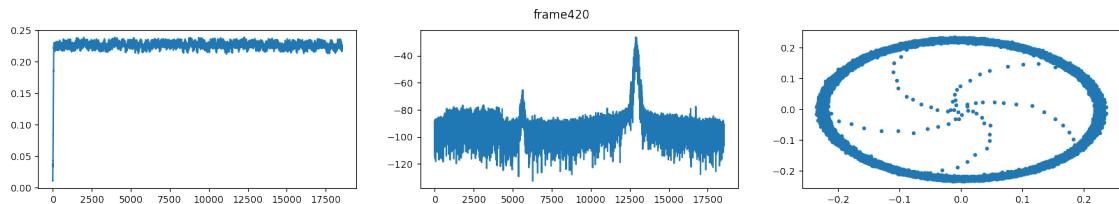


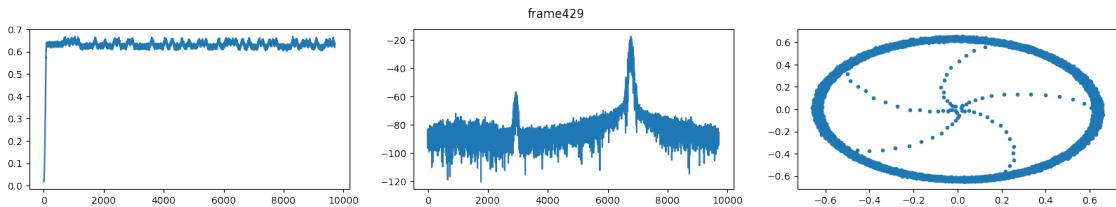
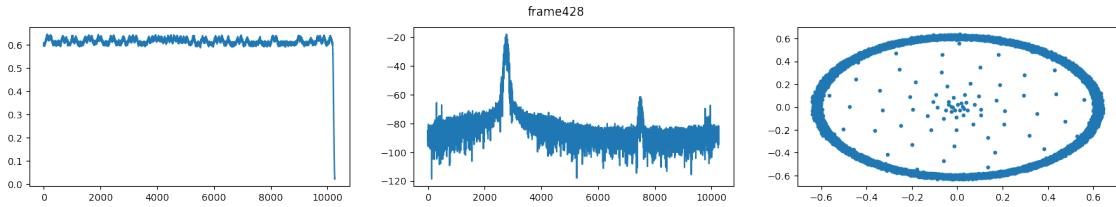
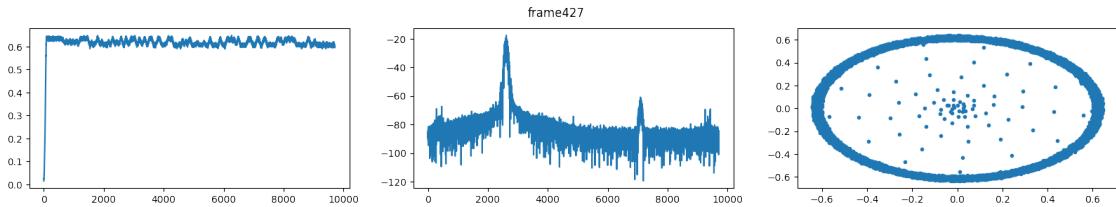
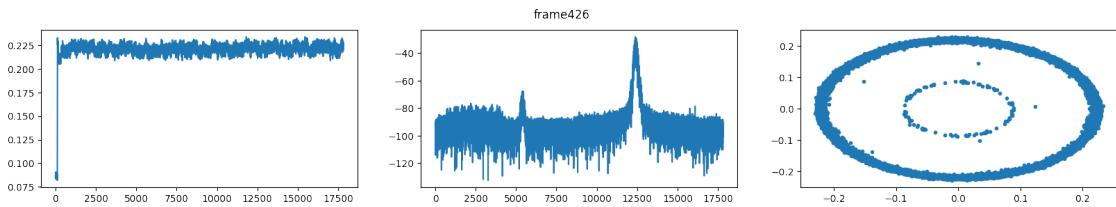
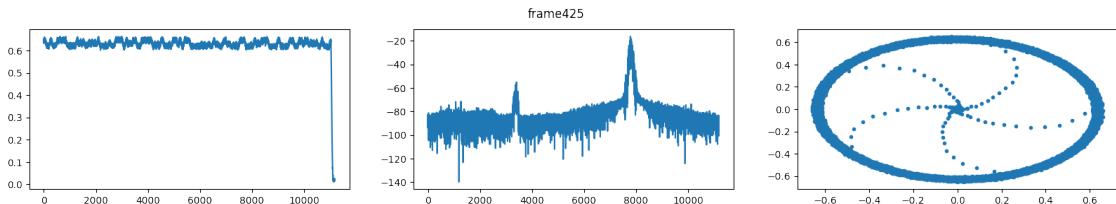


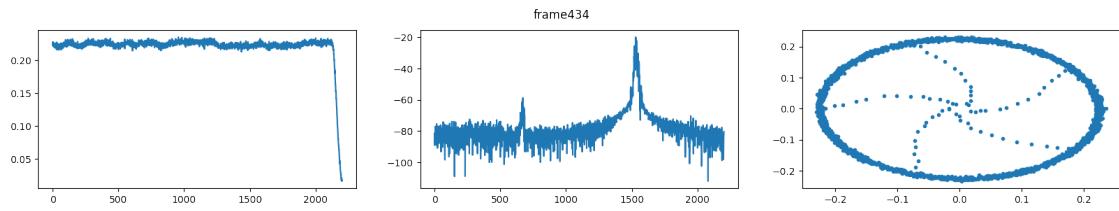
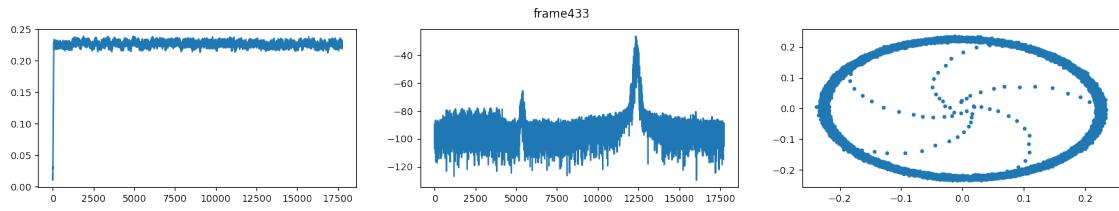
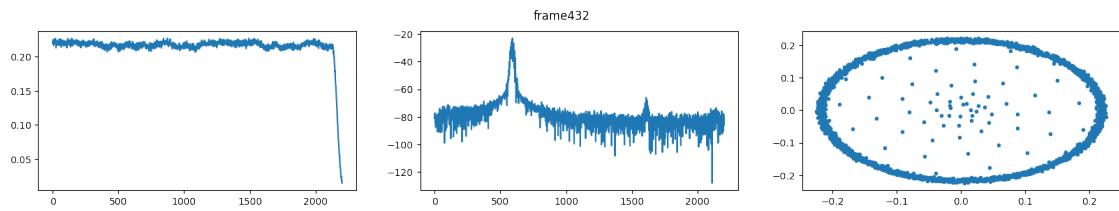
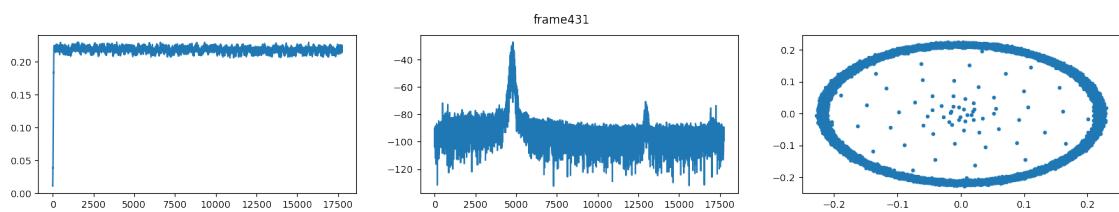
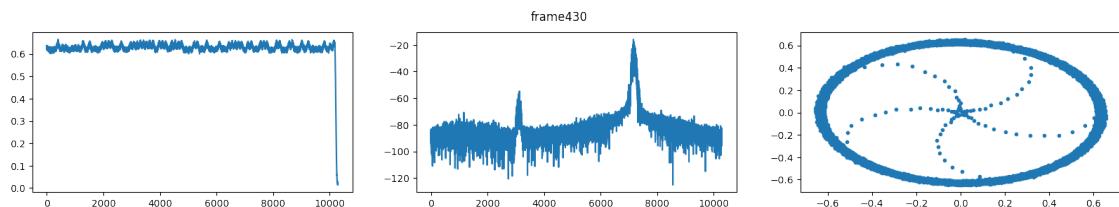


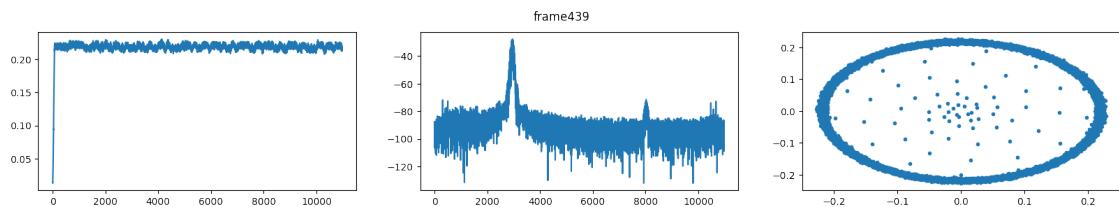
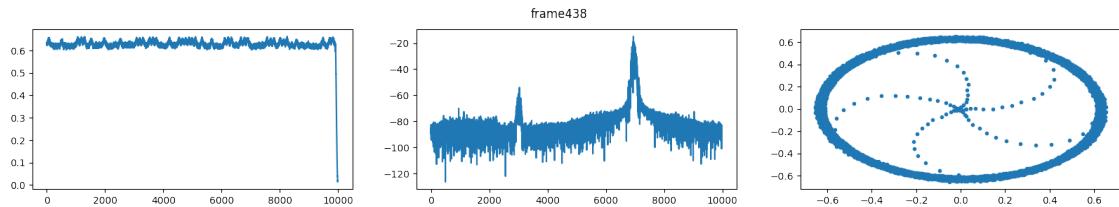
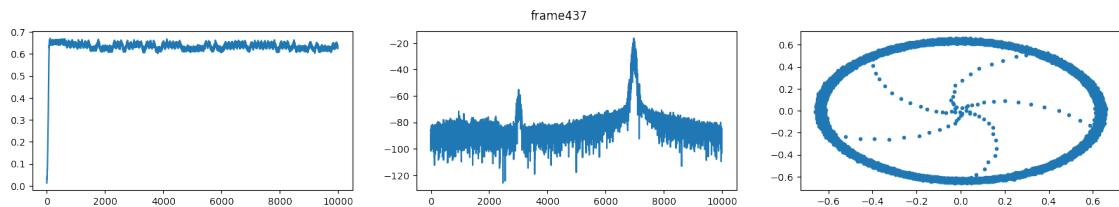
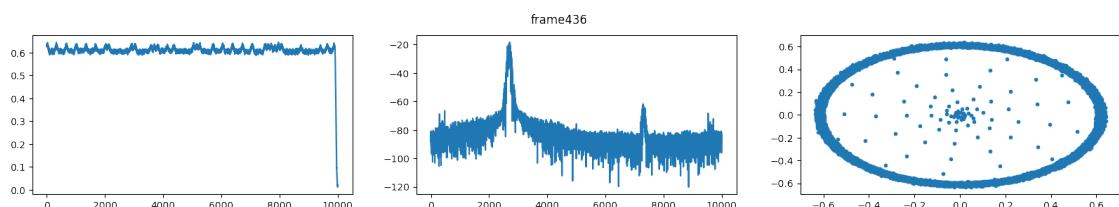
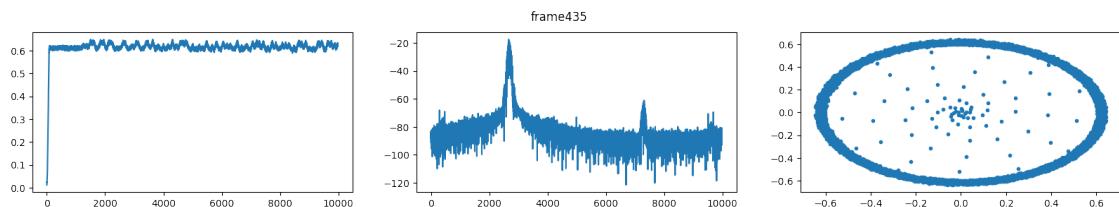


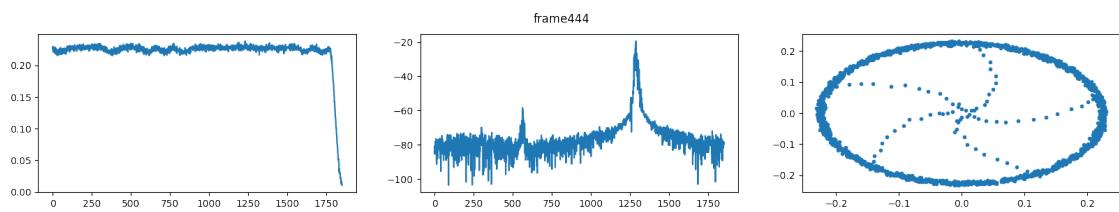
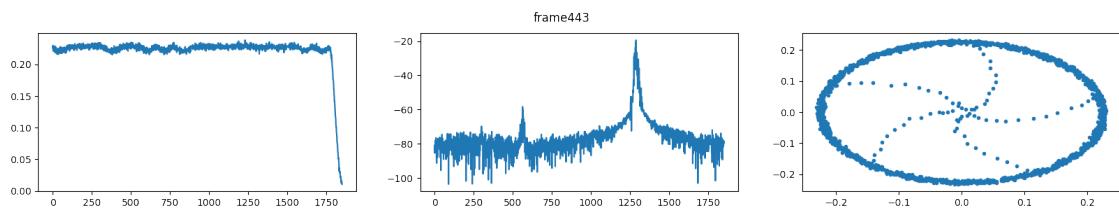
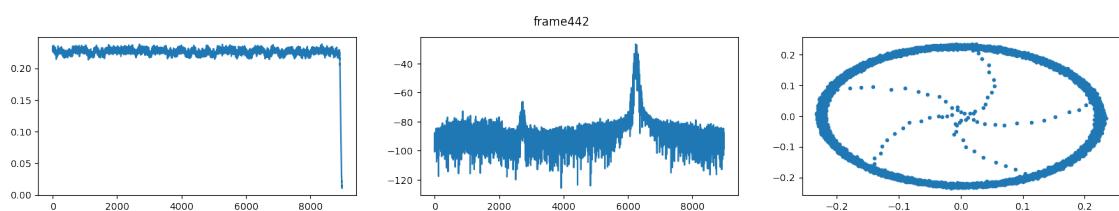
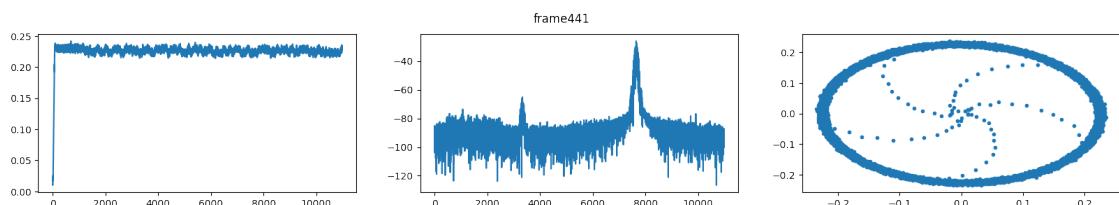
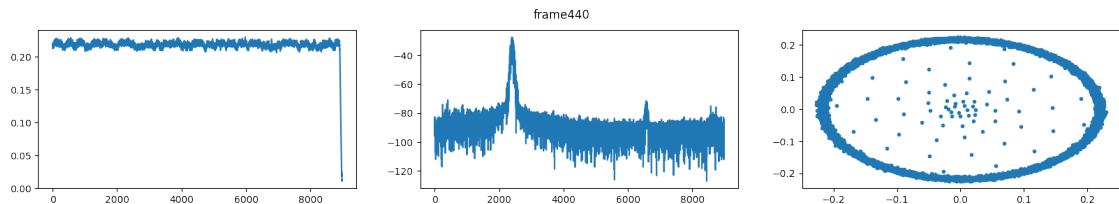


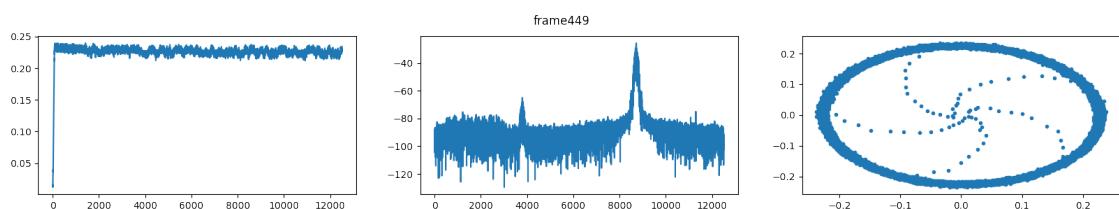
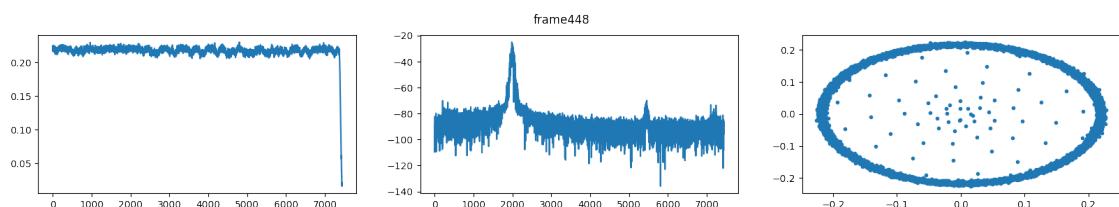
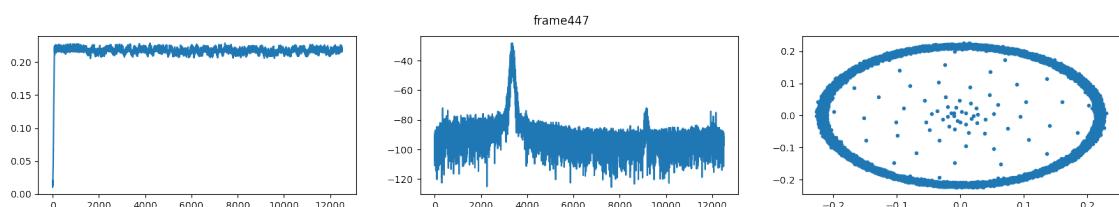
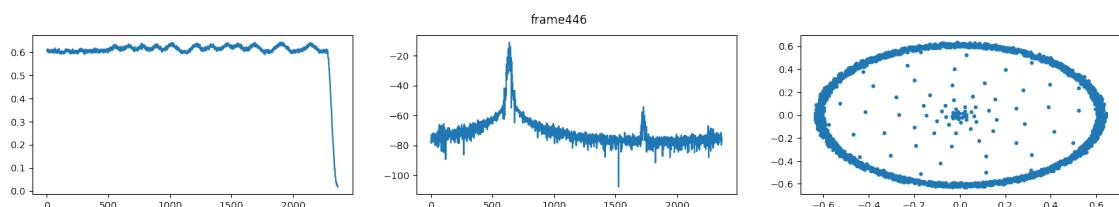
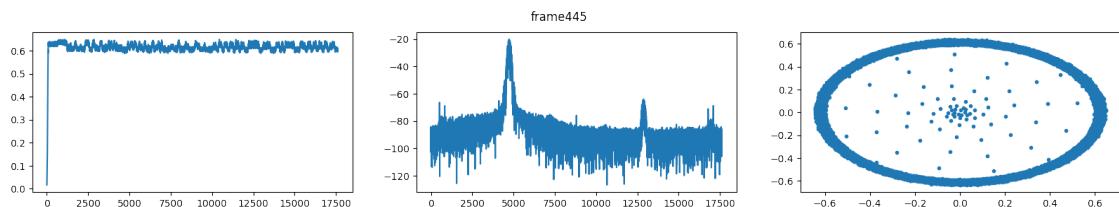


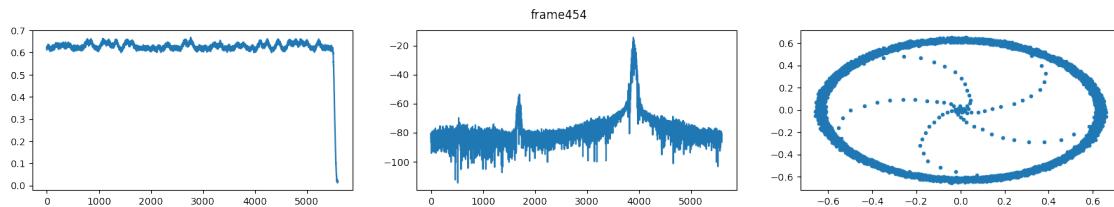
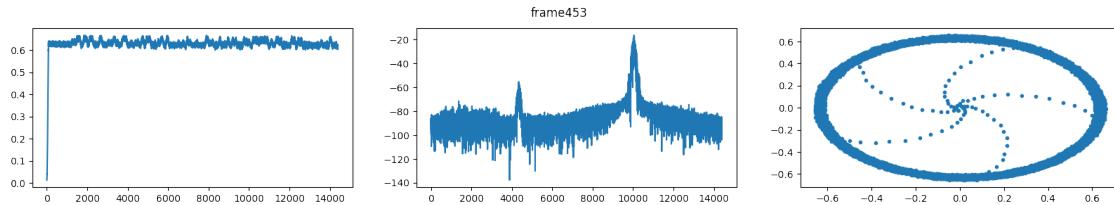
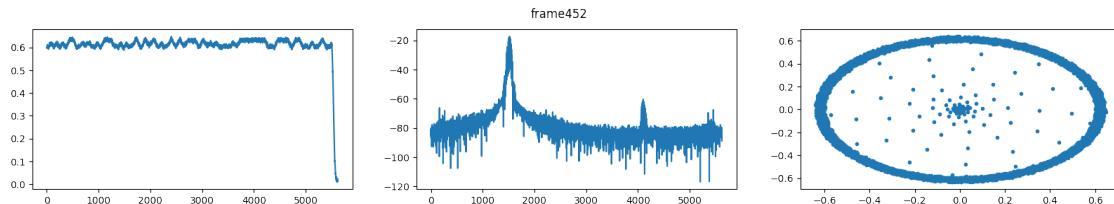
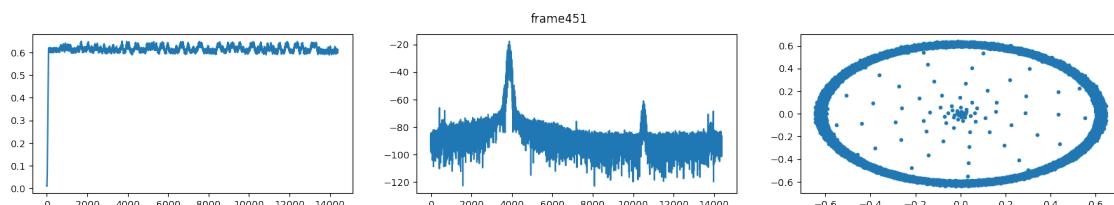
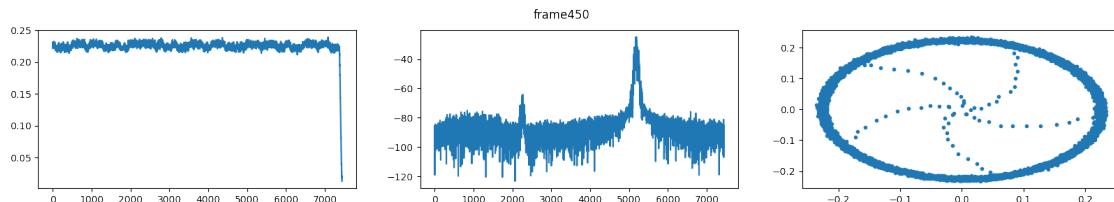


