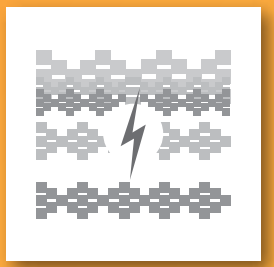
User Manual

PSCT | Protection Analytic tool



COMTRADE VIEWER

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1 Introduction

This manual provides information on the **MiCtViewer** module. In this module an option is provided for the user to view the Comtrade files both in numerical and graphical way.

The Comtrade viewer reads the .dat file and .cfg file for the inputs and it displays the samples both in numerical as well as graphical format. The data display offers a high-resolution graphical interface for displaying, analyzing and manipulating analog and digital channels of an oscillography record or a periodic load file. Displayed channels are marked, zoomed, numerically processed and summarized.

2 Menus

2.1 File Menu

The file menu consists of the following options as shown in figure below:

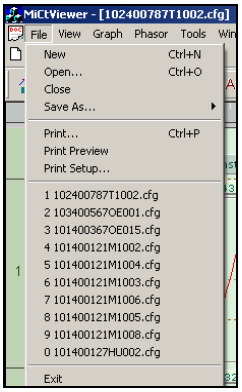


Figure 1: File Menu

2.1.1 New

On the file menu, Click **File > New** to create a new file. The shortcut for this option is **"Ctrl+N"**

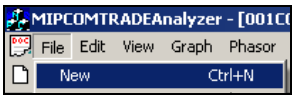


Figure 2: New

2.1.2 Open

On the file menu, Click **File > Open** to open a file from the exisiting folder. The shortcut for this option is **"Ctrl+O"**

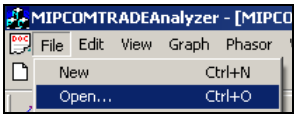


Figure 3: Open

2.1.3 Close

On the file menu, Click **File > Close** to close the application.

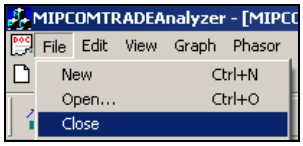


Figure 4: Close

2.1.4 Save As

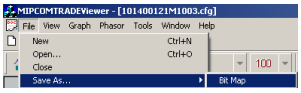


Figure 5: Save As

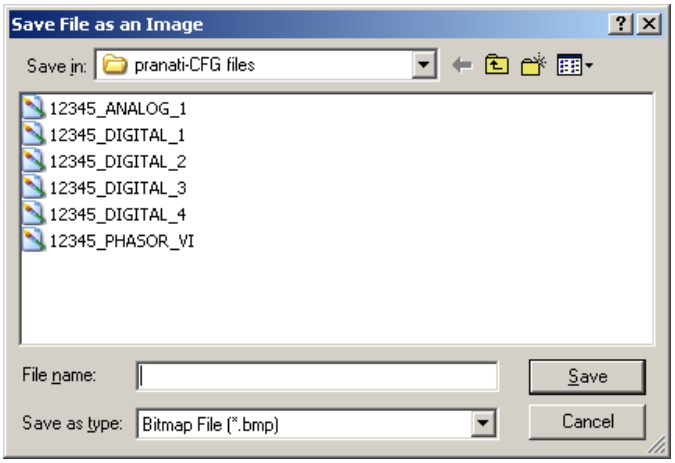
On the file menu, Click **File > Save As** to save the file into different file formats. The options available are;

- Bitmap
- JPEG
- Generate image

Note: You can save the opened file in .bmp or .jpeg format. If you click on the analog section and do a save as it will save only the analog screen. If you click on the digital section it saves the digital section.

Now to save the screen in .bmp format you need to do the following:

Bitmap: Open a .cfg file go to **File > Save as** and select bitmap. The following dialog box appears:



Now enter a file name and click save. The image is saved in .bmp format as shown below:

