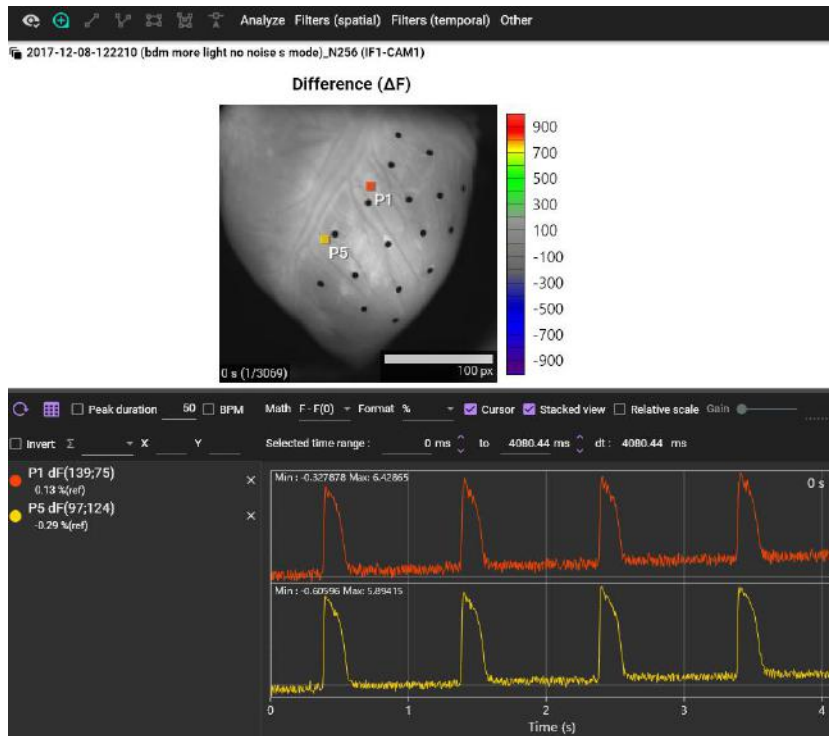



## 8-1. Point/line/ROI designation and analysis

### 8-1-1. Point

#### (1) Specifying a point

Specify point by clicking on an image with "Add point"  selected. Change in brightness at that point is displayed as a waveform. You can also analyze specified points.

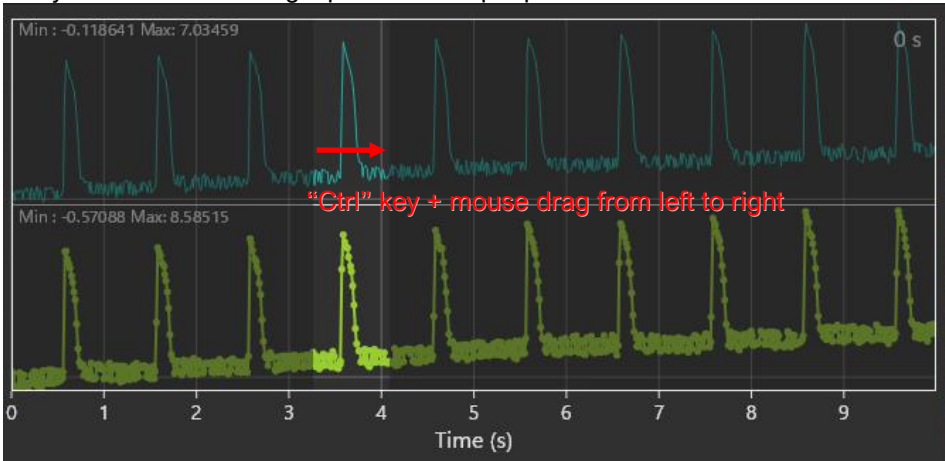


Operation	Description	
Click on image with  selected	Display waveforms by specifying points	
Click specified point	Select point	
Mouse drag point	Move point	
Right click on point	Peak analysis	Peak analysis (see page 42 (2))
	Frequency analysis	Frequency analysis (see page 44 (3))
	Phase analysis	Phase analysis (see page 45 (4))
	Time-frequency analysis	Time-frequency analysis (see page 46 (5))
	Copy	Copy point coordinates and display it in another data of same data set
	Delete	Delete point

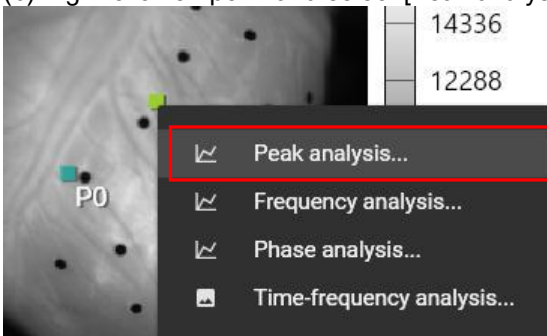
## (2) Peak analysis

Right click on point and select "Peak analysis" to performs waveform analysis.