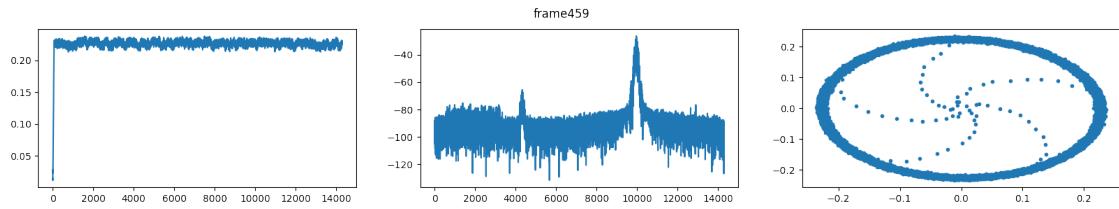
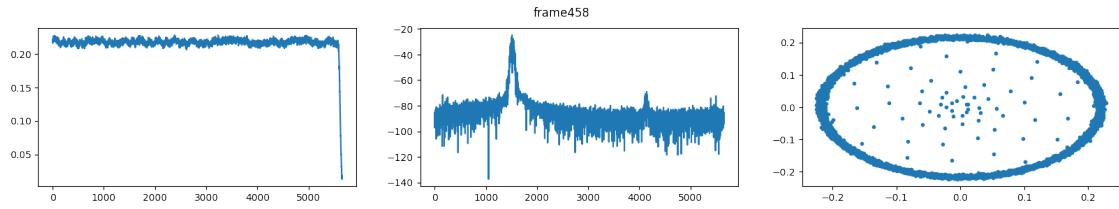
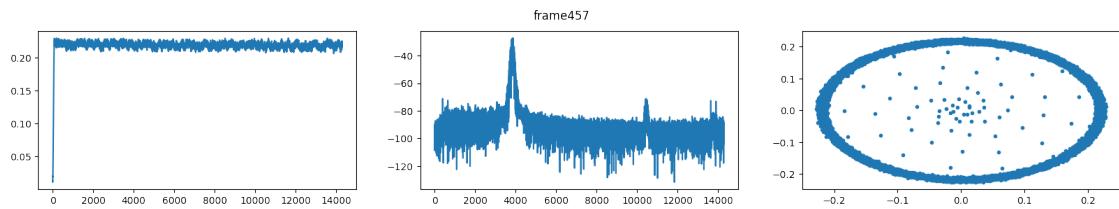
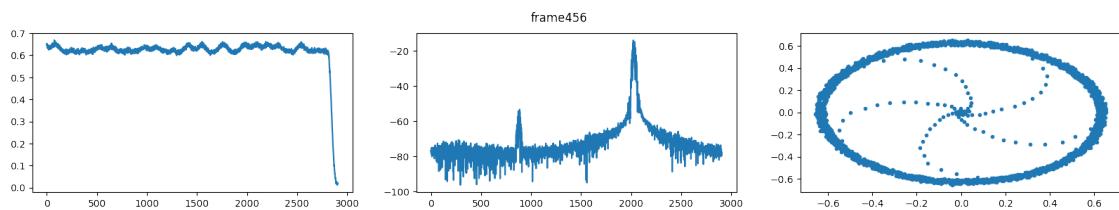
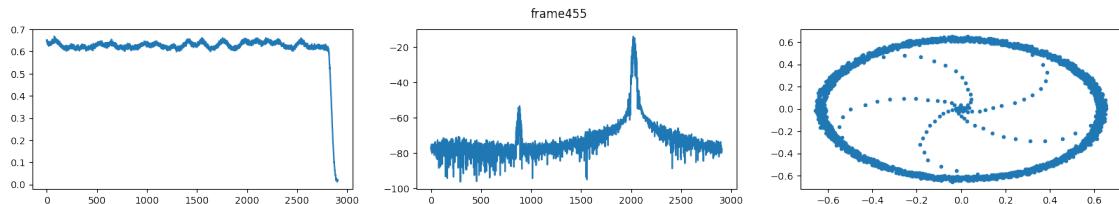


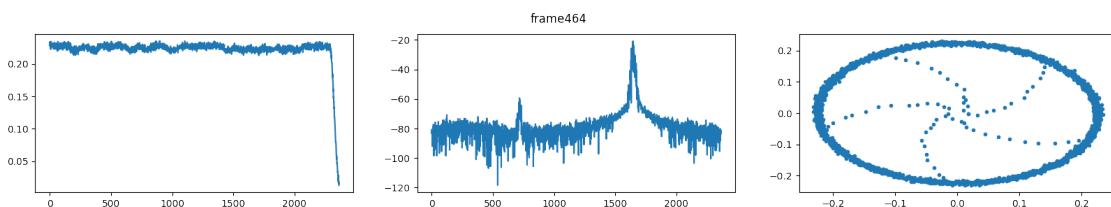
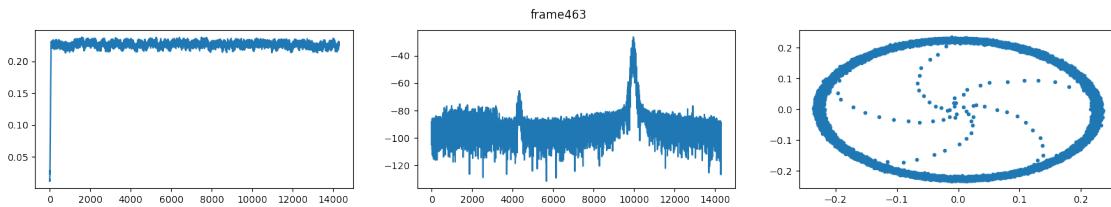
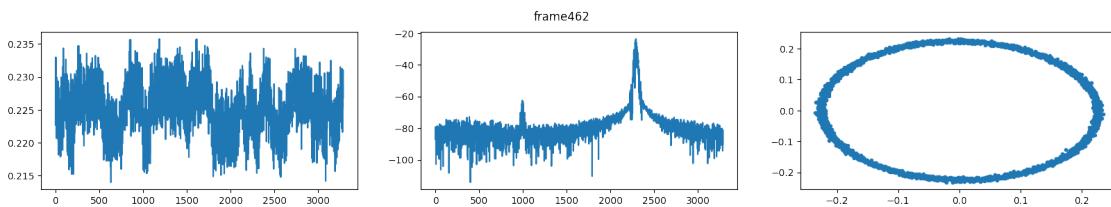
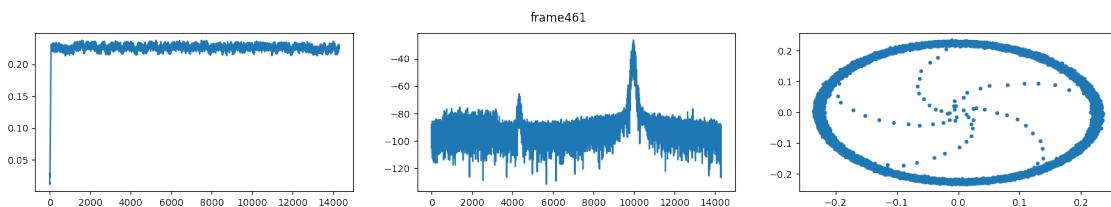
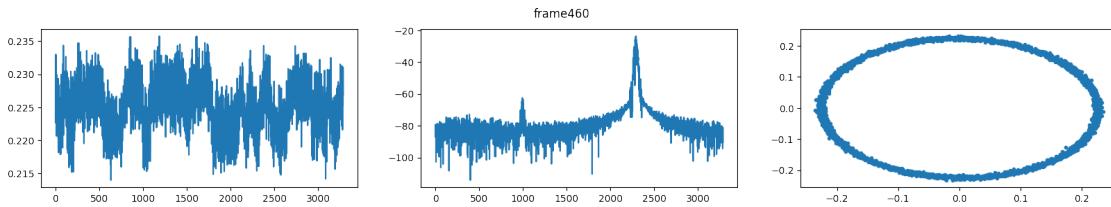


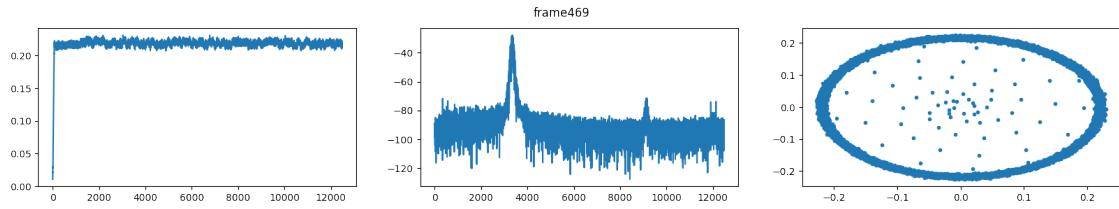
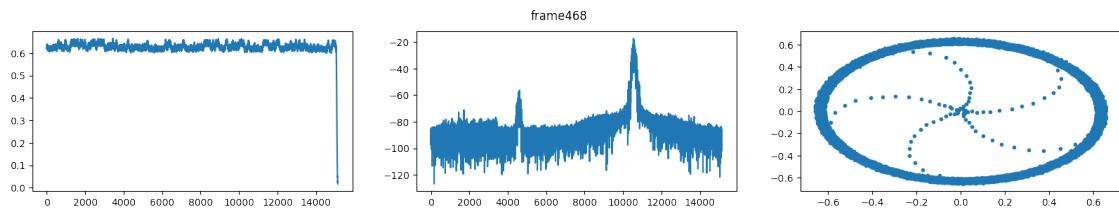
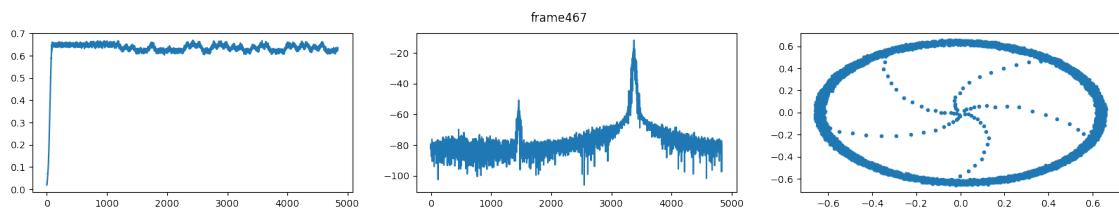
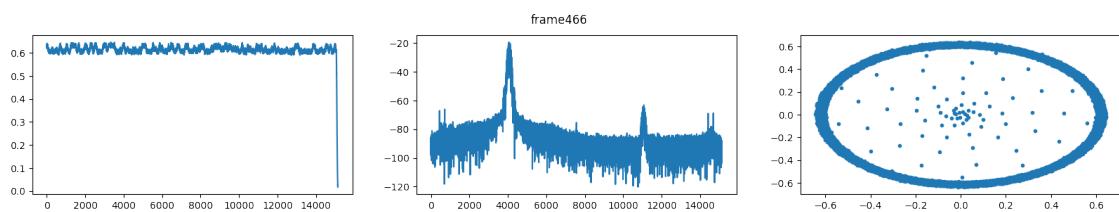
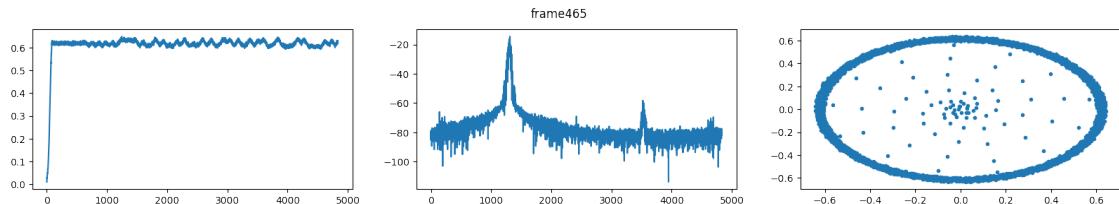


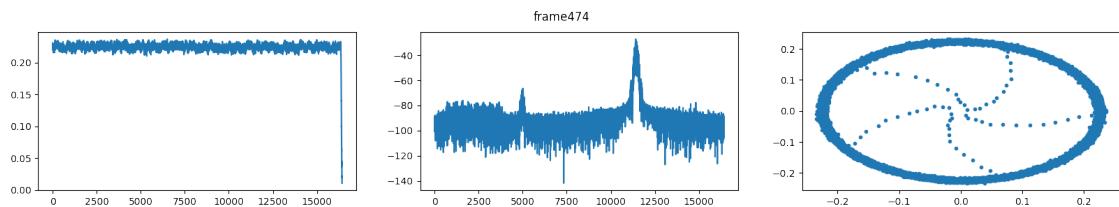
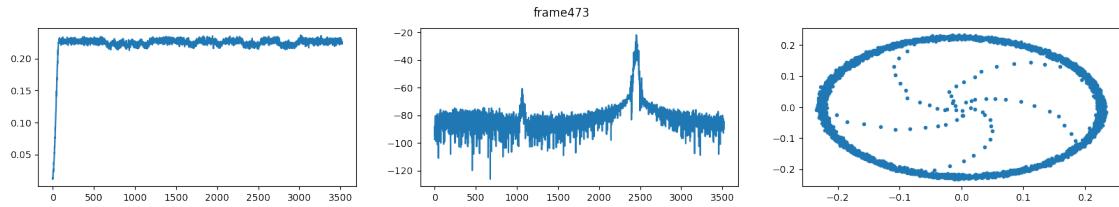
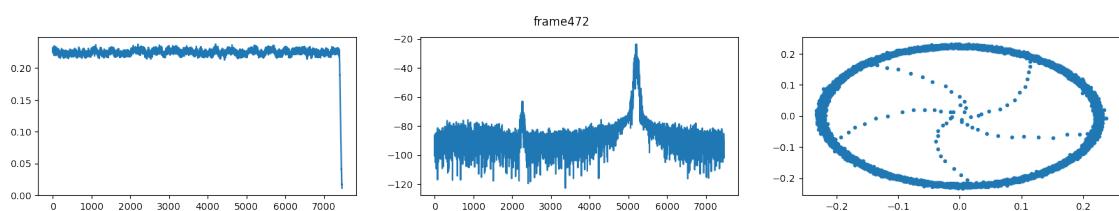
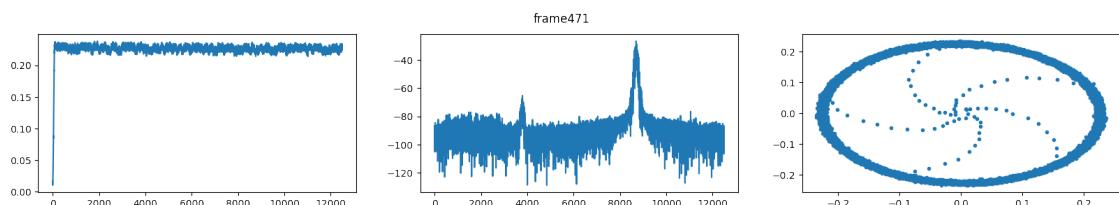
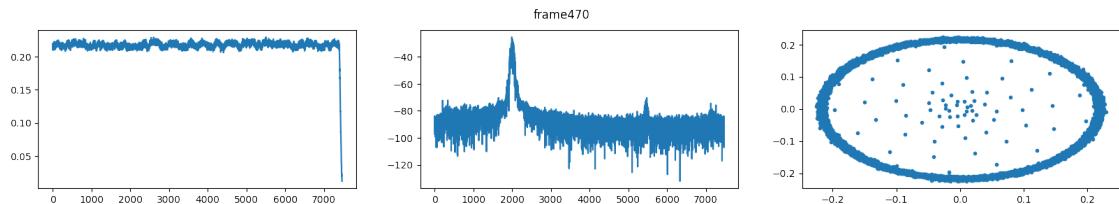


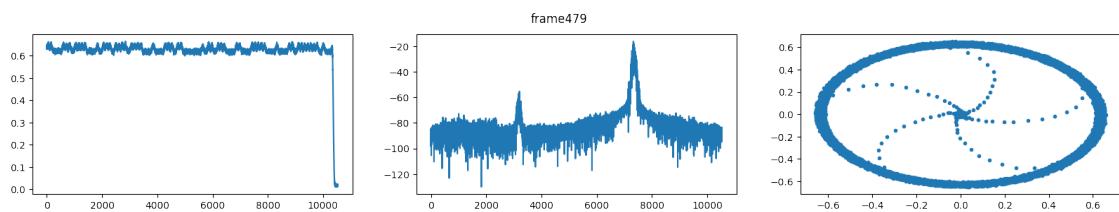
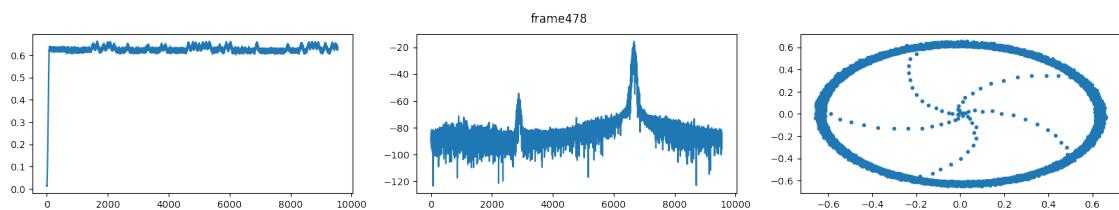
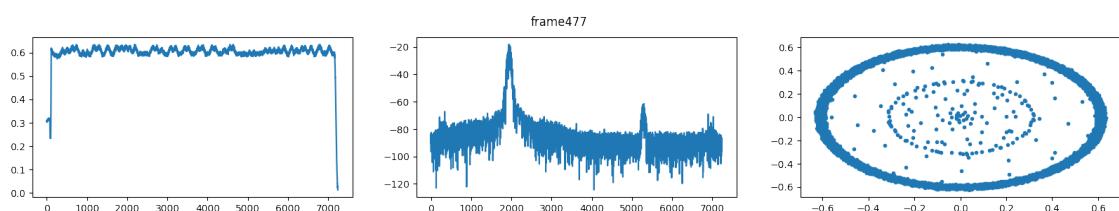
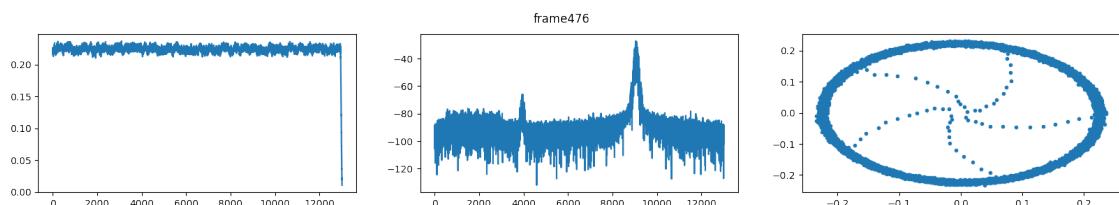
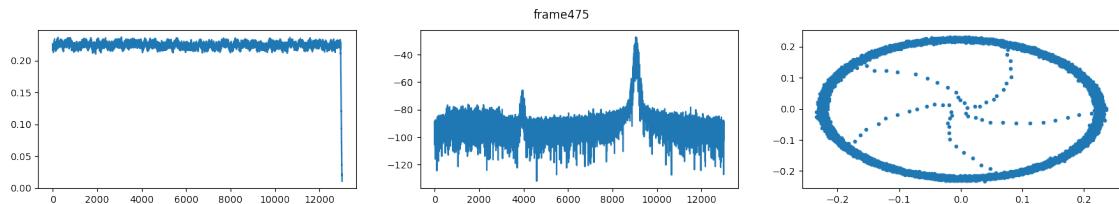