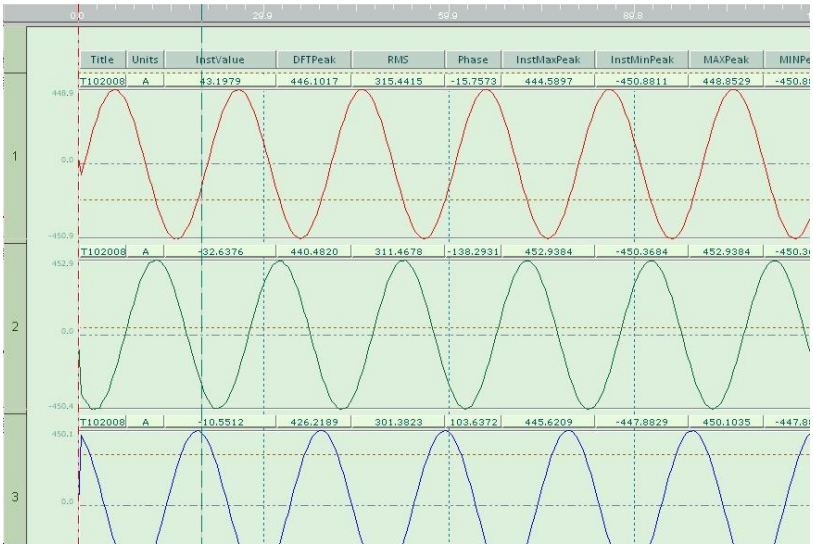


Figure 6: .cfg File in .bmp Format (Analog Section)

Open a .cfg file and put the cursor on the digital section and save as .bmp format. The image is saved as shown below:

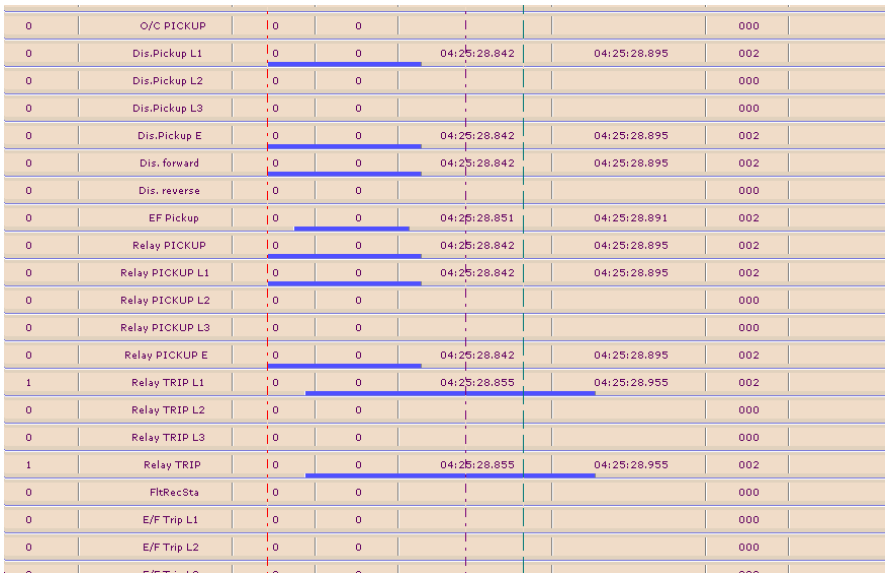


Figure 7: .cfg File in .bmp Format (Digital Section)

JPEG: Open a .cfg file go to **File > Save as** and select .jpeg format. The following dialog box appears:

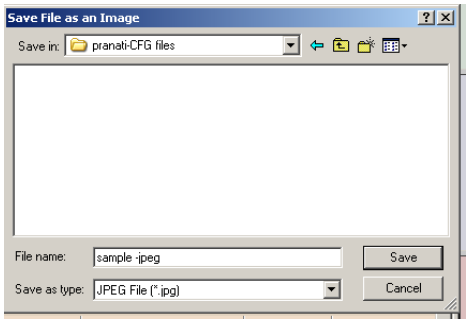


Figure 8: .cfg File Saved in .jpeg Format

The image is saved as shown below:

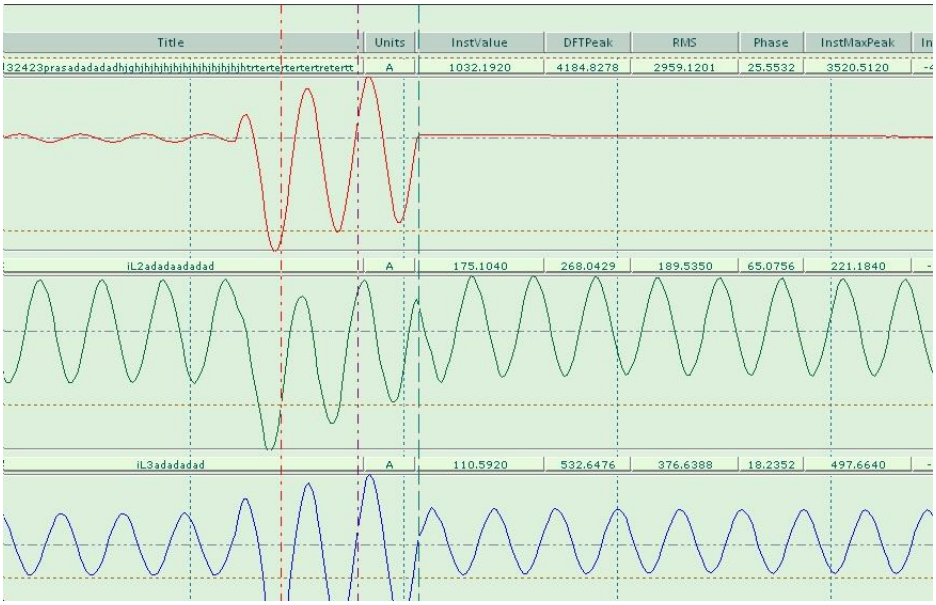


Figure 9: Image Saved in .jpeg Format

Generate Image: Open a .cfg file go to **File > Save** as and select generate image, the following window appears:

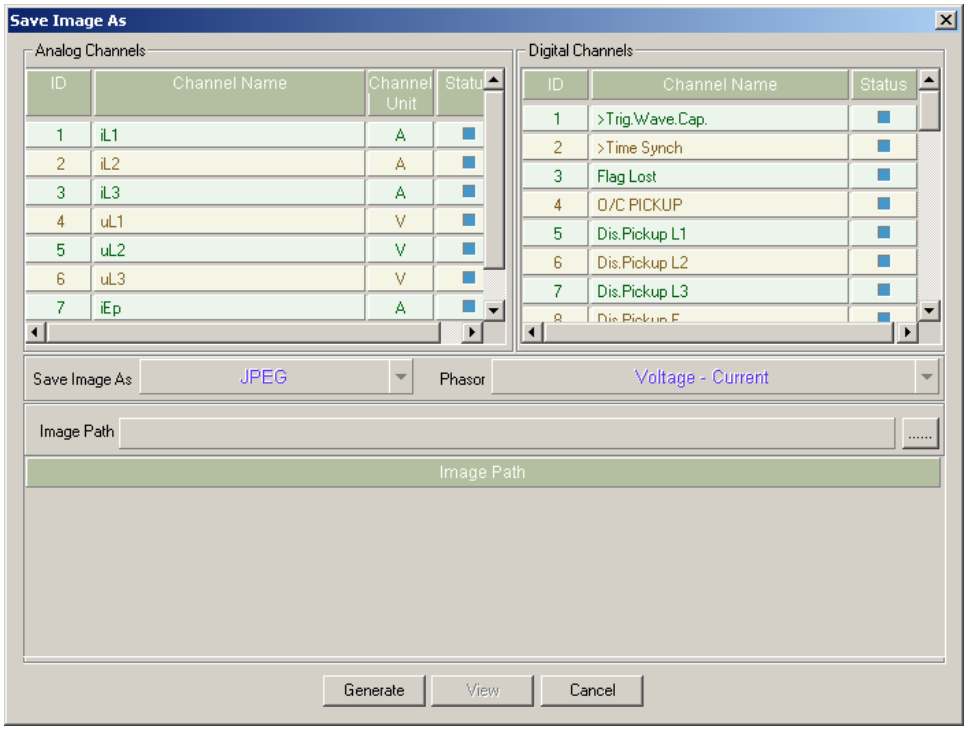


Figure 10: Generate Image – Save Image As

In this screen the data is displayed for both analog and digital channel. User has the option to select or de-select the particular channels. The fields for Analog and Digital channels are described below:

Analog Channels: Analog channels have the following attributes.

Channel ID: Channel ID is the number of the channel.

Channel Name: The respective name for the channel ID.

Channel Unit: According to the channels, unit is displayed.