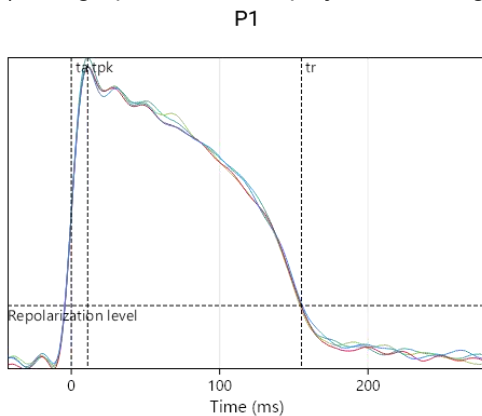
(a) Hold down the "Ctrl" key and drag mouse from left to right on waveform to select waveform range to be analyzed. It can be a single peak or multiple peaks.



(b) Right-click on point and select [Peak analysis].

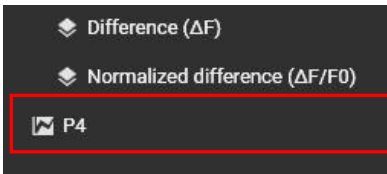


(c) The graph below is displayed on the right side of image.

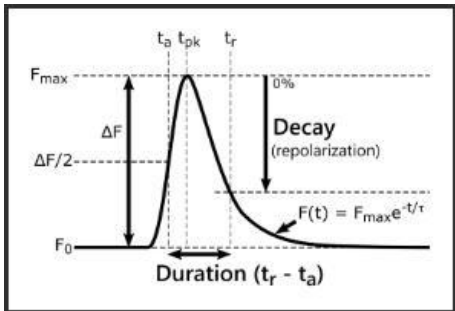


Operation	Description
Scroll mouse wheel	Enlarge/reduce size of graph
Right click	Save data: Save numerical data in CSV file  Save image: Save images in PNG/JPG/BMP format

(d) Click point name displayed in the list to display analysis result below the list.



(e) Waveform analysis result is displayed.



Activation	Fmax/2	
Repolarization	80 %	
P1	Mean	Std.dev
ta	1885.91	1118.31 ms
tpk	11.1216	0.102579 ms
fmax	333.333	7.51911
tr	154.448	0.588417 ms
d	154.448	0.588417 ms
tau	2028.44	1118.7 ms

← Select activation time from Fmax/2, Fmax, max(dF/dt).

← Specify XX% repolarization time.