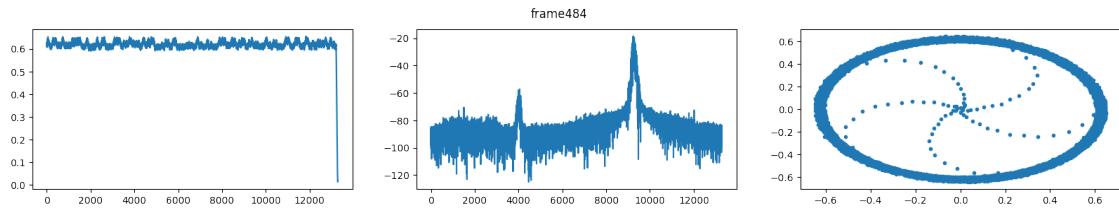
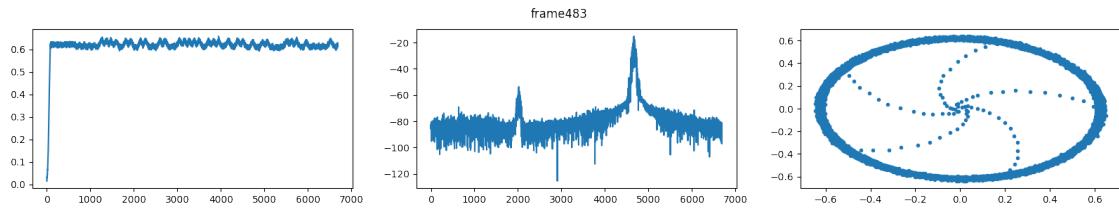
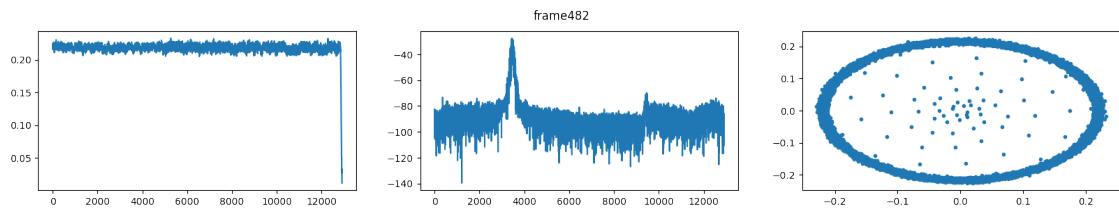
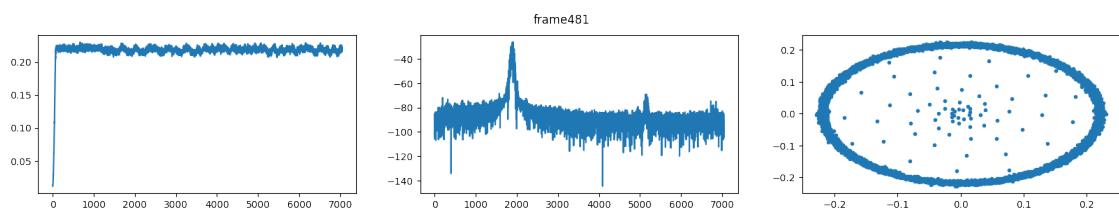
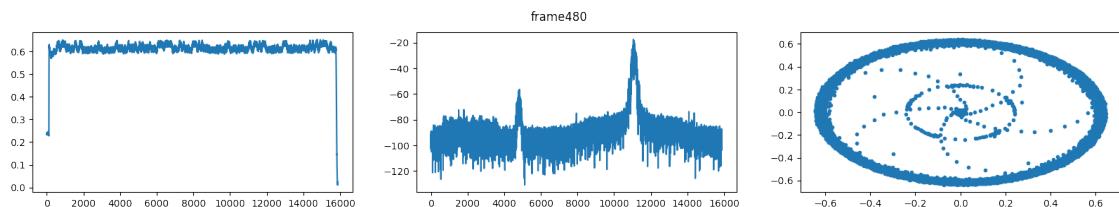


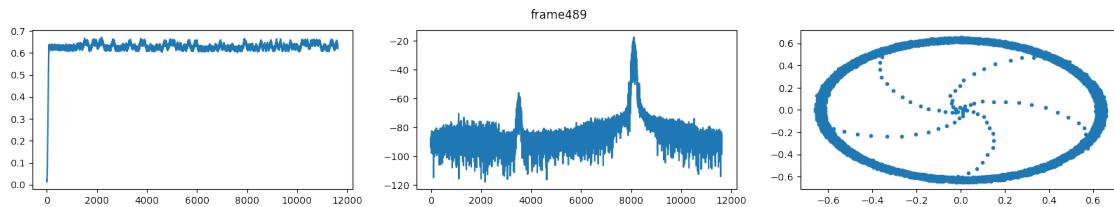
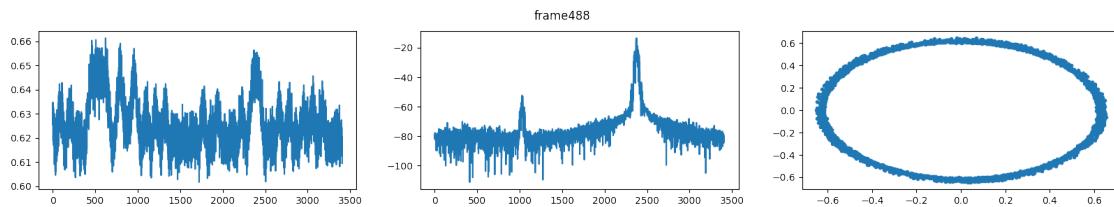
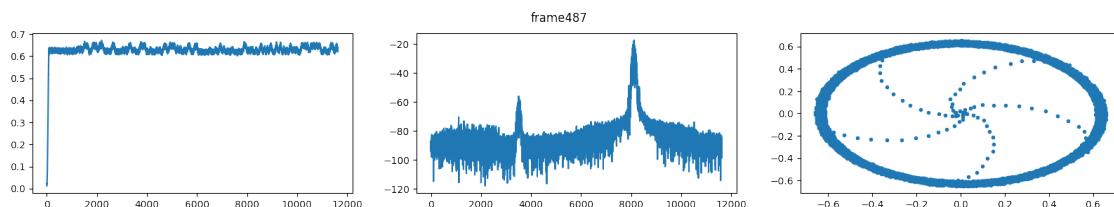
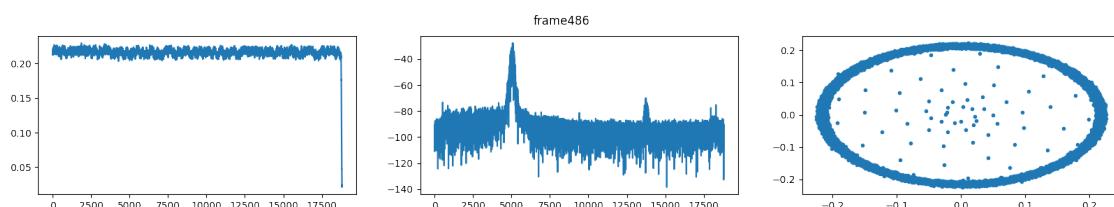
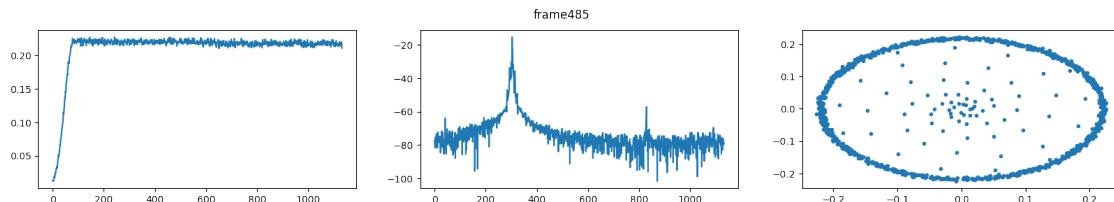


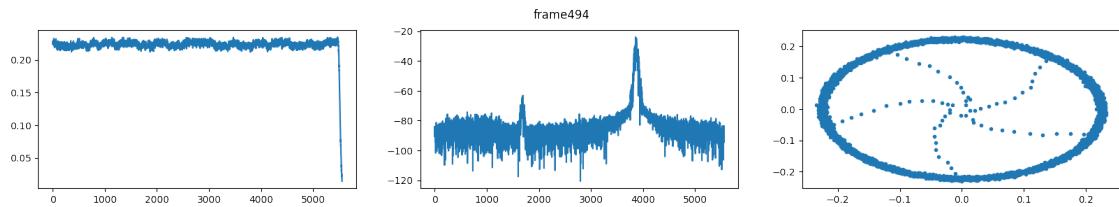
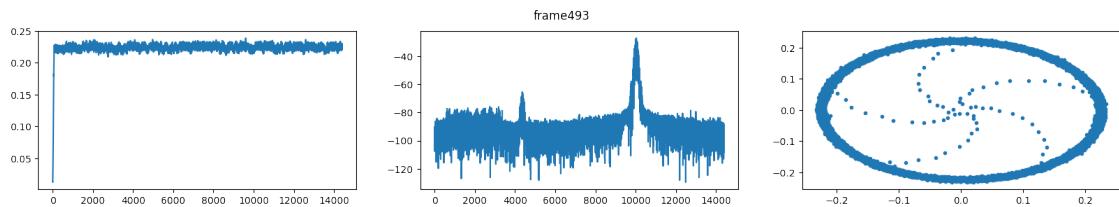
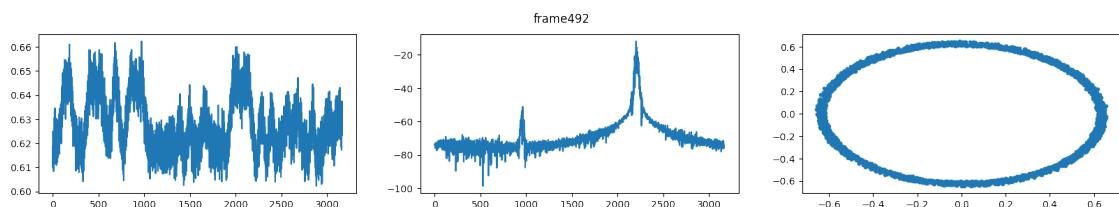
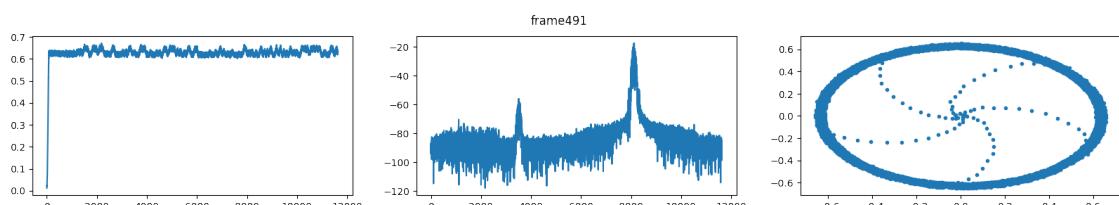
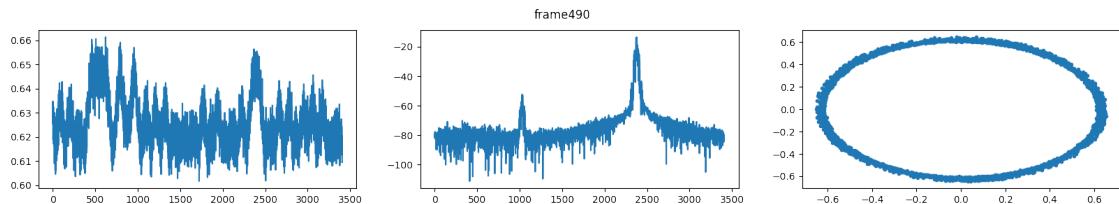


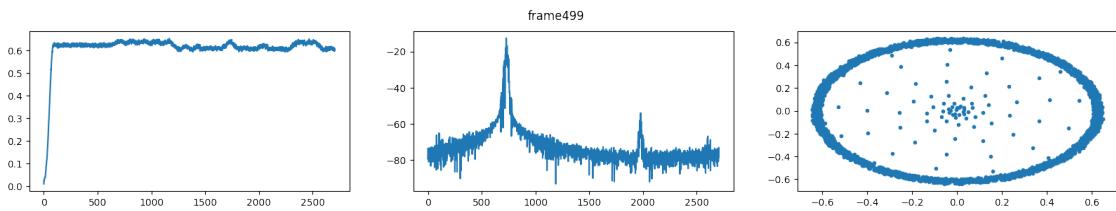
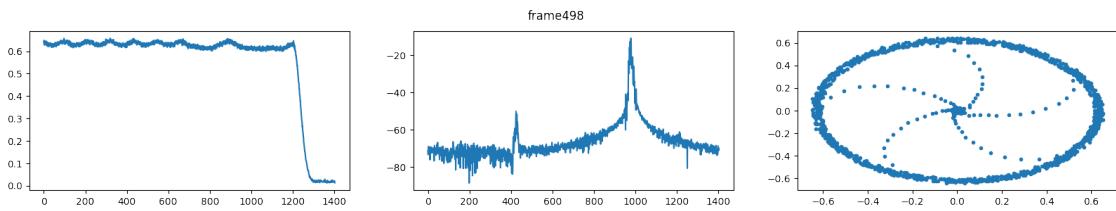
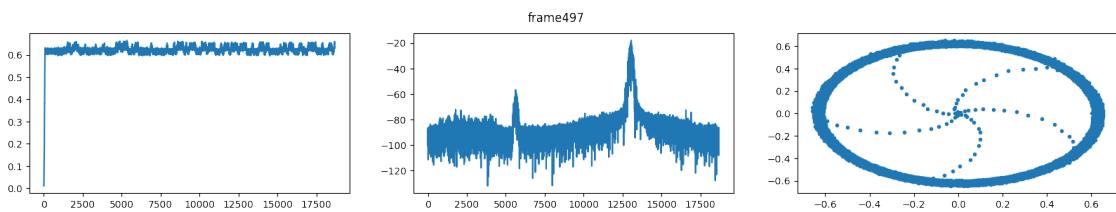
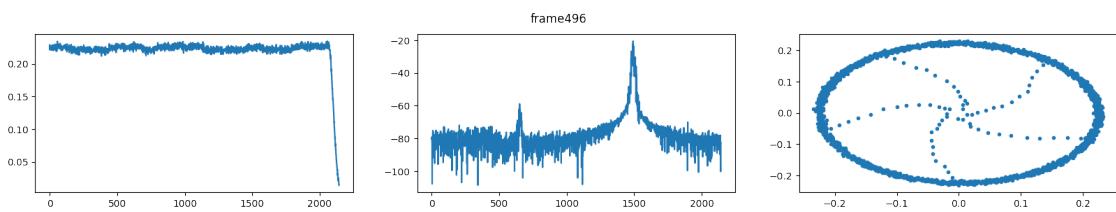
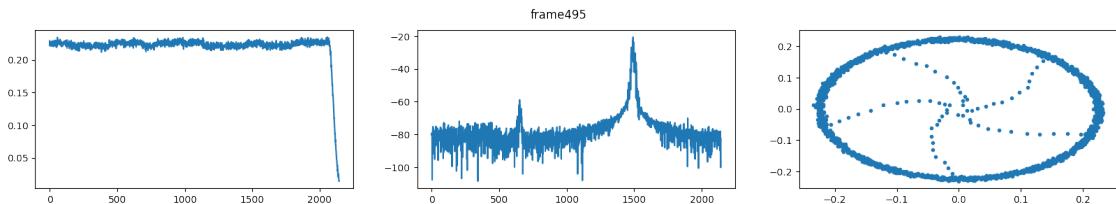


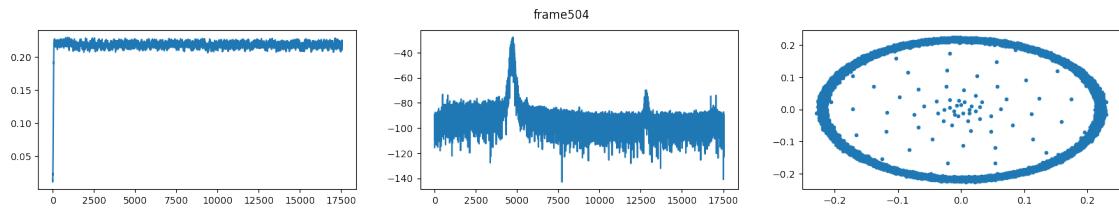
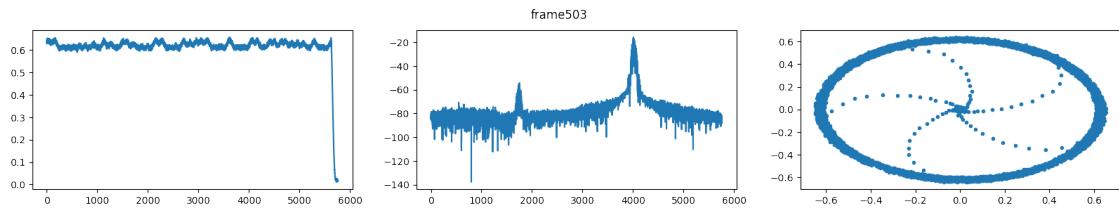
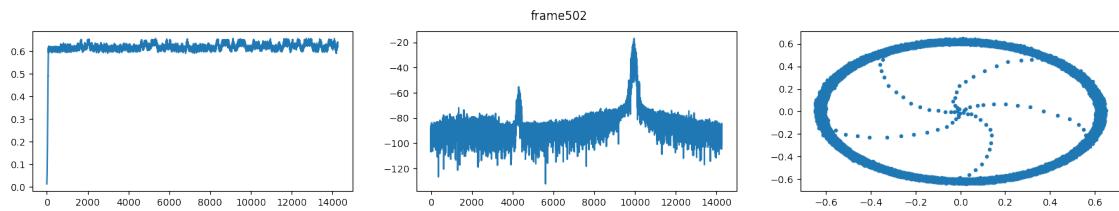
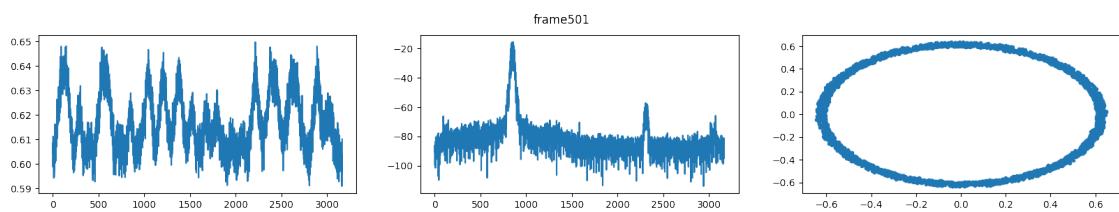
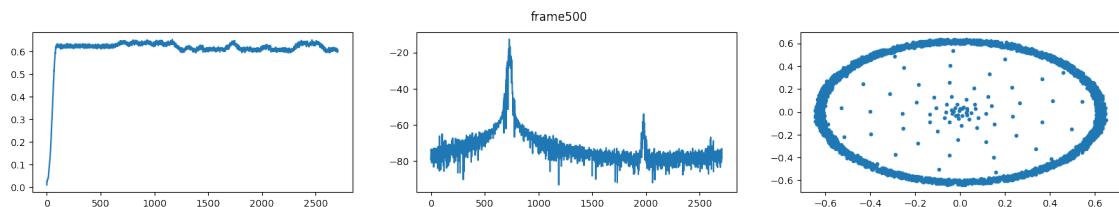


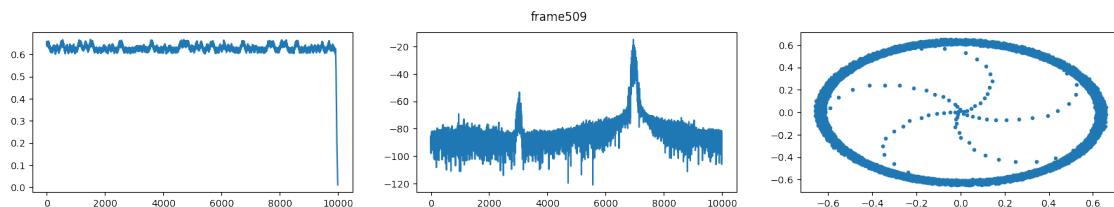
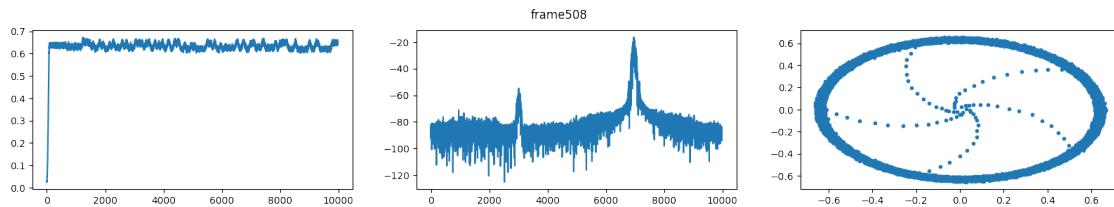
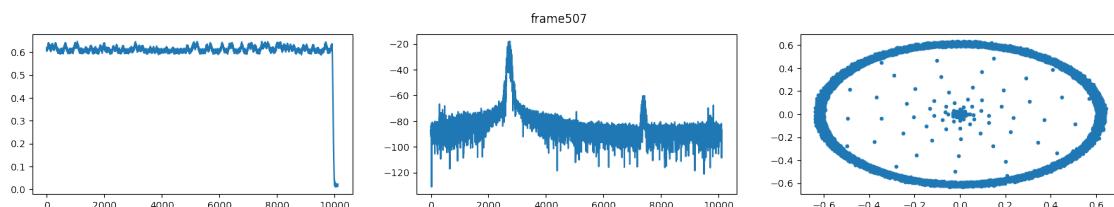
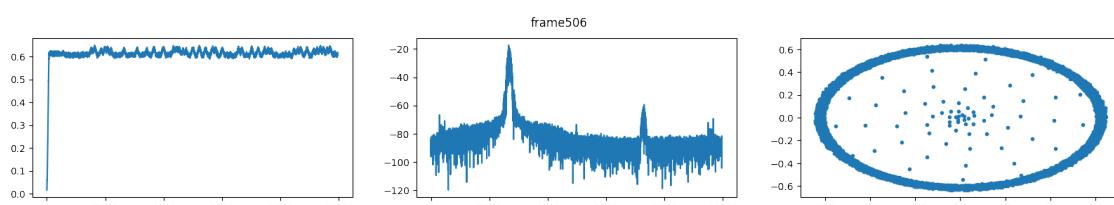
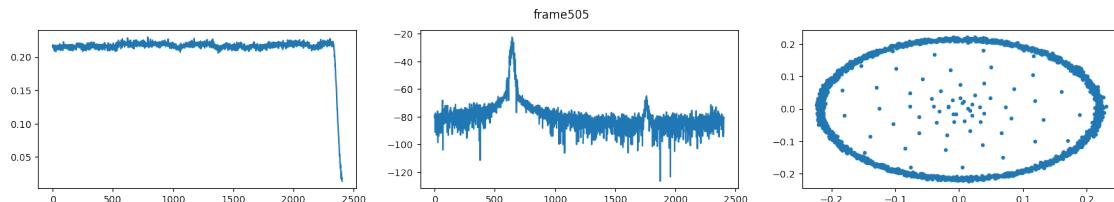