Status: The status of the channel is shown in form of a check box which user can select and de-select. The option for select or deselect is provided for channel selection. As a user you may not need all the channels while generating image. So in that case you can use this option.

Digital Channels: Digital channels have the following attributes.

Channel ID: Channel ID is the number of the channel.

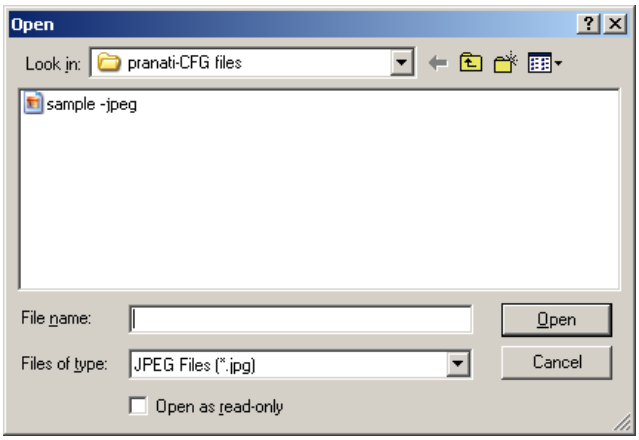
Channel Name: The respective name for the channel ID.

Status: The status of the channel is shown in form of a check box which user can select and de-select. The option for select or de-select is provided for channel selection. As a user you may not need all the channels while generating image. So in that case you can use this option.

Save Image As: User can select the option to save the file into image format. The options available are .bmp and .jpeg.

Phasor: The options to select in the phasor window are None, Voltage, Current, Voltage and Current and all. Depending on the selection type the images are generated.

Image Path: Click this button ..... , the following dialog box appears:



Enter the file name and click open. This will store the path where the image is going to be stored.

Generate: Click this button to generate the image.

View: Select a file and click view button to see the image.

Cancel: Click this button to cancel the above actions.

Note: For both analog and digital channels the information comes from the .cfg files.

2.1.5 Print

On the file menu, Click **File > Print** to print the Comtrade viewer screen. The shortcut for this option is **"Ctrl+P"**

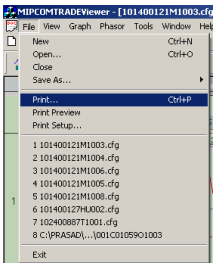


Figure 11: Print

2.1.6 Print Preview

On the file menu, Click **File > Print Preview** to have a print preview of the comtrade viewer.

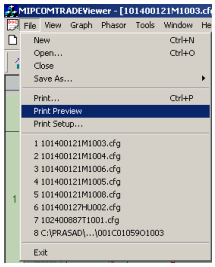


Figure 12: Print Preview

2.1.7 Print Setup

On the file menu, Click **File > Print Setup** to have a print set up for the comtrade viewer.

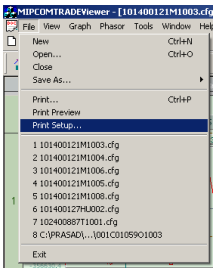


Figure 13: Print Setup

2.1.8 Recently Opened Files

Recently opened files. It lists maximum of ten recently opened files as shown below:

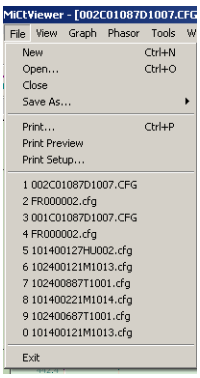


Figure 14: Recently Opened Files

2.1.9 Exit

On the file menu, Click **File > Exit** to come out of the application.

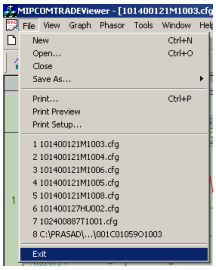
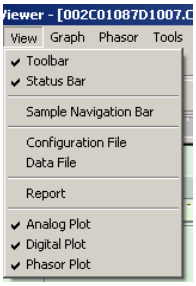


Figure 15: Exit

3 View

3.1 View Menu

The view menu consists of the following options as shown in figure below:



3.1.1 Toolbar

On the View menu,select **View > Toolbar** to activate the toolbar as shown in the figure below:

Figure 16: Toolbar

Now all the options in the tool bar are active. De-selecting the toolbar option takes out the tool bar from the active window.