Display mean and standard deviation

← Activation time

← Peak time

← Maximum value

← Repolarization time

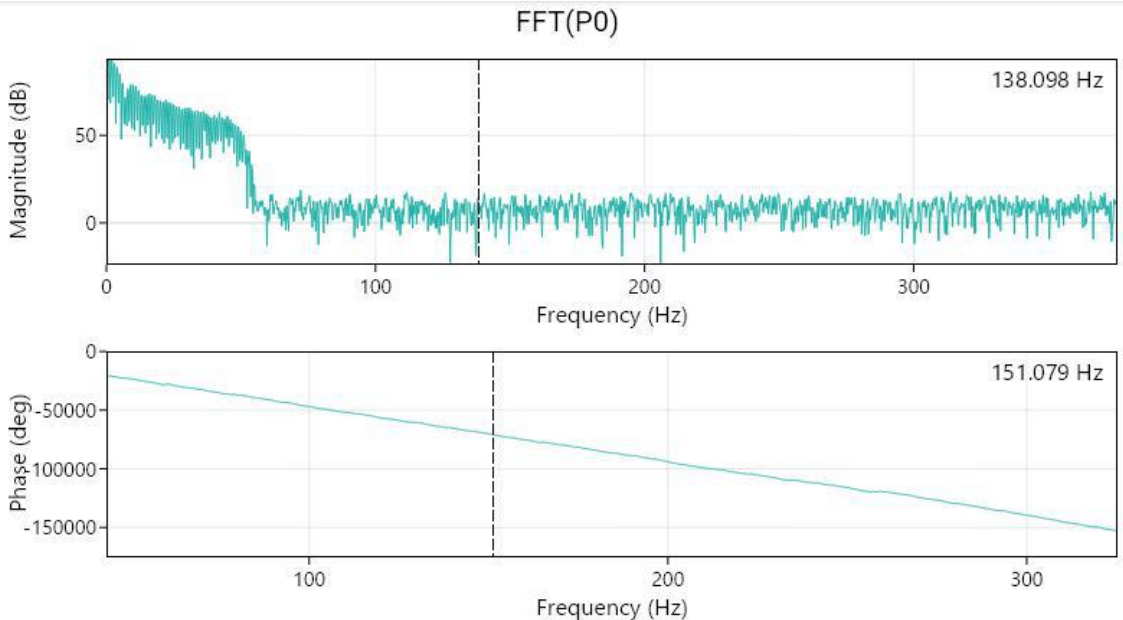
← Duration

← Decay tau

### (3) Frequency analysis

Performs frequency analysis using the Fast Fourier Transform (FFT). If data length is not a power of 2, it is padded with 0s. Available window functions are Rectangular (none), Hann, Hamming, Blackman-Harris.

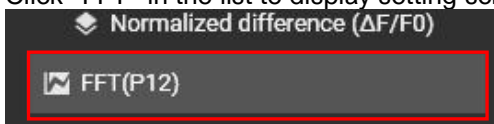
Right-click on point and select [Frequency analysis] to display frequency response graph (horizontal axis: frequency, vertical axis: amplitude) of waveform at one point. Click [Show phase] to display a graph with horizontal axis representing frequency and vertical axis representing phase.



Show phase  Unwrap phase Fmax : 0.918 Hz dF : 0.184 Hz N : 4096

Operation	Description
Left click or drag vertical cursor with mouse	Frequency selection (frequency display at upper right of graph changed)
Scroll mouse wheel	Enlarge/reduce size of graph
Right click	Export raw data: Save numerical data (Frequency, Magnitude, Phse) in CSV file  Export image: Save frequency response graph in PNG/JPG/BMP format

Click "FFT" in the list to display setting screen below.



Specify window function.



- None (Rectangular)
- Blackman-Harris
- Hamming
- Hann

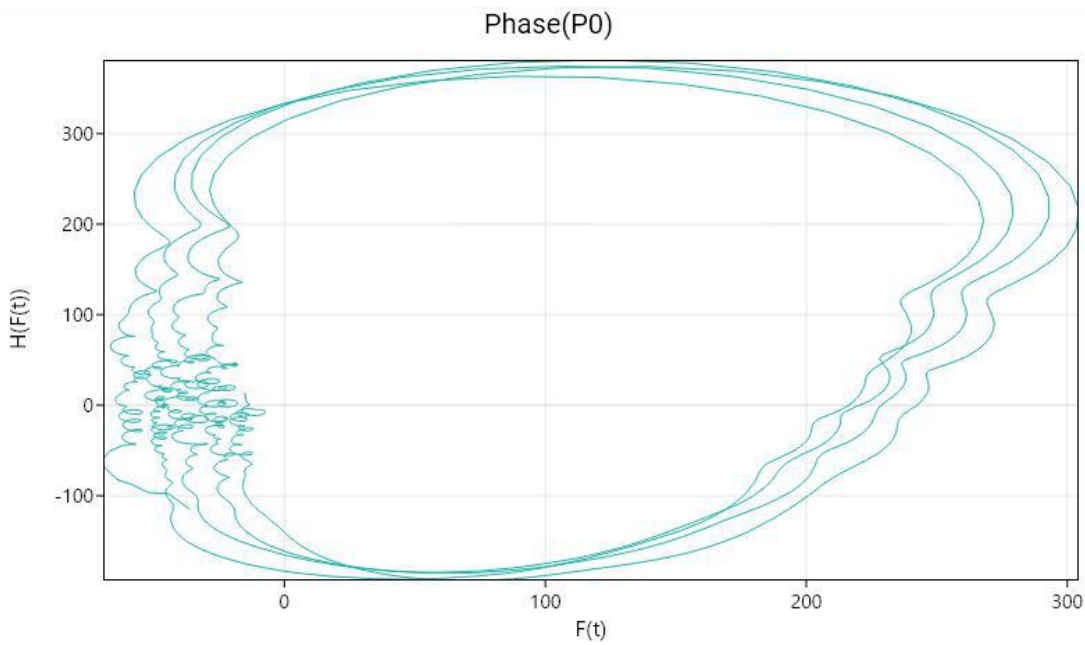
(4) Phase analysis

Right-click on point and select [Phase analysis].