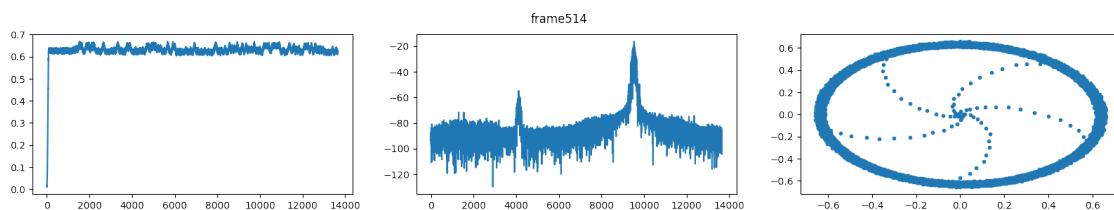
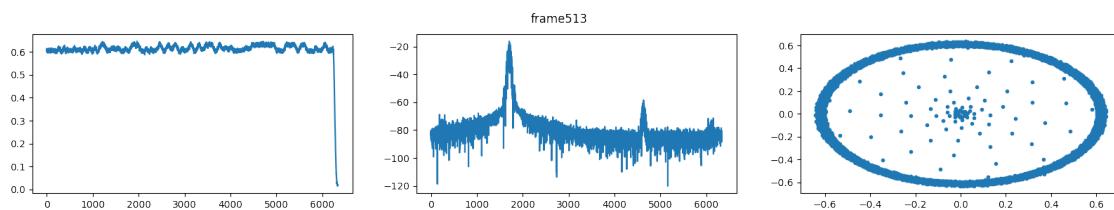
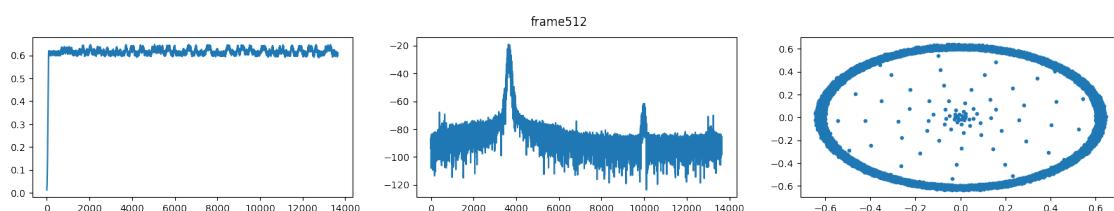
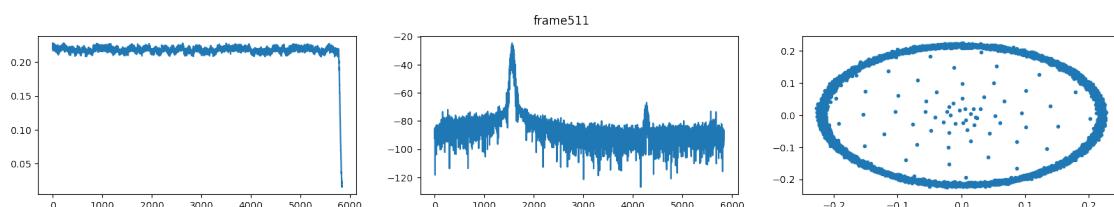
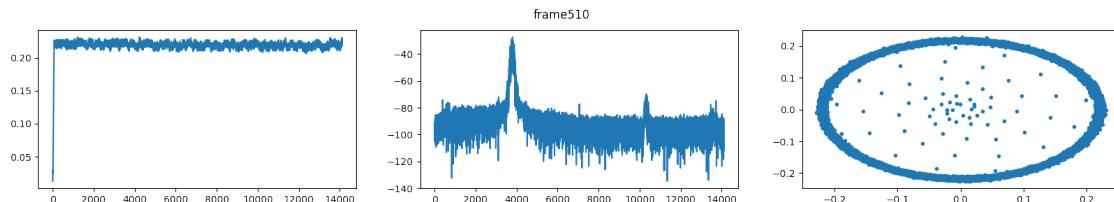


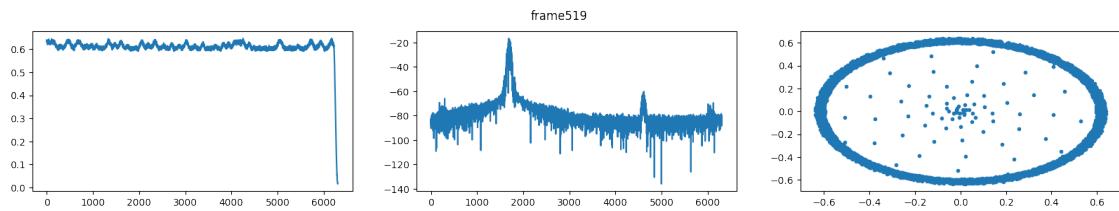
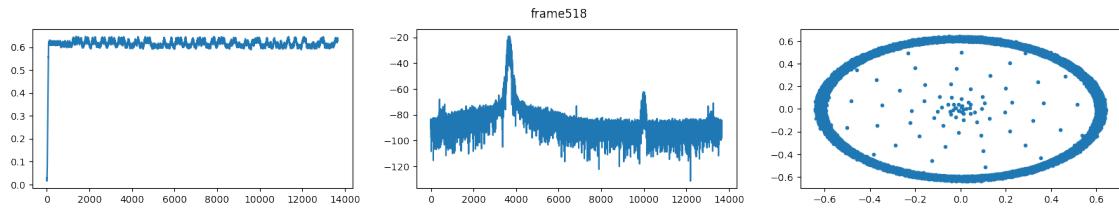
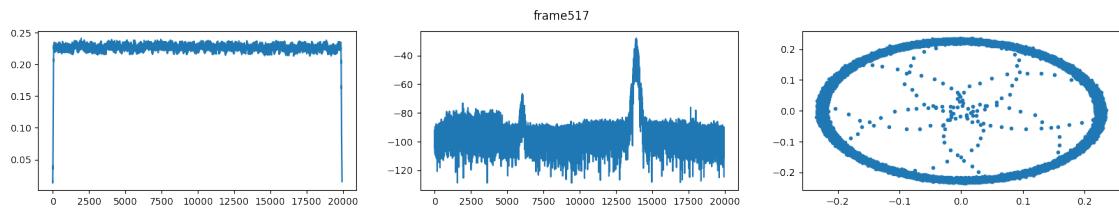
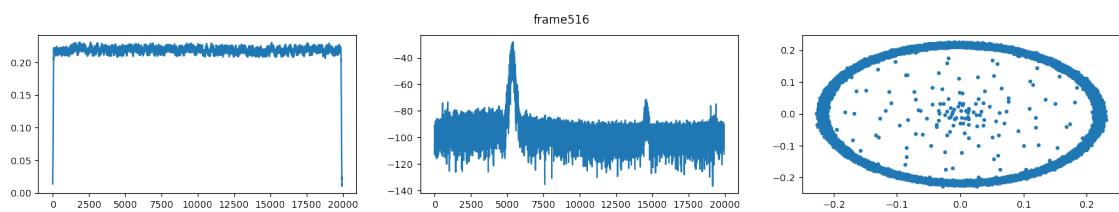
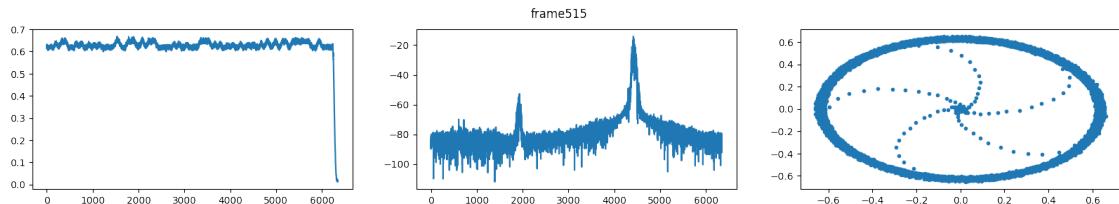


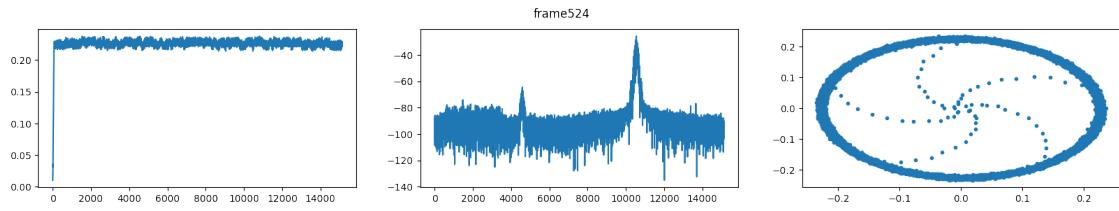
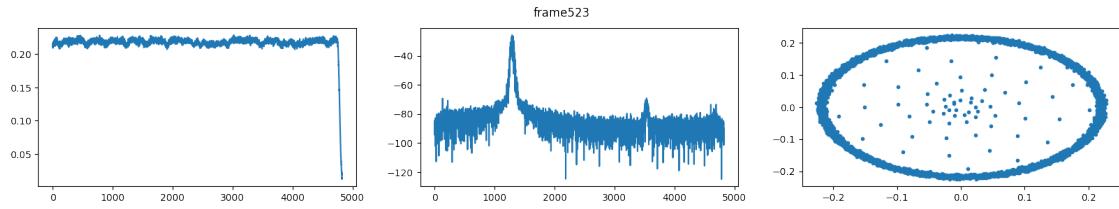
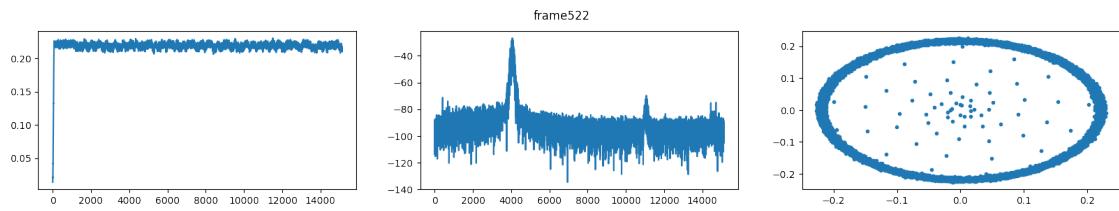
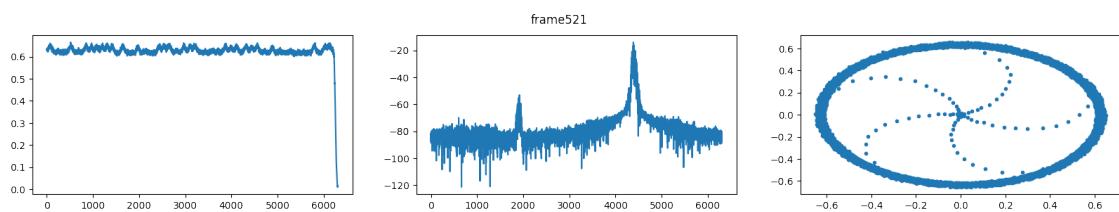
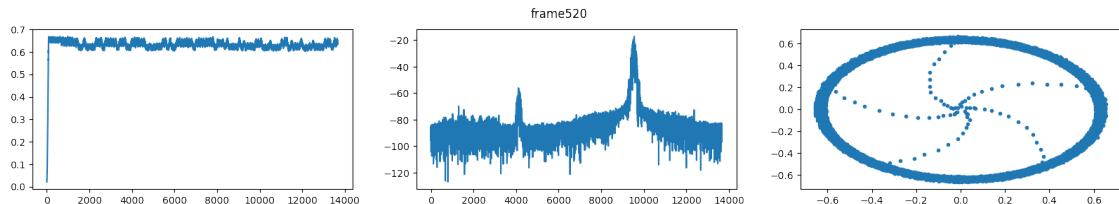


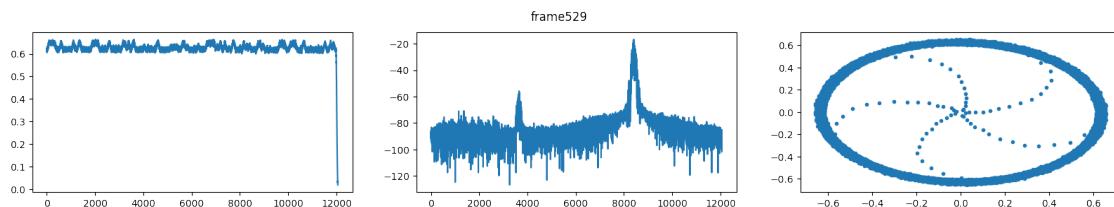
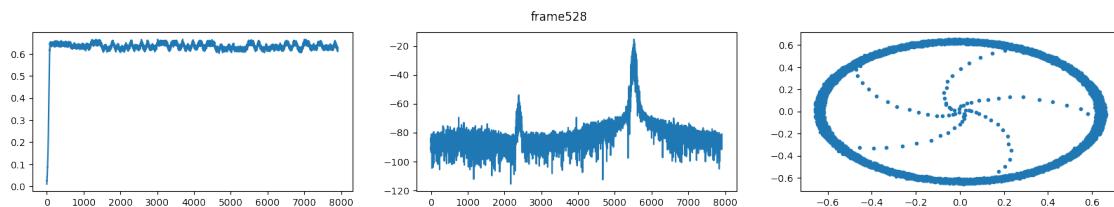
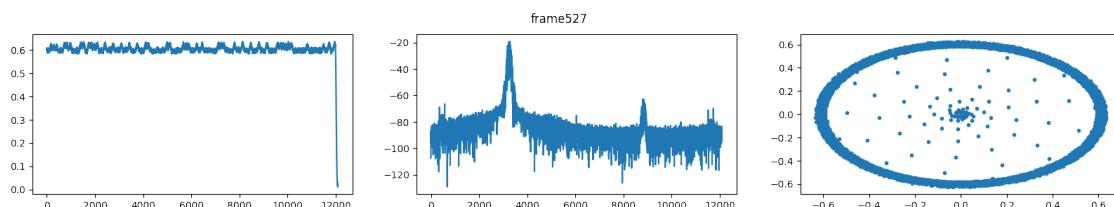
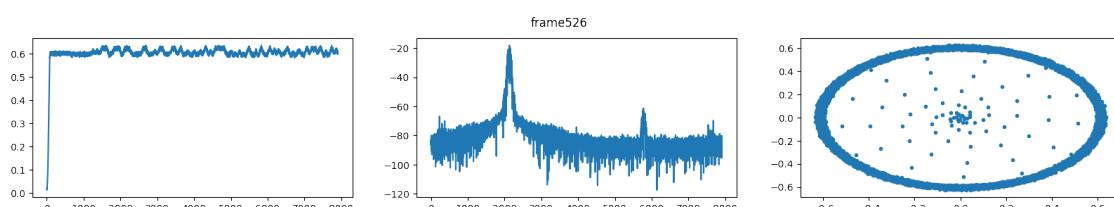
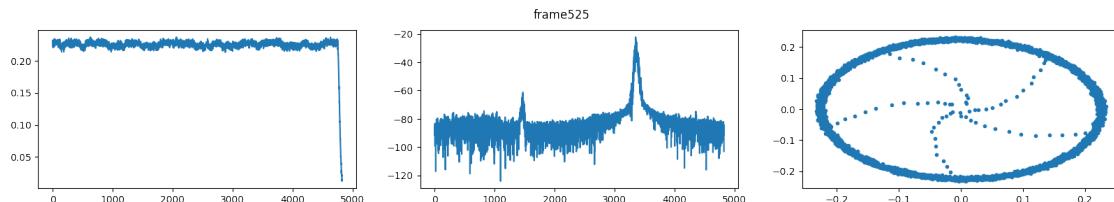


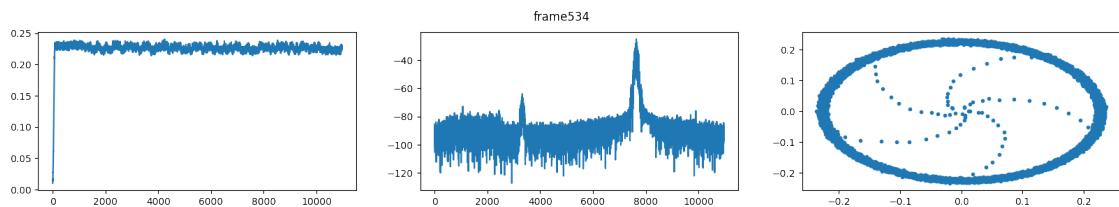
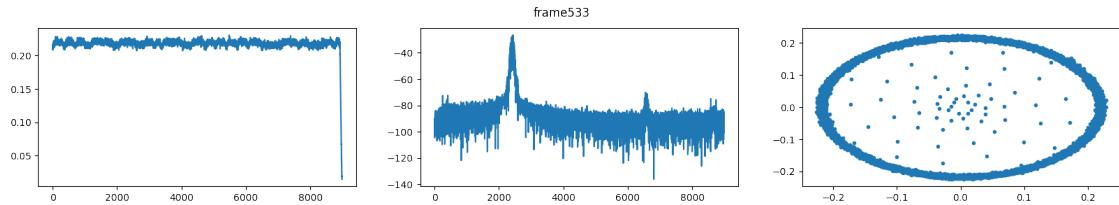
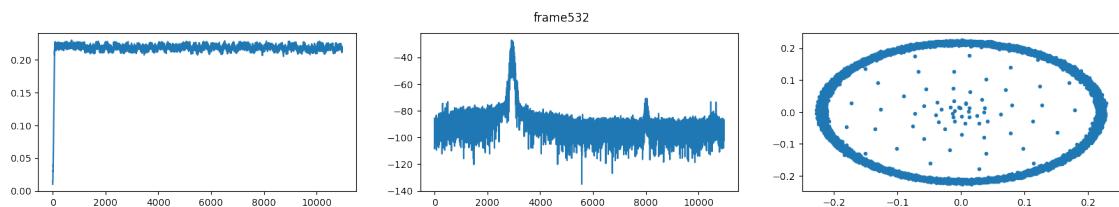
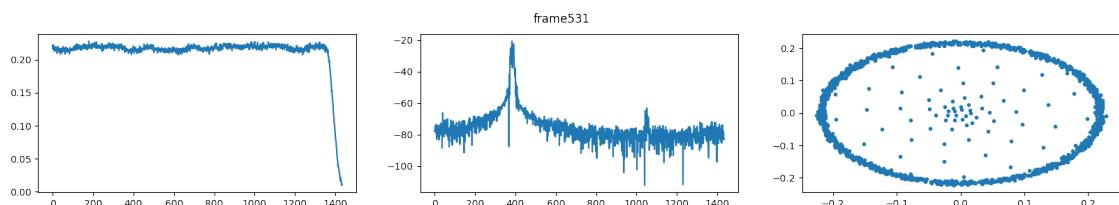
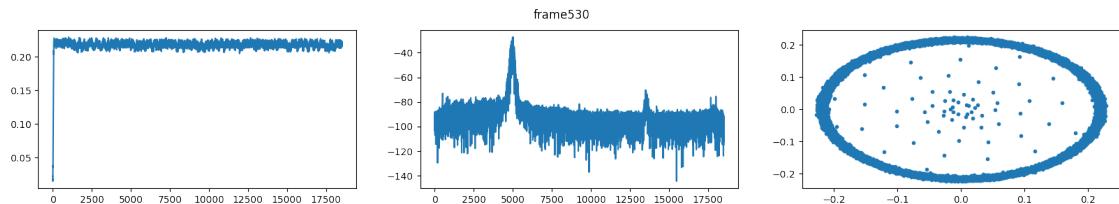


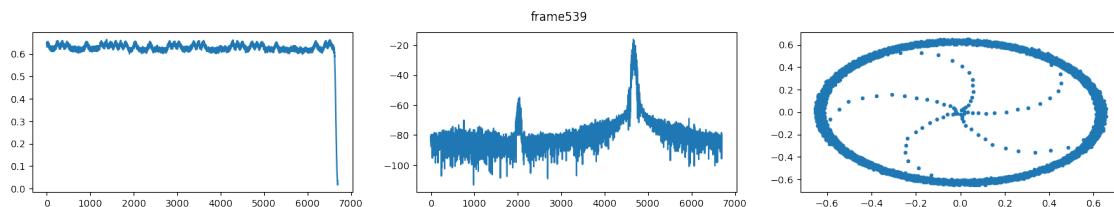
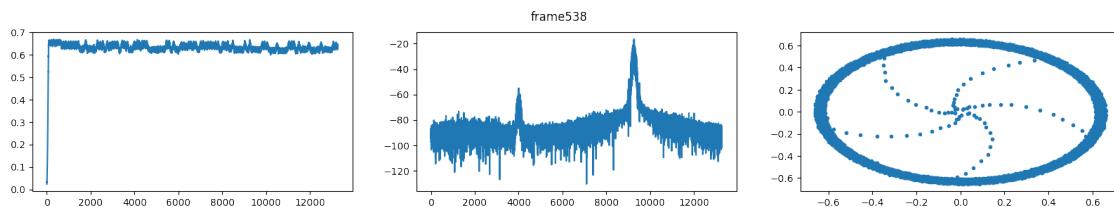
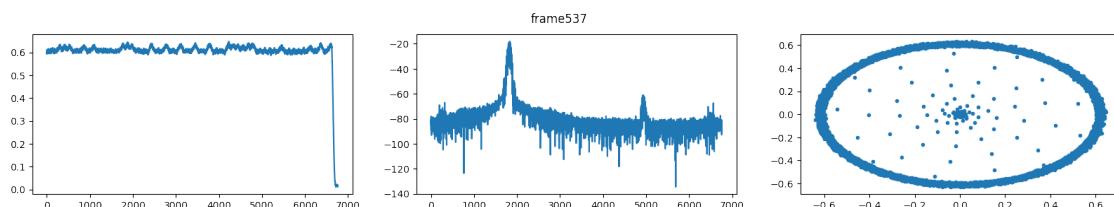
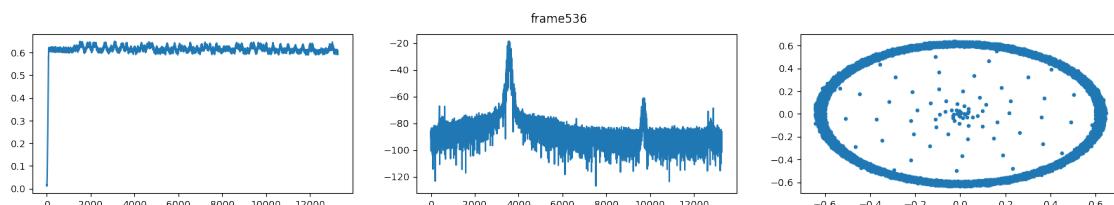
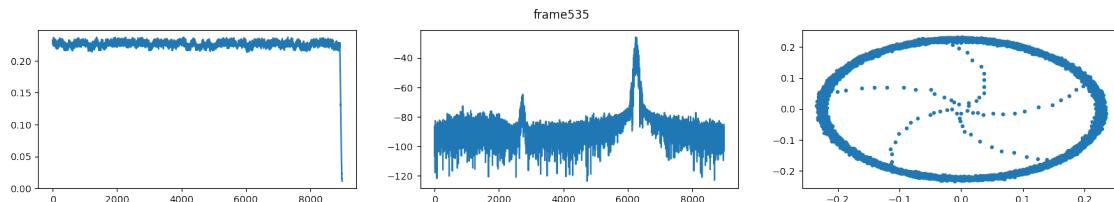


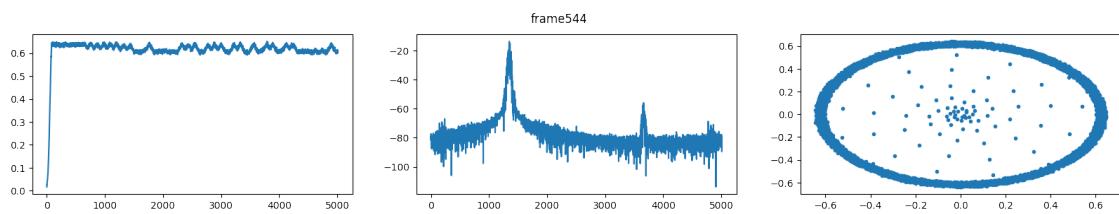
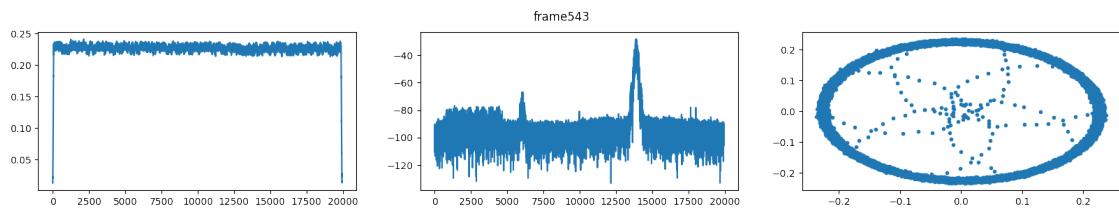
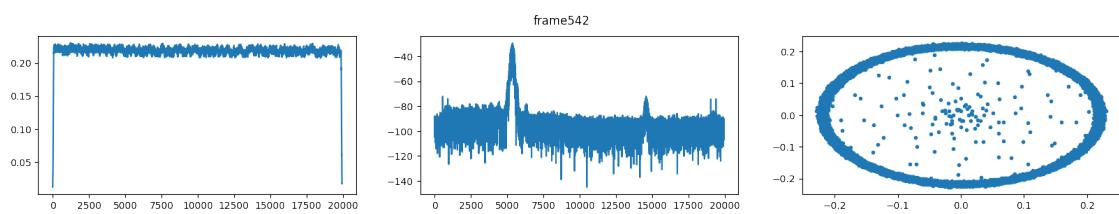
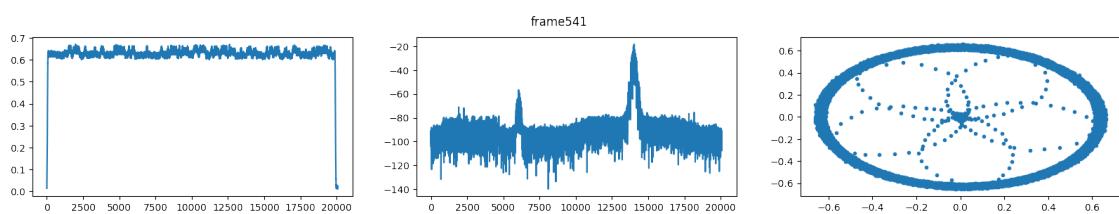
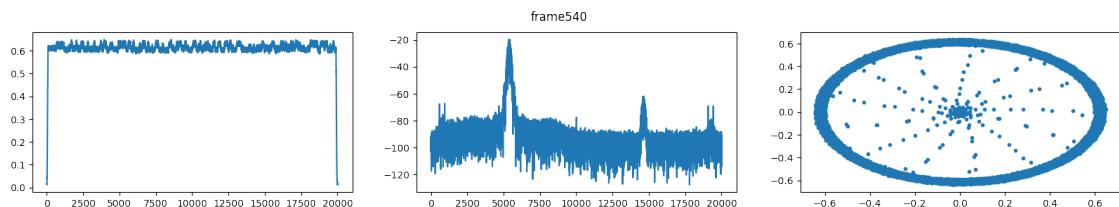


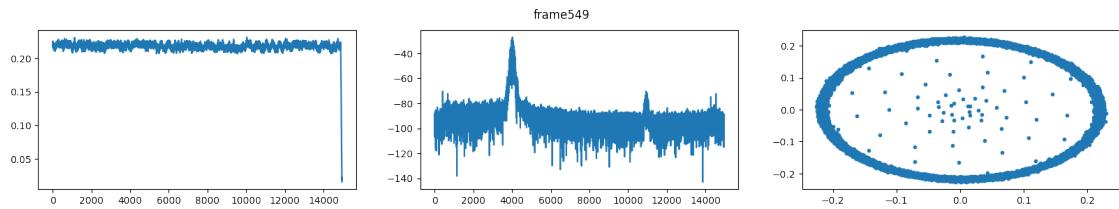
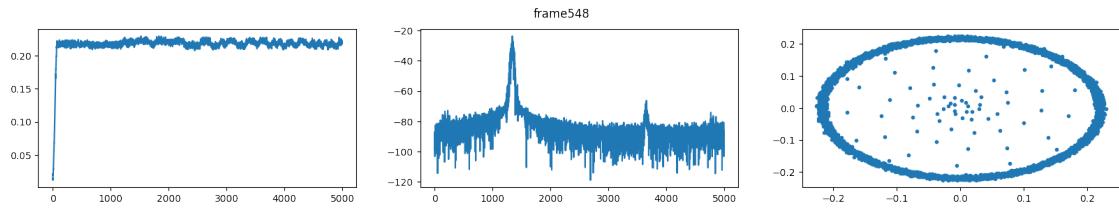
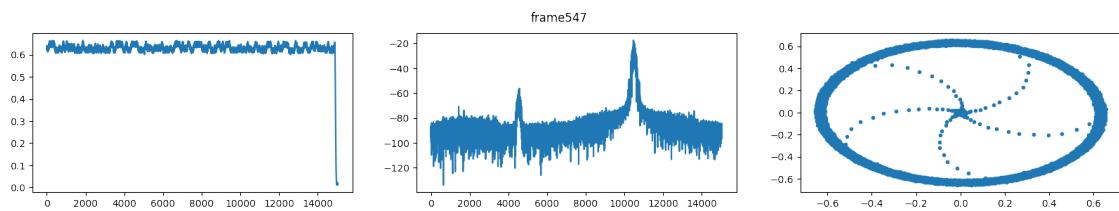
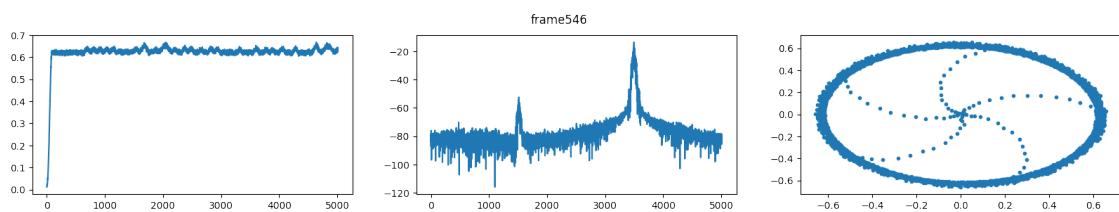
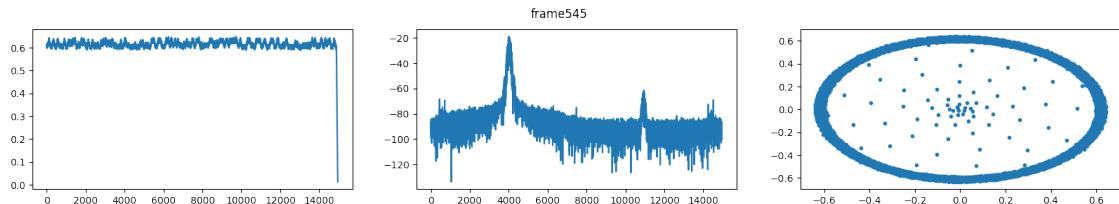


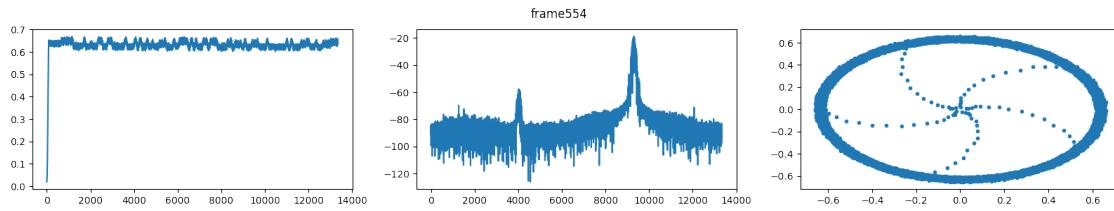
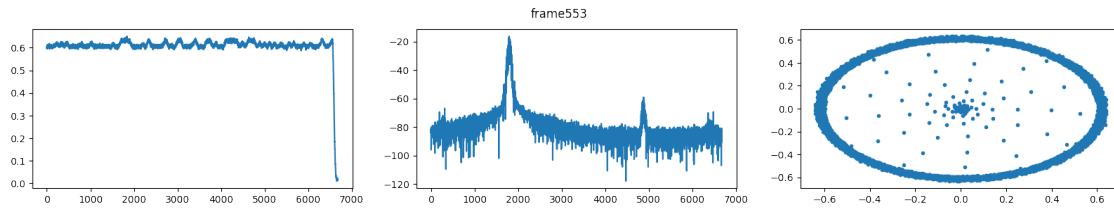
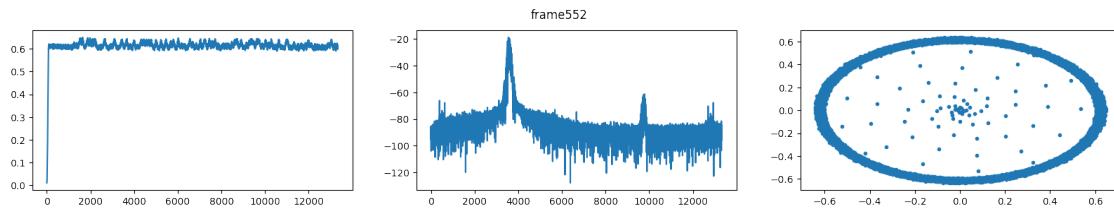
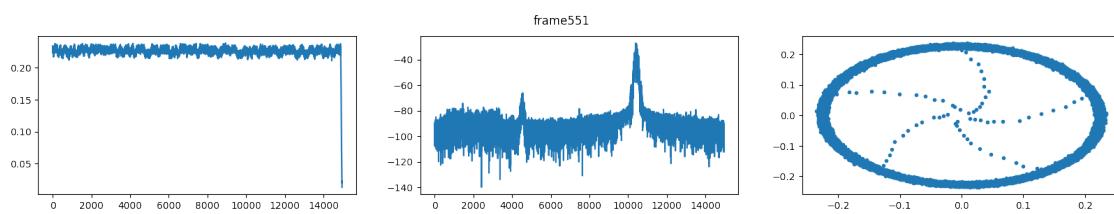
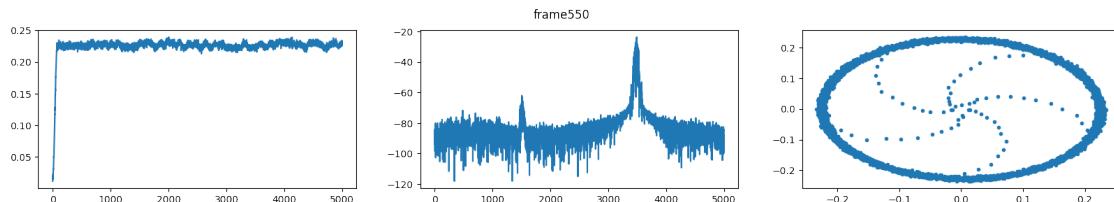


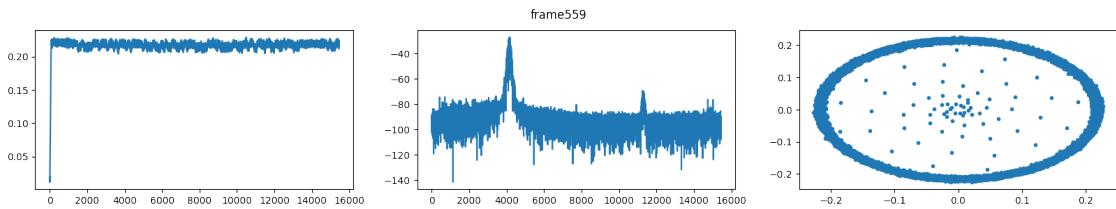
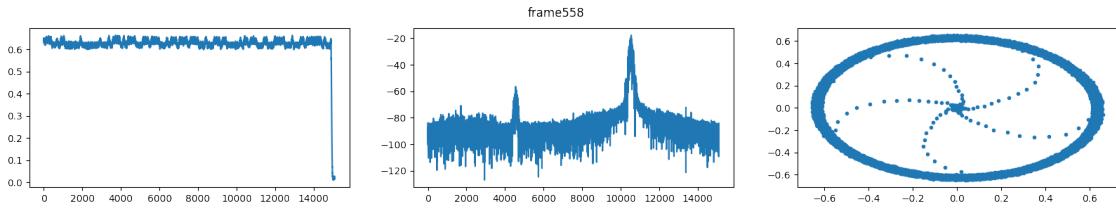
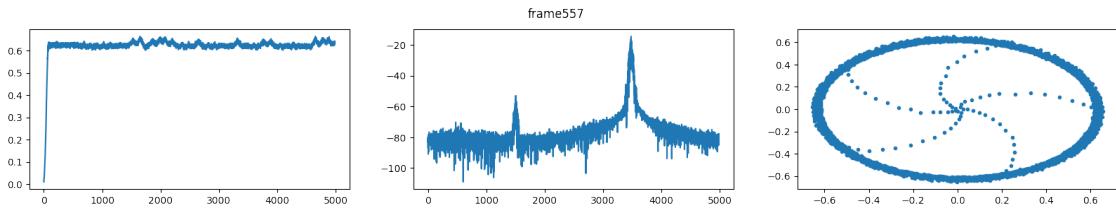
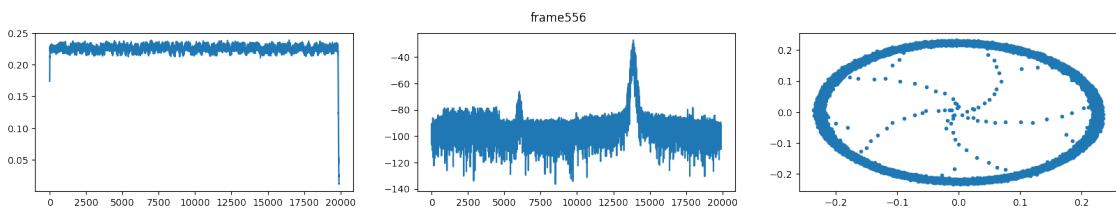
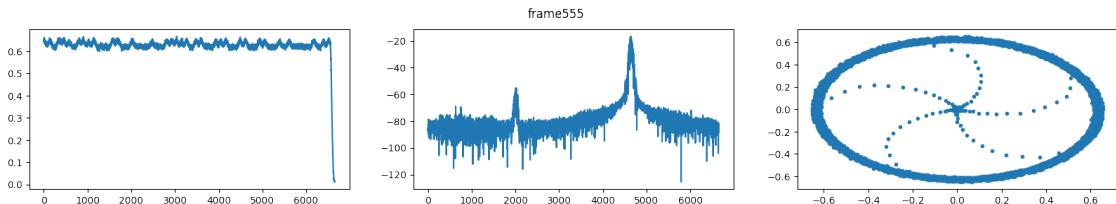


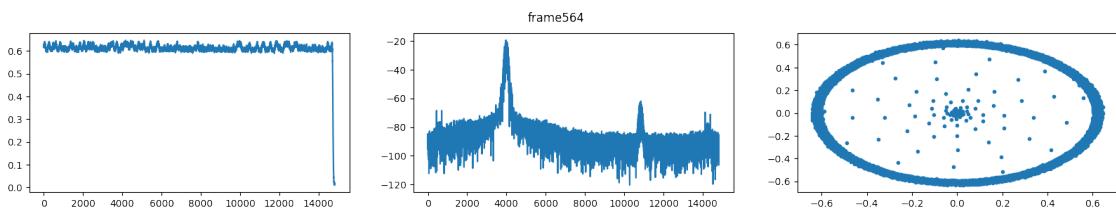
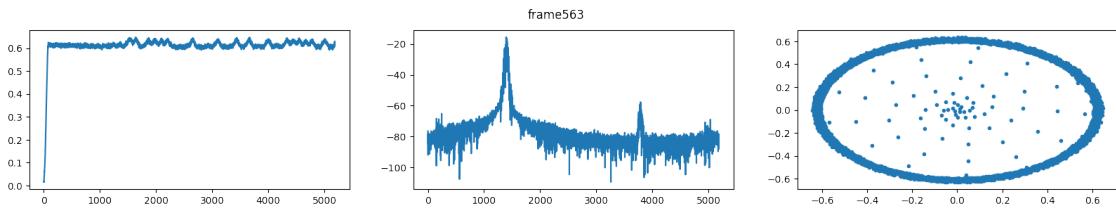
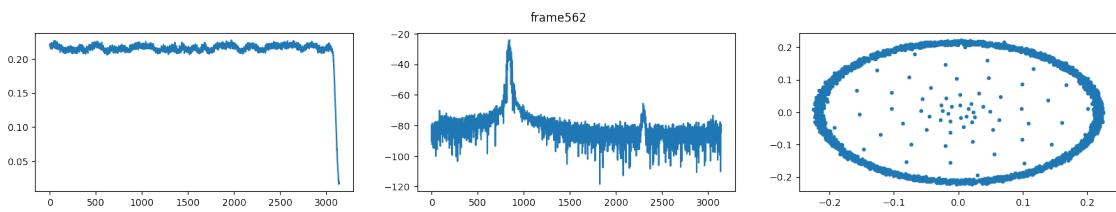
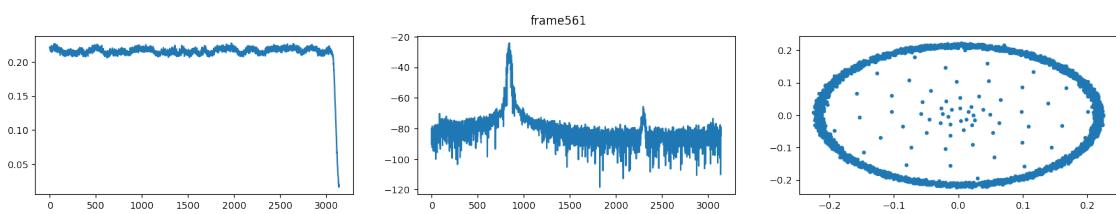
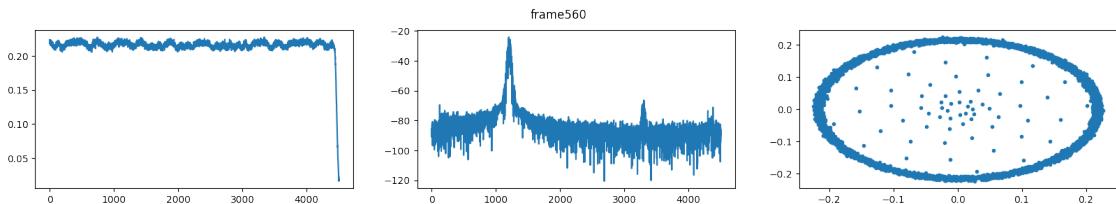


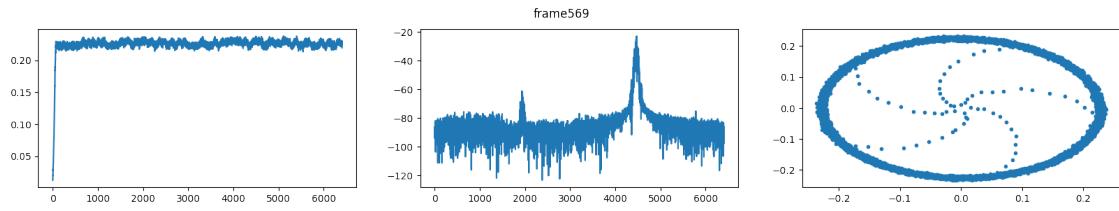
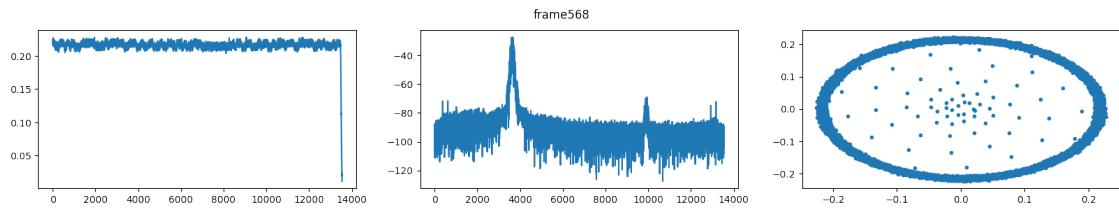
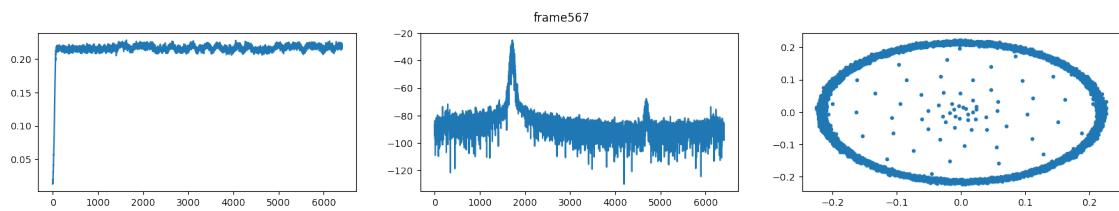
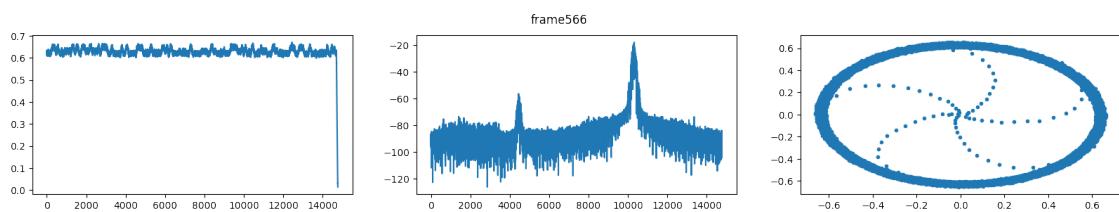
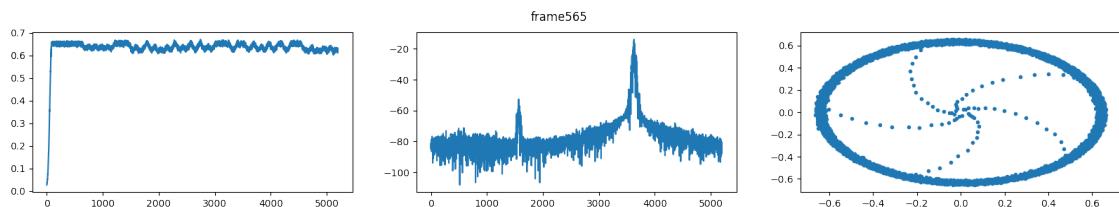