Phase is calculated using formula below, where  $x(t)$  is the input time signal,  $H$  the Hilbert transform and  $z(t)$  a complex signal.

$$z(t) = x(t) + i[H(x(t))]$$

$$\phi(t) = \text{phase}(z(t))$$

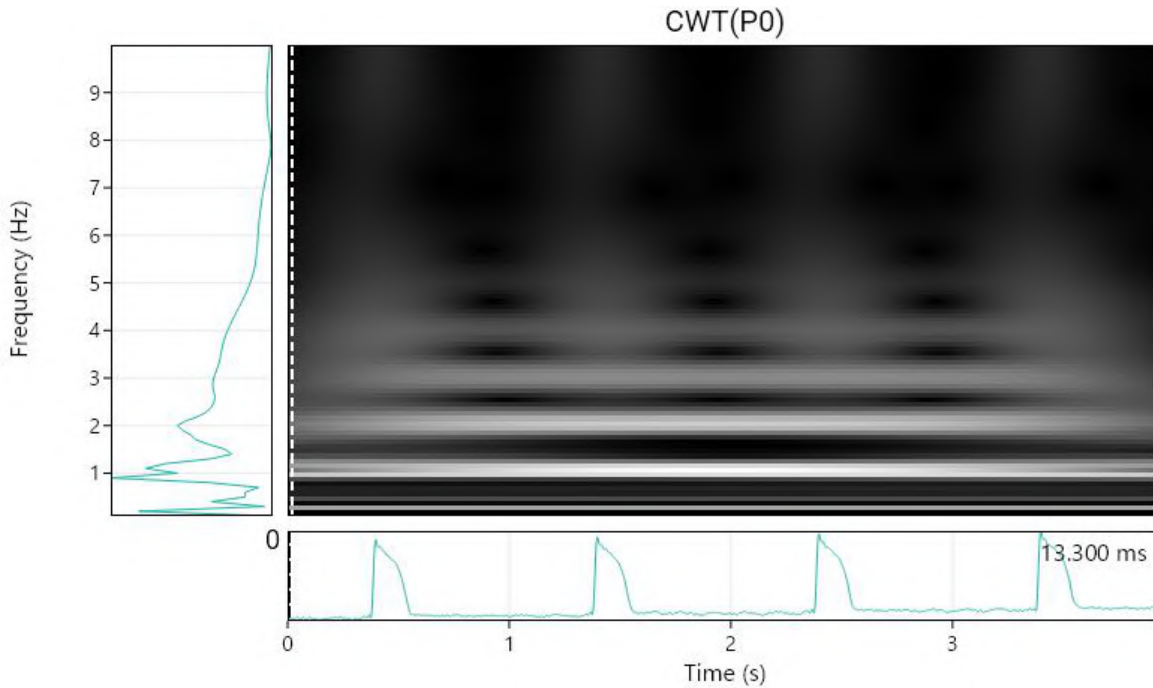


Operation	Description
Right click	Save data: Save numerical data in CSV file.  Save image: Save images in PNG/JPG/BMP format.

(5) Time-frequency analysis

Right-click on point and select [Time-frequency analysis].

Performs time-frequency analysis by using the Continuous Wavelet Transform (CWT) with the Morlet wavelet.



Operation	Description
Left click or drag vertical cursor with the mouse	Selection of time
Right click	<p>Show title: Set On/Off of title displayed above map.</p> <p>Show color bar: Set On/Off of color bar displayed on right side of map.</p> <p>Save data: Save time frequency data in CSV format.</p> <p>Save image: Save time frequency data in image format (png/bmp/jpg).</p> <p>Edit colors: Change color map.</p>

Click "CWT" in the list to display setting screen.