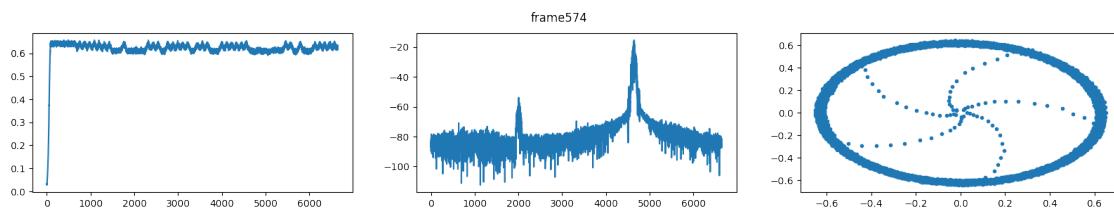
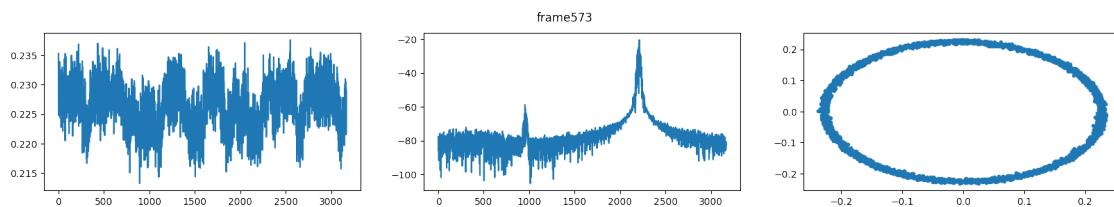
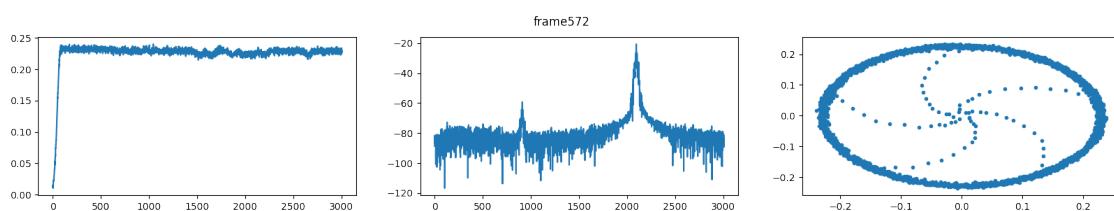
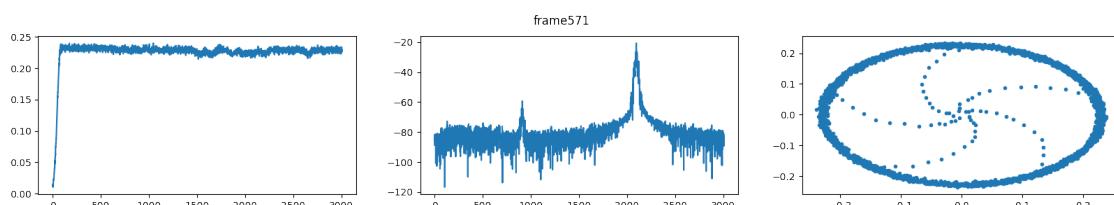
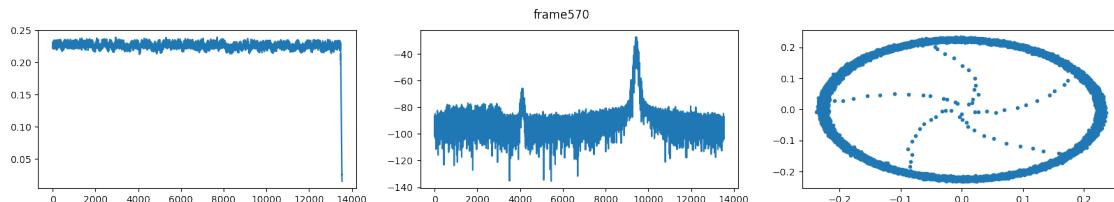


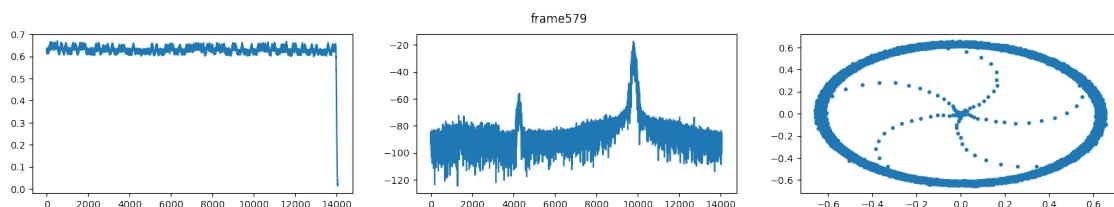
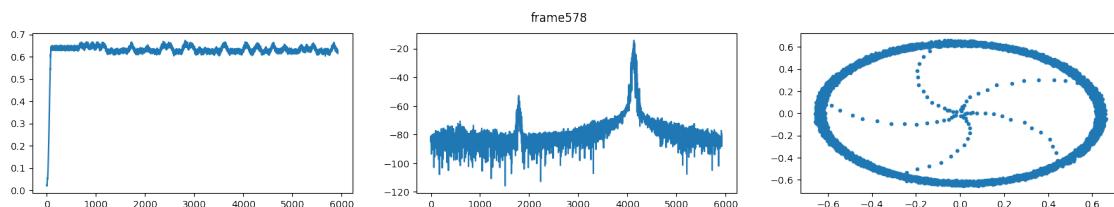
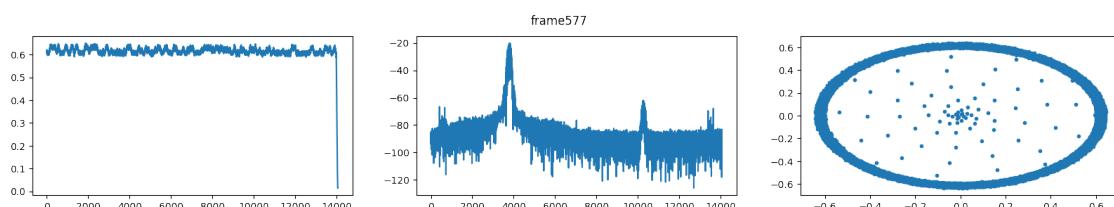
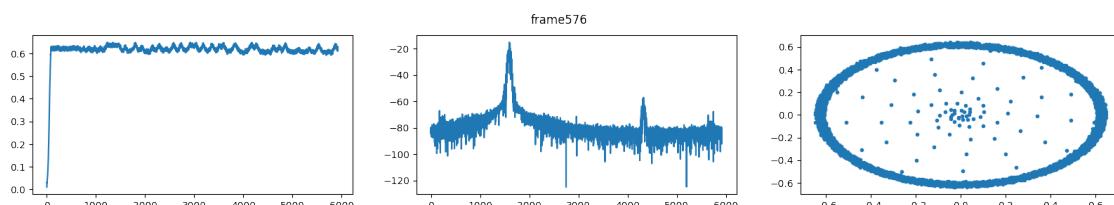
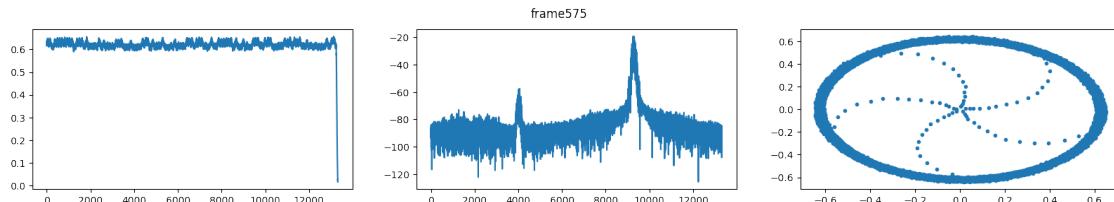


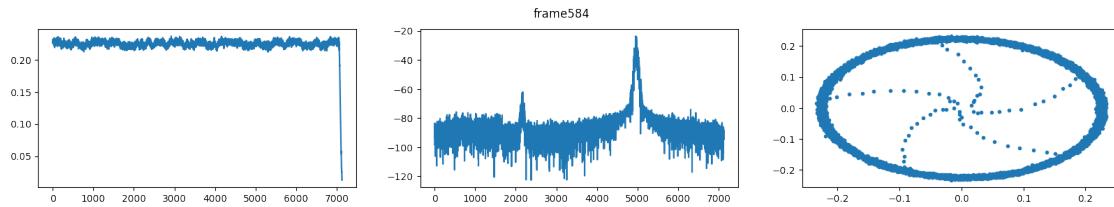
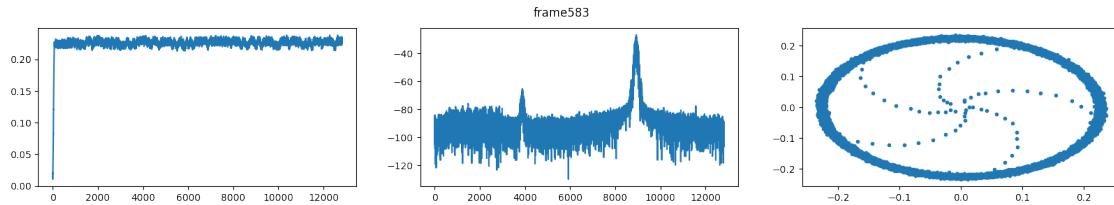
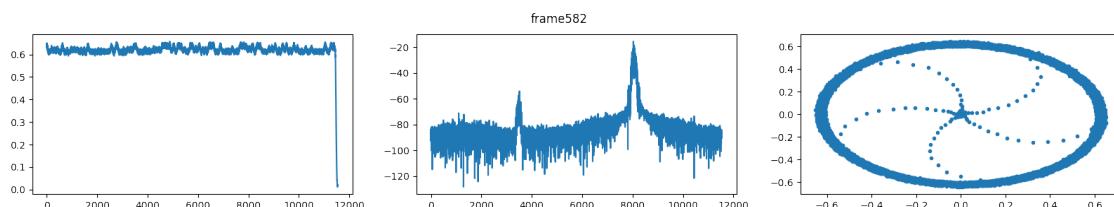
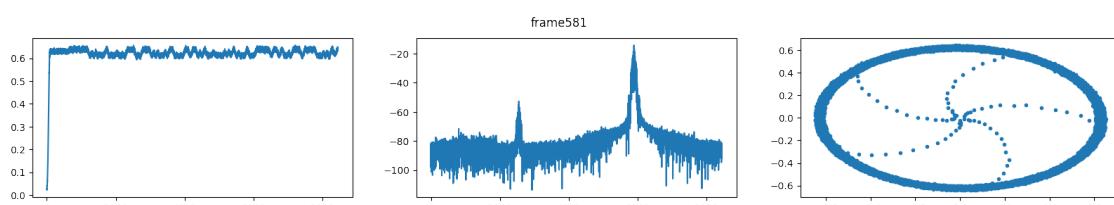
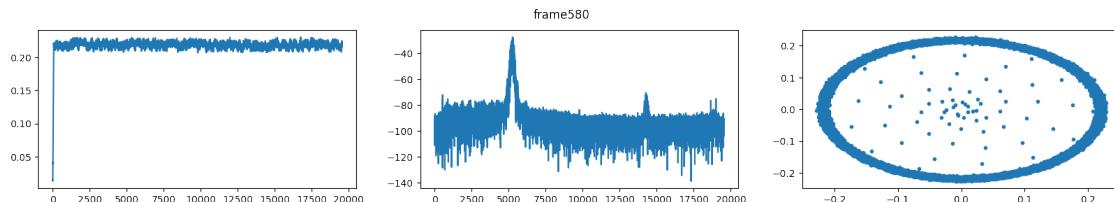


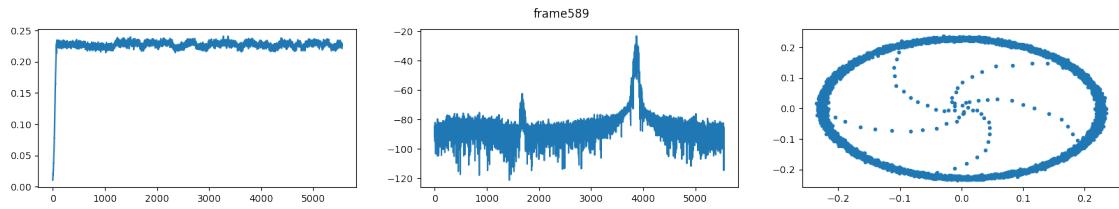
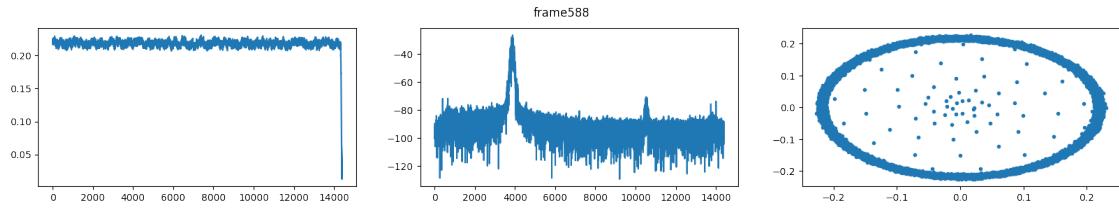
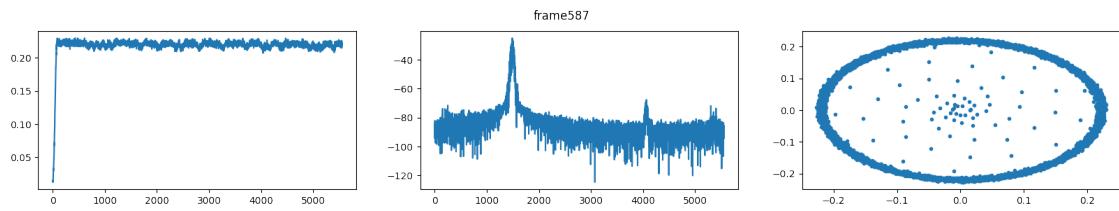
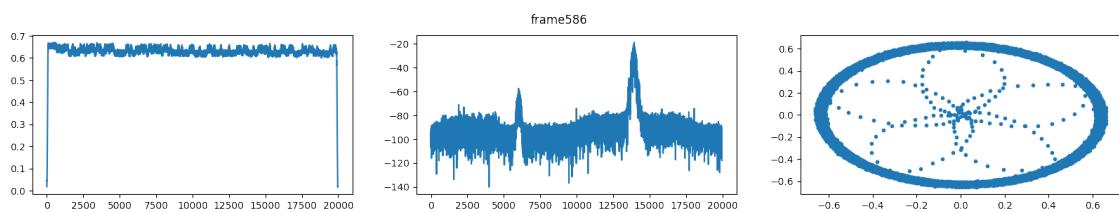
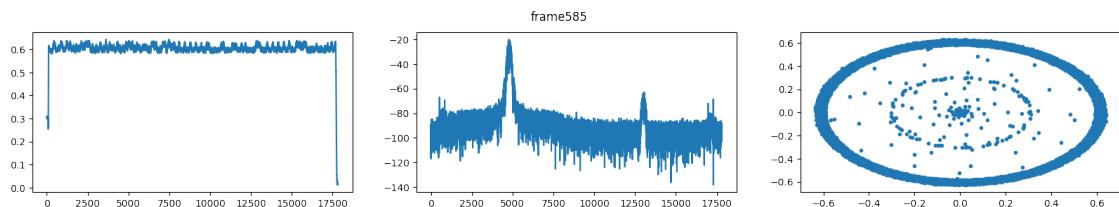


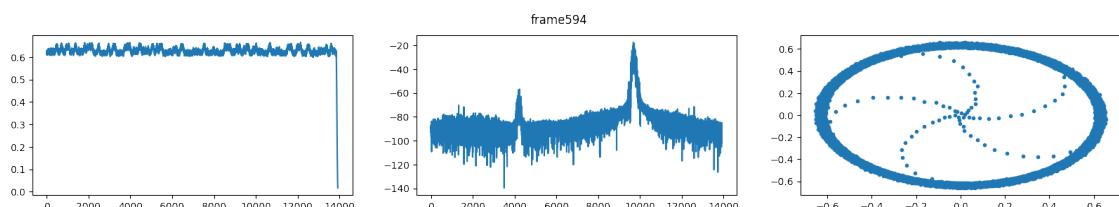
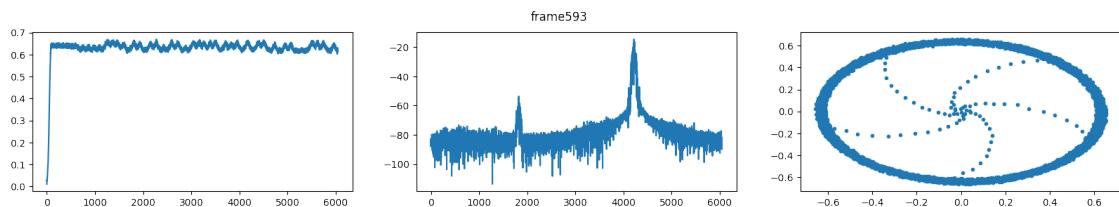
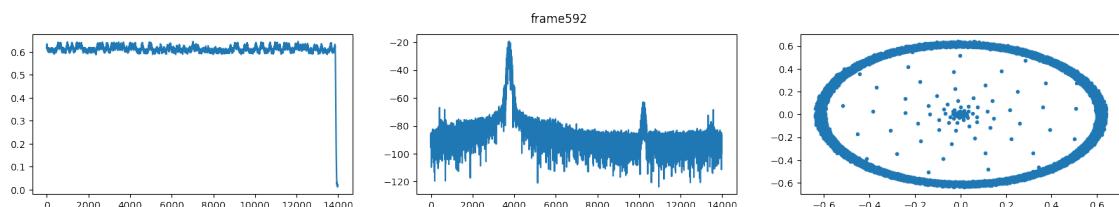
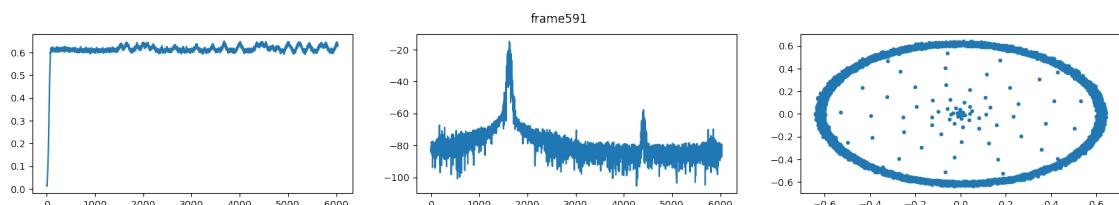
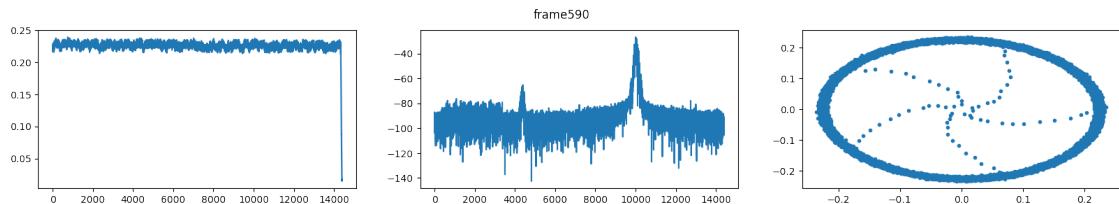


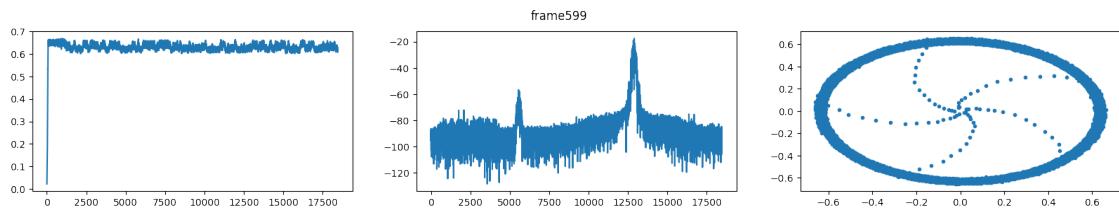
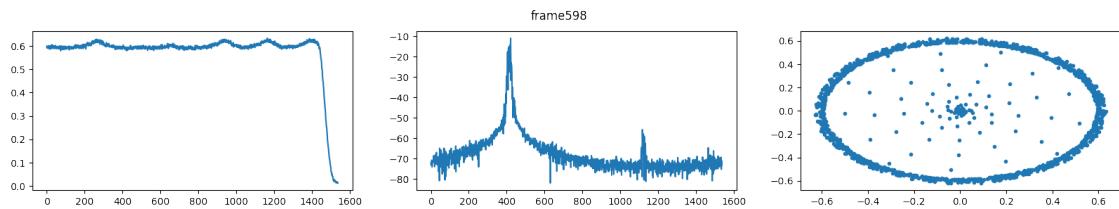
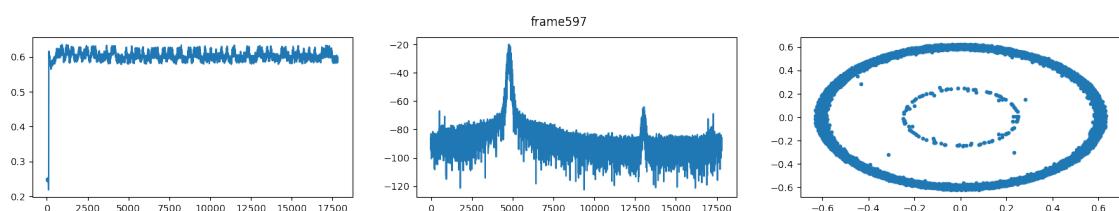
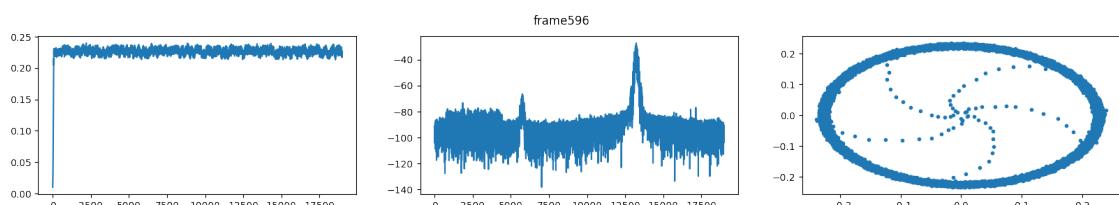
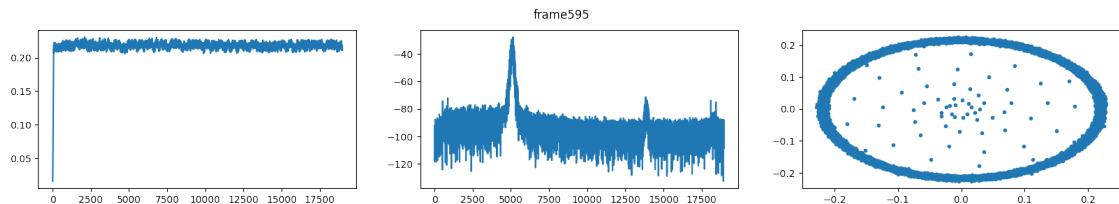


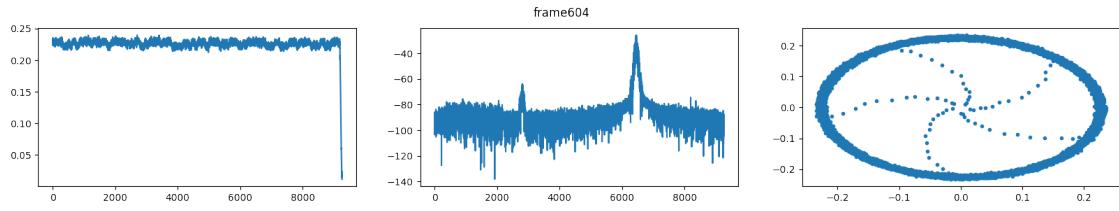
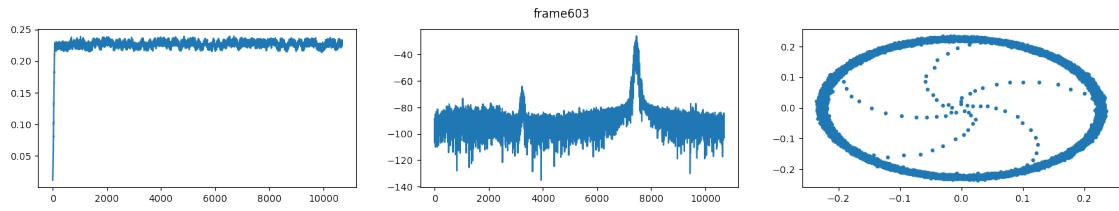
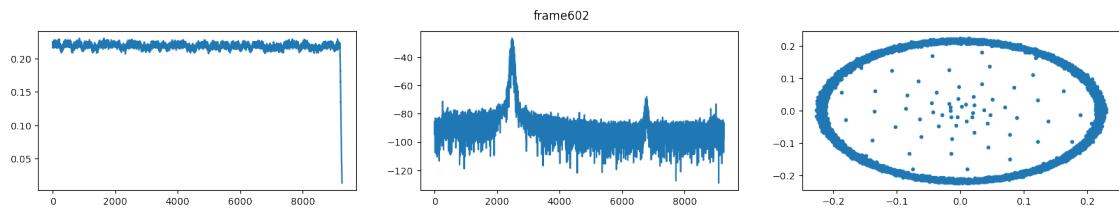
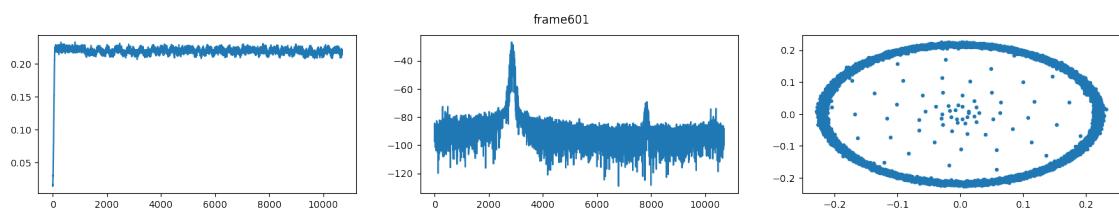
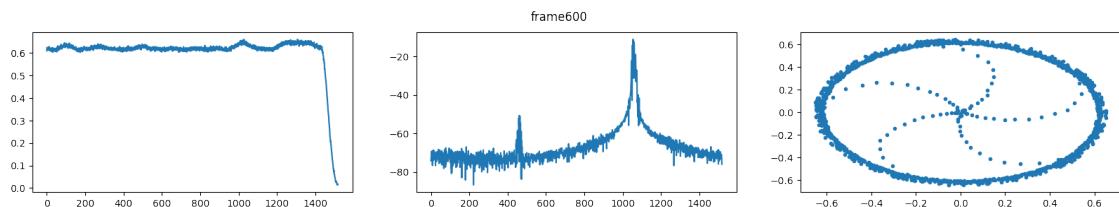


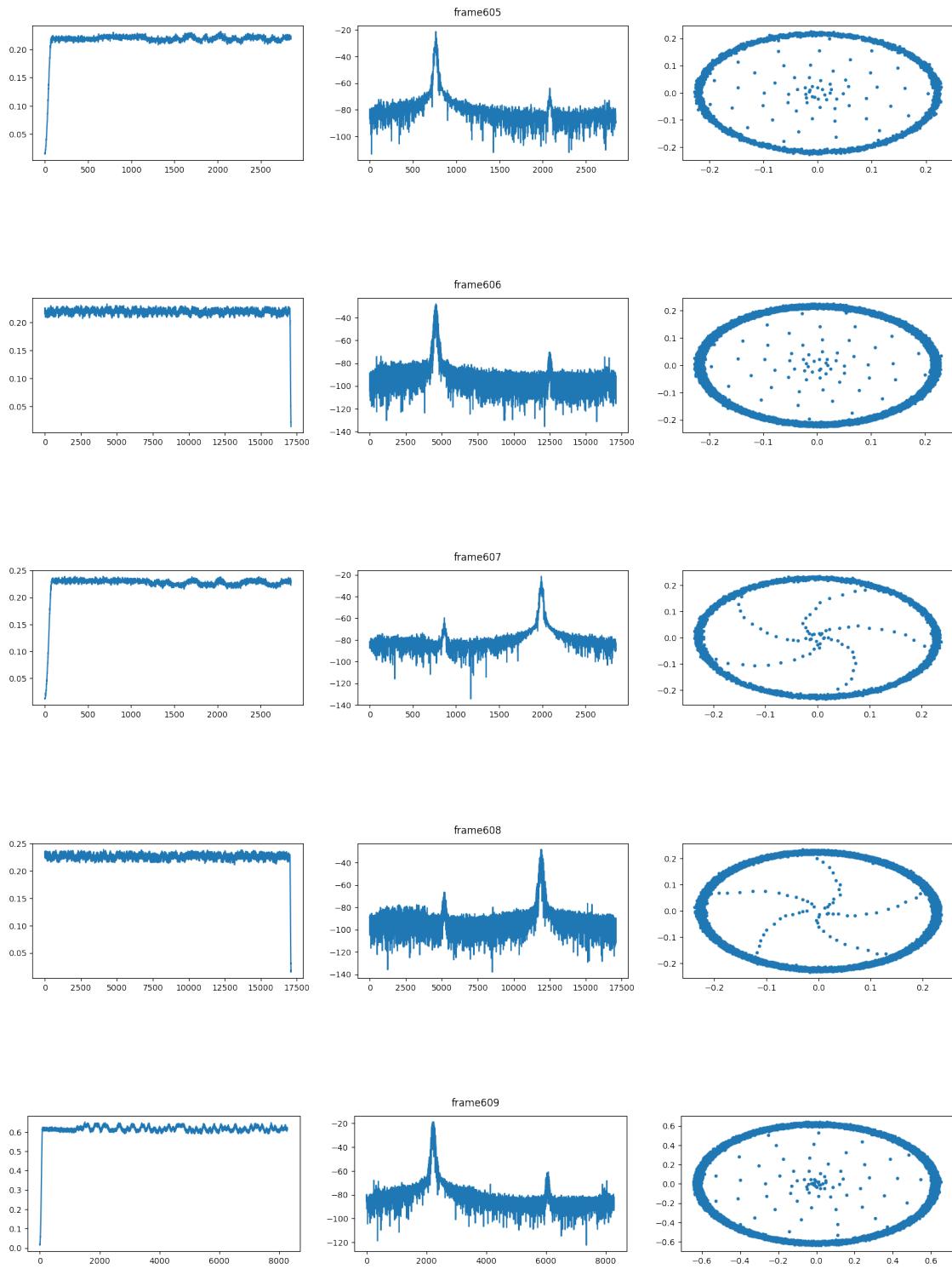


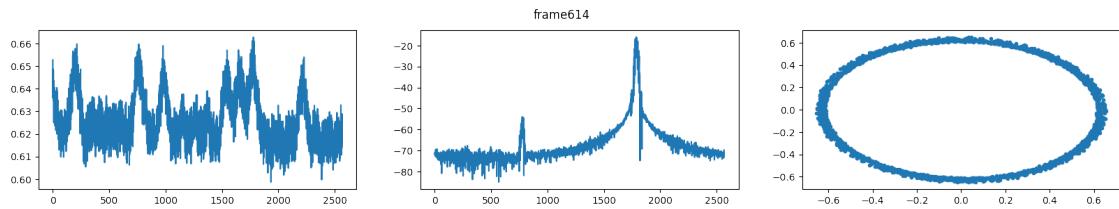
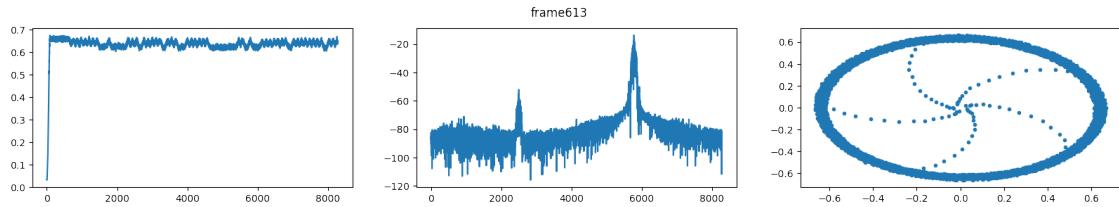
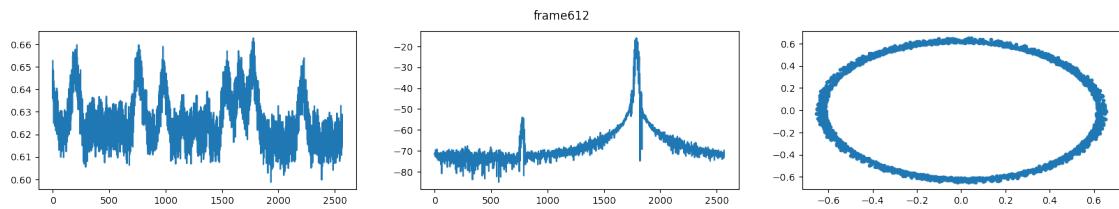
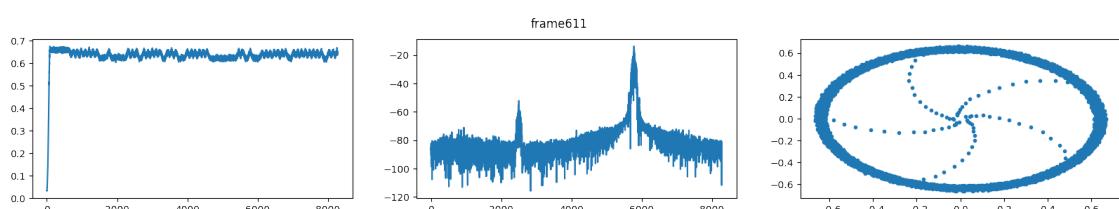
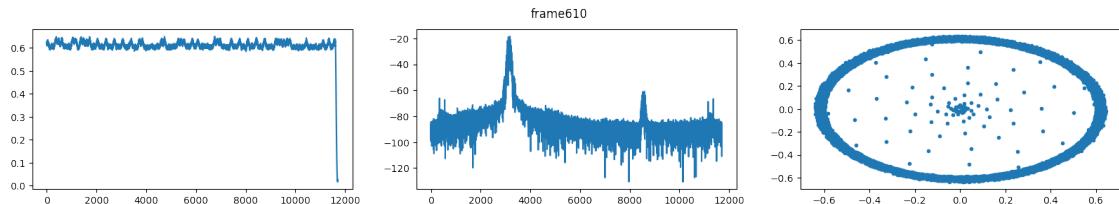


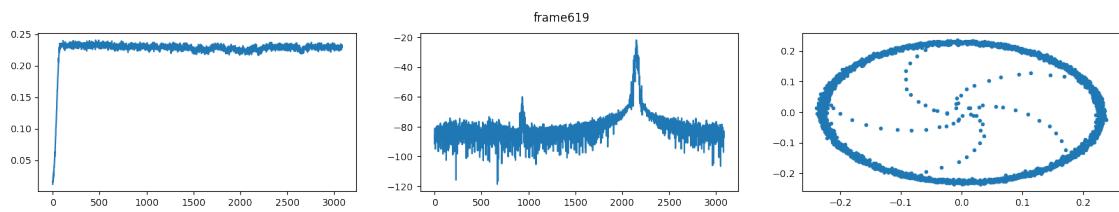
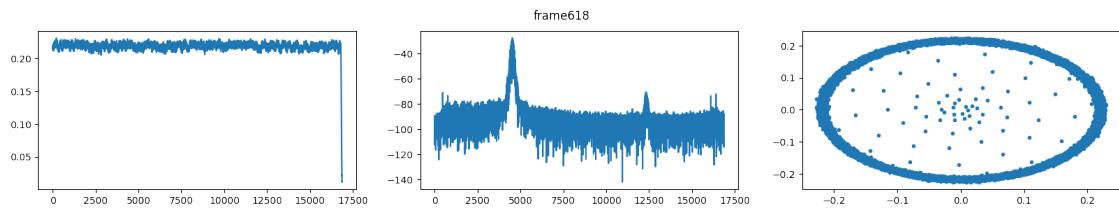
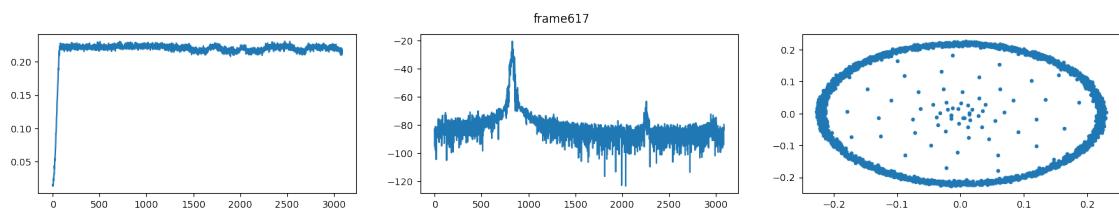
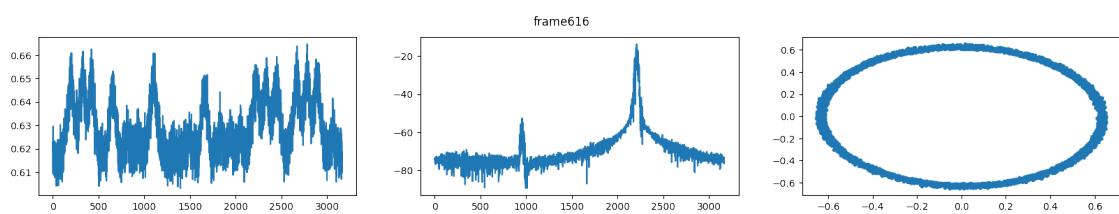
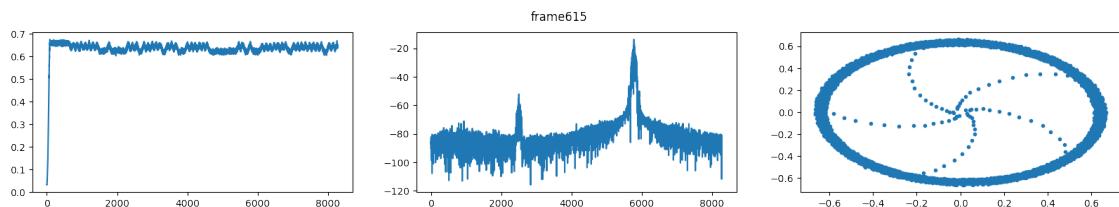


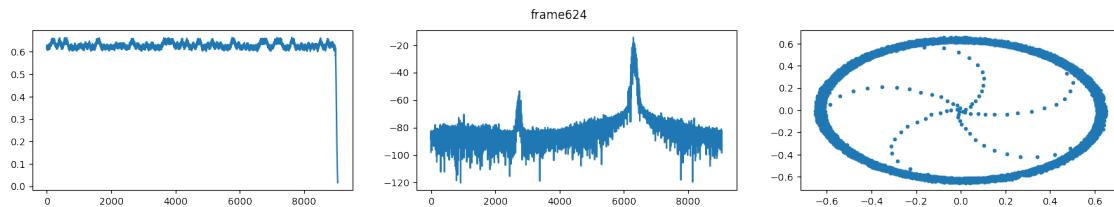
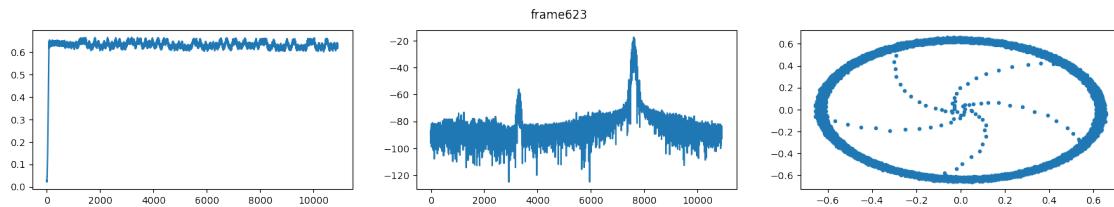
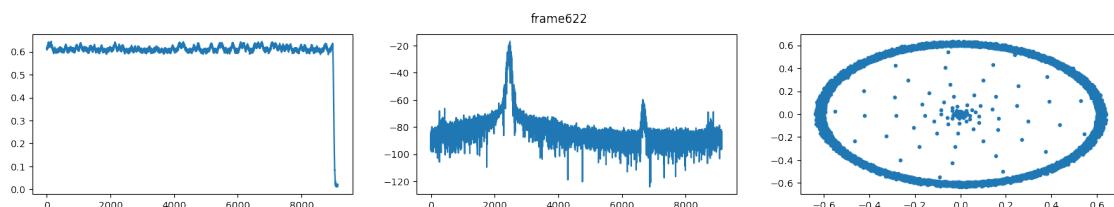
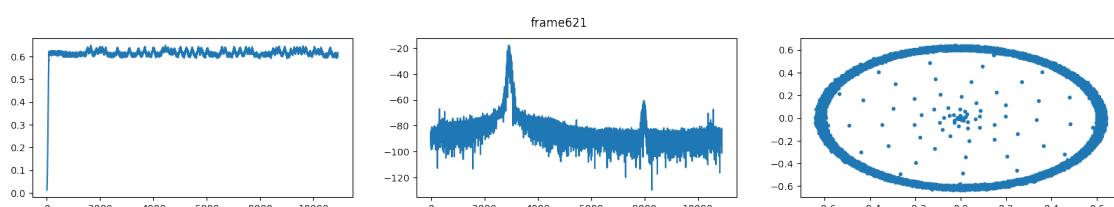
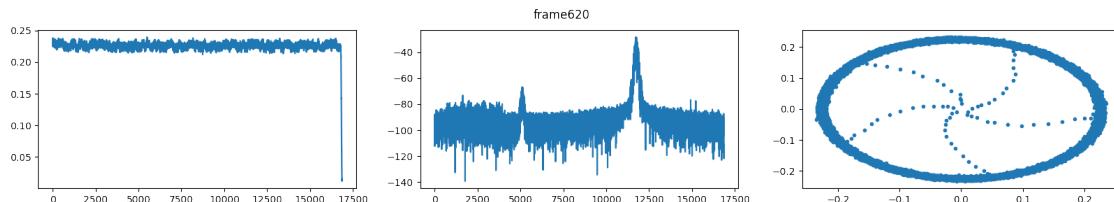


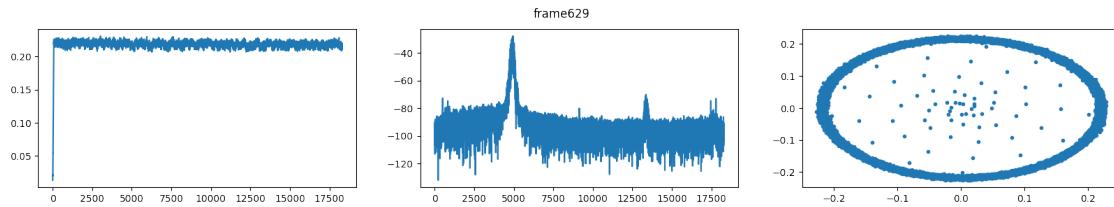
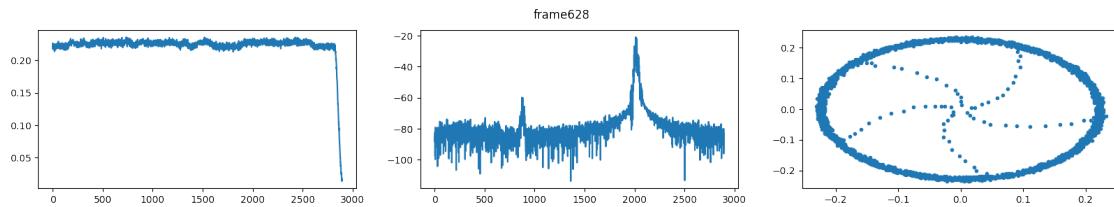
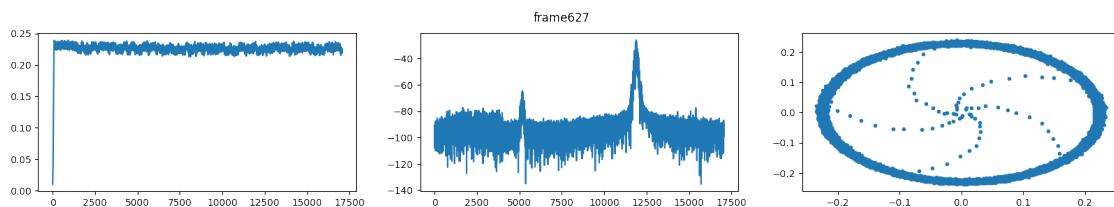
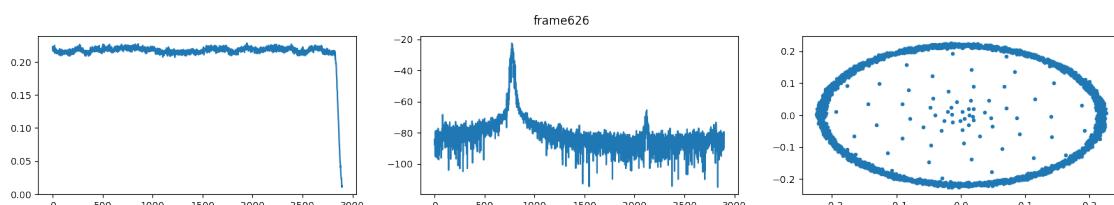
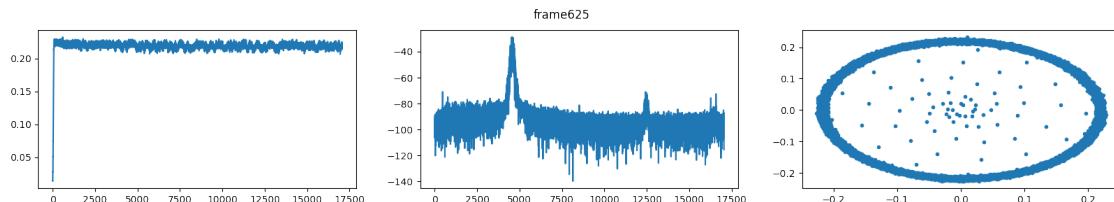


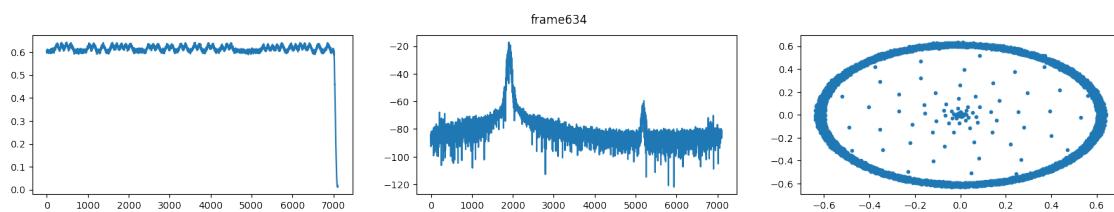
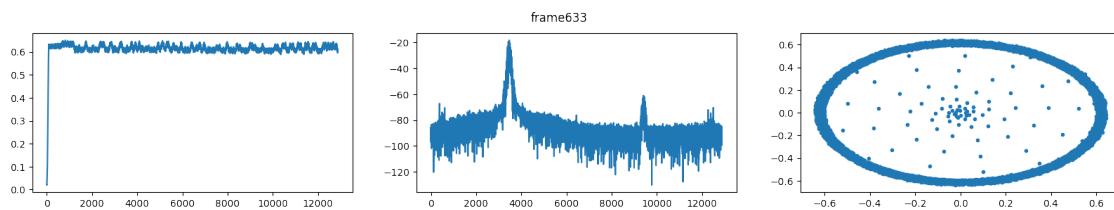
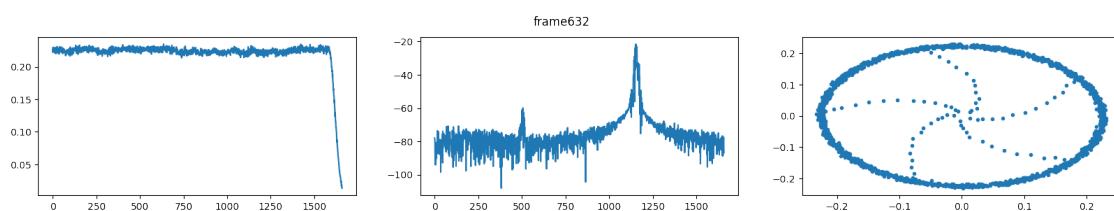
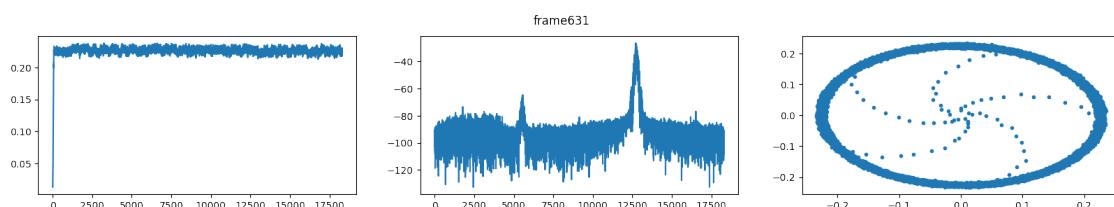
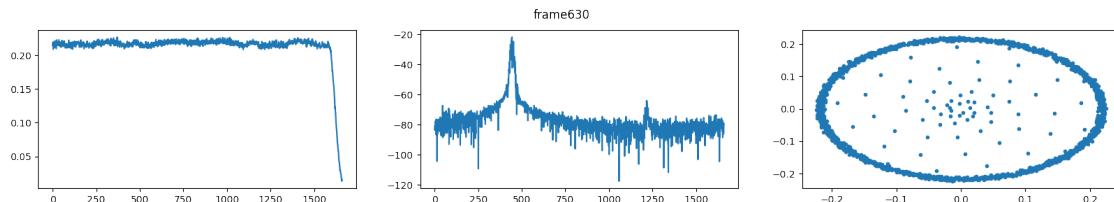


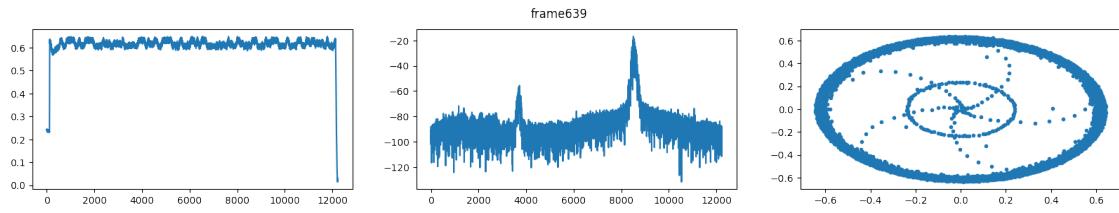
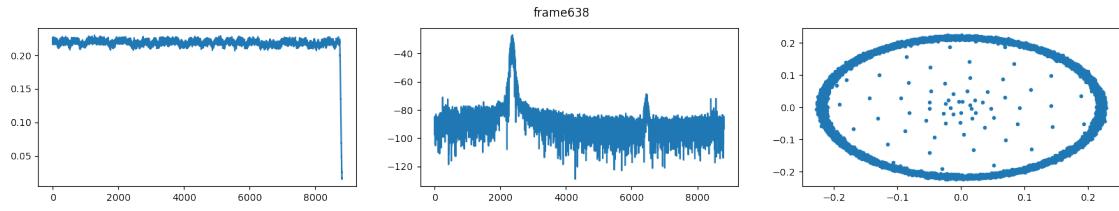
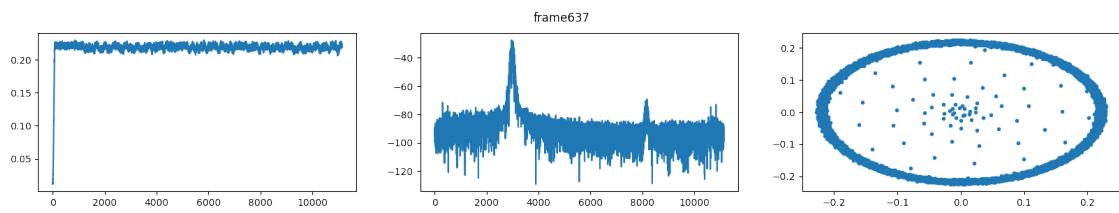
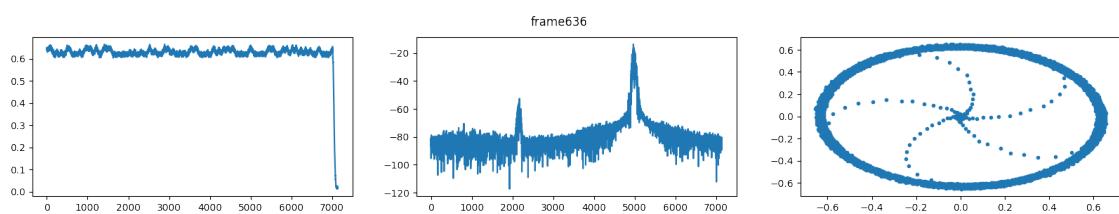
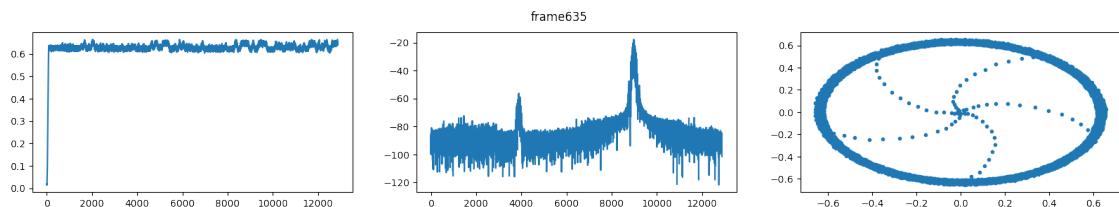


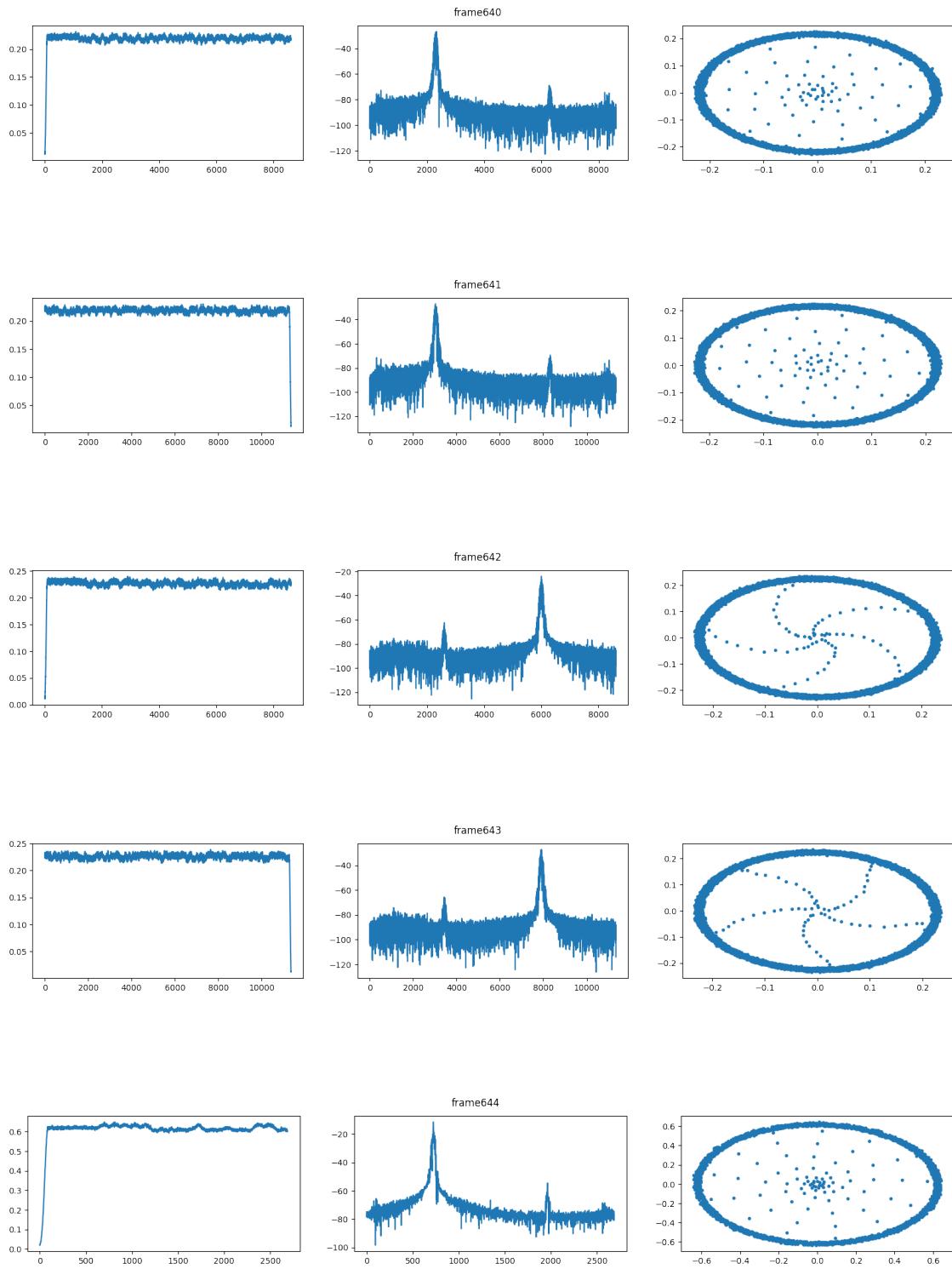


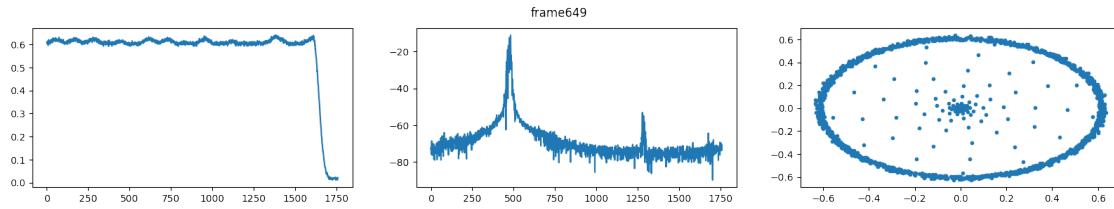
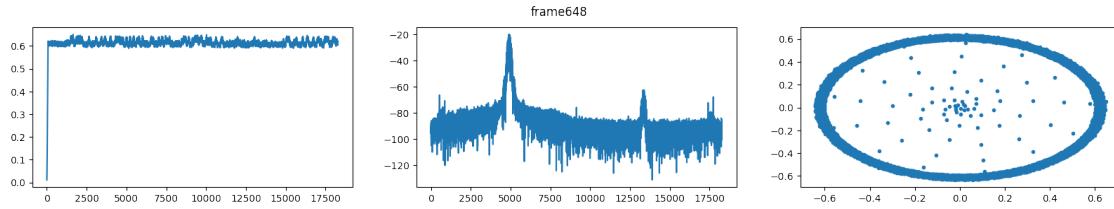
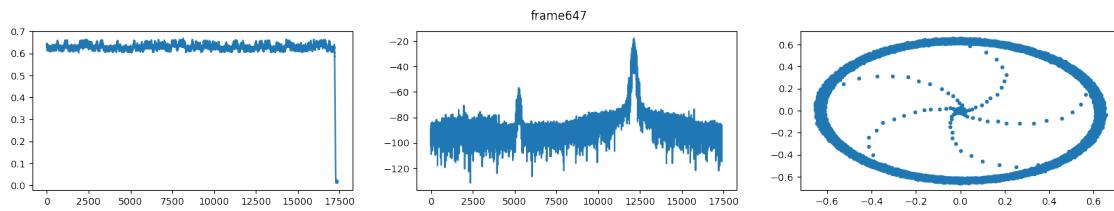
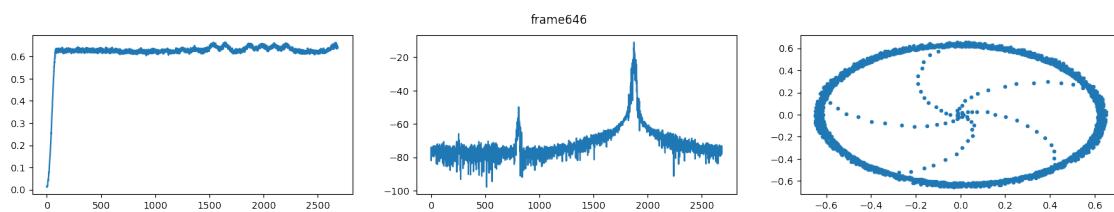
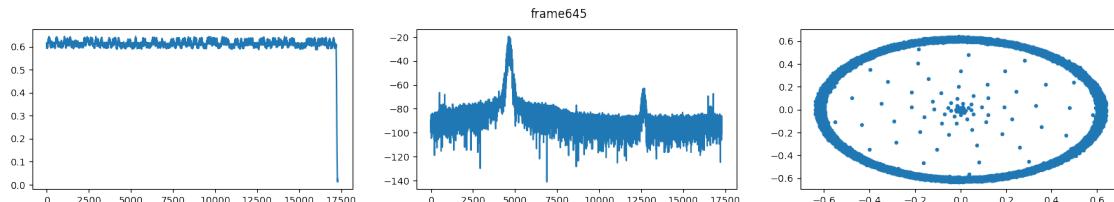


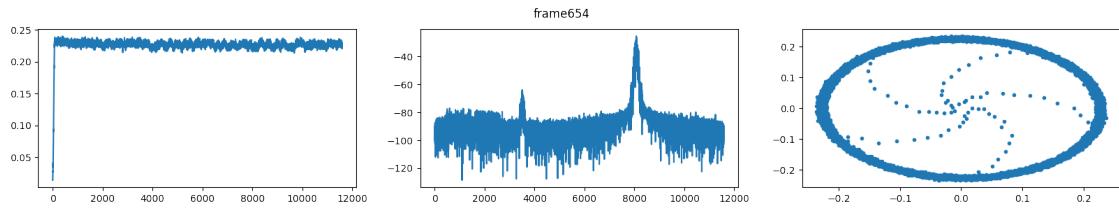
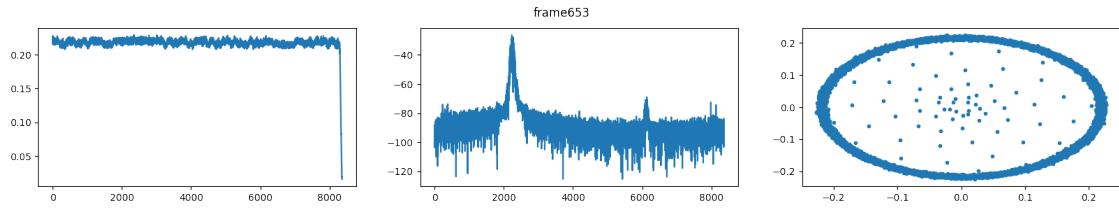
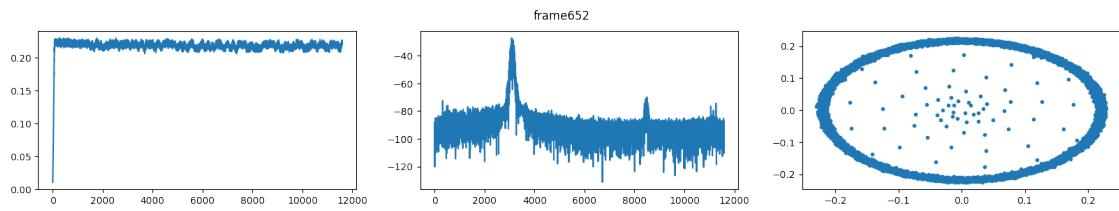
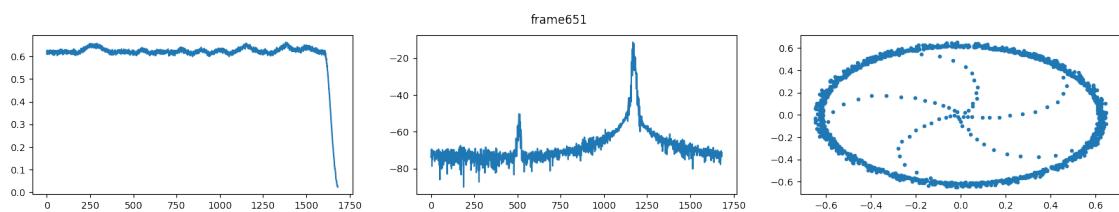
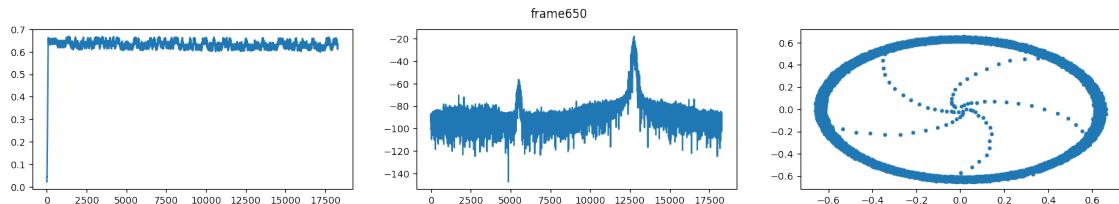


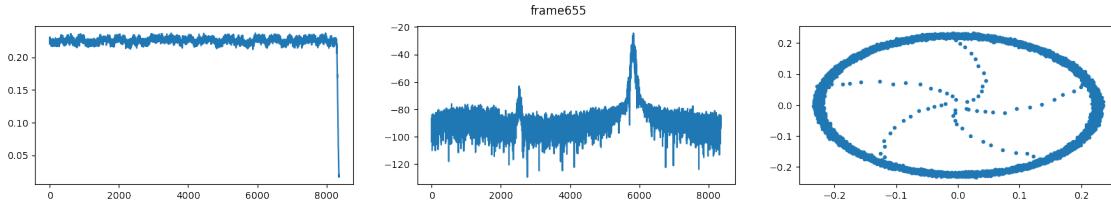












```
[ ]: # plt.plot(abs(frames[9]))
# target = frames[9][abs(frames[9])>.6]
# # target = target[0:500]
# # plt.plot(abs(target))
# plt.show()
# plt.plot(np.real(target[500:-1]),np.imag(target[500:-1]),'.')
# plt.plot(np.real(target[0:500]),np.imag(target[0:500]),'.')
# plt.show()
# window = 512
# for i in range(4000//window):
#     PSD = (np.abs(np.fft.fft(target>window*i:window*i + window))/len(target>window*i:window*i + window))**2
#     PSD_log = 10.0*np.log10(PSD)
#     PSD_shifted = np.fft.fftshift(PSD_log)
#     plt.plot(PSD_shifted)
#     plt.title(str(np.where(PSD_shifted == np.max(PSD_shifted))))
#     plt.show()
```