3.1.2 Status Bar

On the View menu, select **View > Status bar** to activate the Status Bar as shown in the figure below:

Figure 17: Status Bar

Now all the options in the status bar are active De-selecting the Status Bar option takes out the tool bar from the active window.

.

3.1.3 Sample Navigation Bar

On the View menu, Select **View > Sample Navigation Bar** to activate the Sample Navigation Bar as shown in the figure below:

Figure 18: Sample Navigation Bar

The sample navigation bar appears below the tool bar.

Sample: Sample is read from the .cfg files. When user selects sample, the reference axis moves based on samples. Sample moves by one number at a time.

For example - if the sample number is 1 and move next is clicked, the sample number is increased by 1 and hence displays 2. This sample number depends on the .cfg files.

Cycle: A cycle consists of fixed number of samples. When the user selects cycle, the analog and digital data windows are moved by one cycle at a time. For example if the cycle number is 1 and you click move next the next cycle will jump to 21. Here the sample per cycle value is 20. This cycle number depends on the .cfg files.

From Sample to To Sample: From sample and to sample

reflects the sample number in the field. Here sample or cycle number gets displayed wherever the reference axis is clicked.. User can enter the desired number and press tab. The reference axis will move to that particular sample/cycle number.

Move First: Clicking this button moves the reference axis to the first sample/cycle.

Move Previous: Clicking on this button moves the reference axis to the previous sample/cycle.

Move Next: Clicking on this button moves the reference axis to the next sample/cycle.

Move Last: Clicking on this button moves the reference axis to the last sample/cycle.

Trigger Point: Clicking on this button moves the reference axis to the trigger point.

3.1.4 Configuration File

On the View menu, click **Configuration File** which brings the following page:

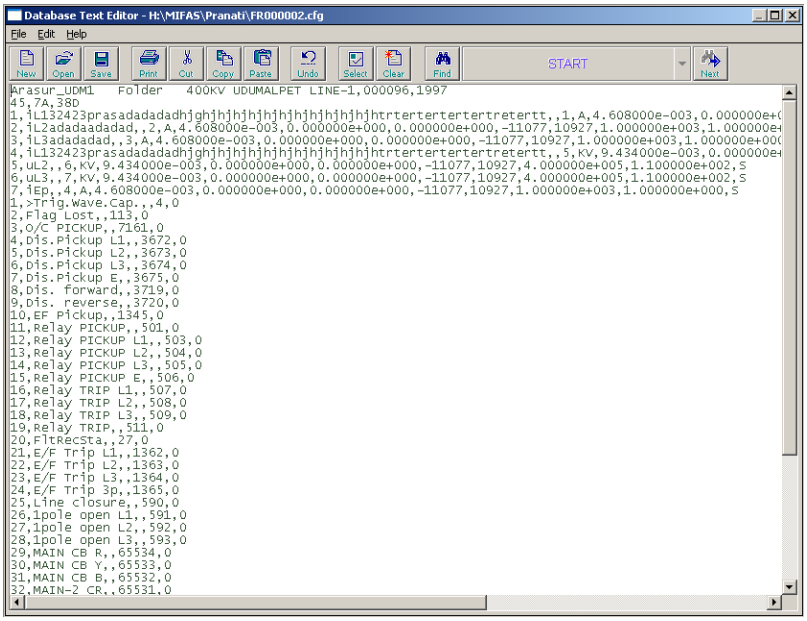


Figure 19: Configuration File

3.1.5 Data File

On the View menu, click **Data File** which brings the following page:

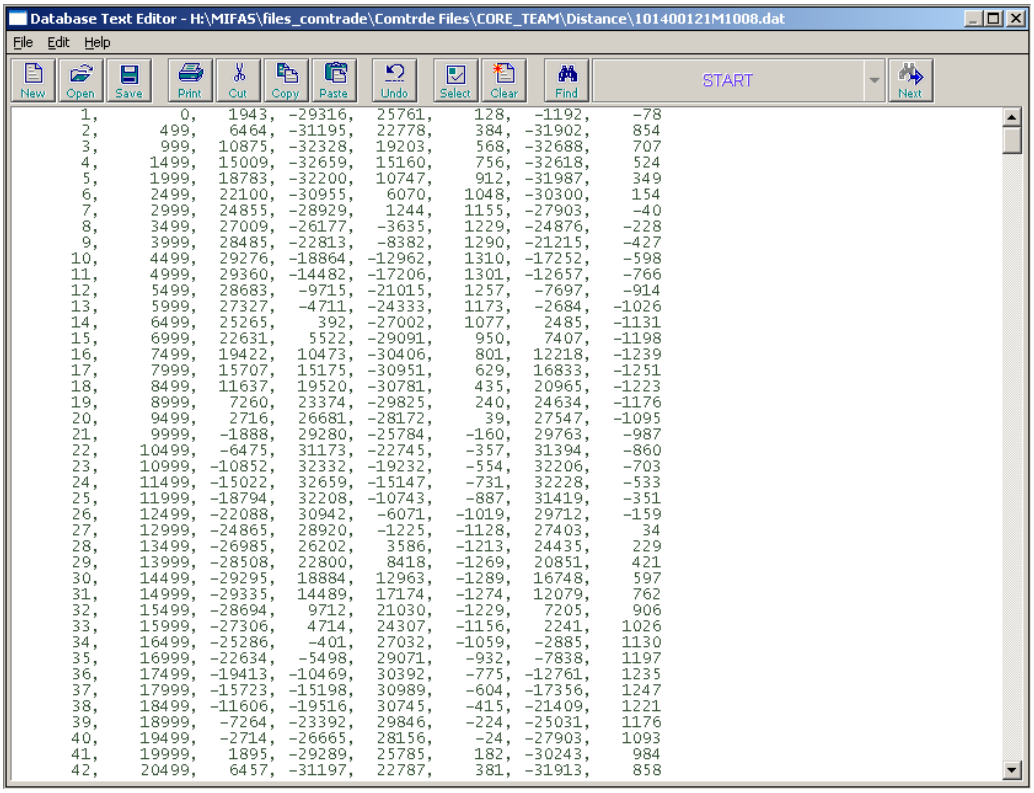


Figure 20: Data File

3.1.6 Report

On the View menu, click on Report option which brings the following page:

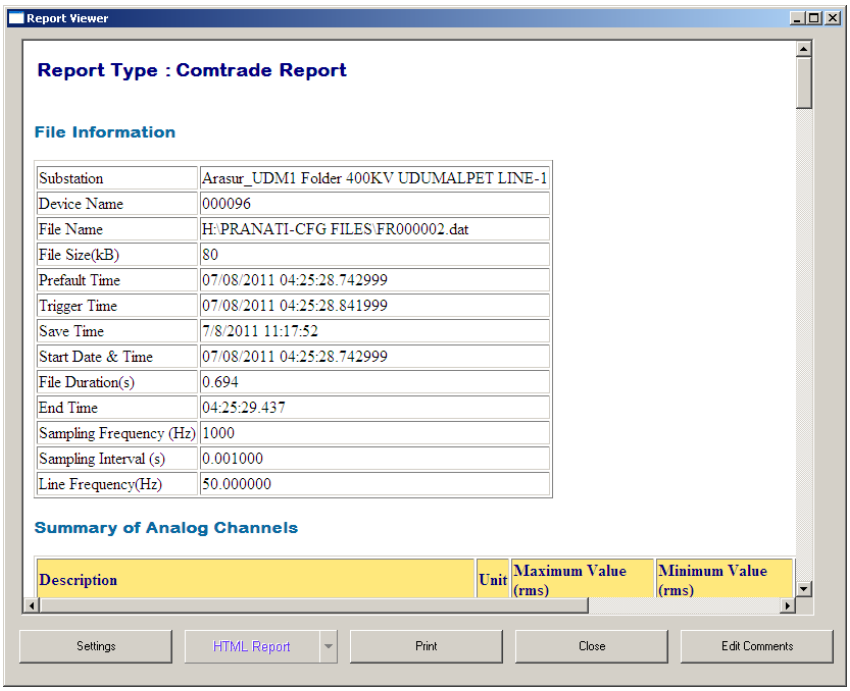


Figure 21: Report

This report is generated for the opened file in the current window. The summary of the report includes:

- File information
- Summary of analog channels
- Digital channel data
- Digital channel sequence events
- Images of analog, digital and phasor section

Setting: On this screen click the settings button which brings the following page:

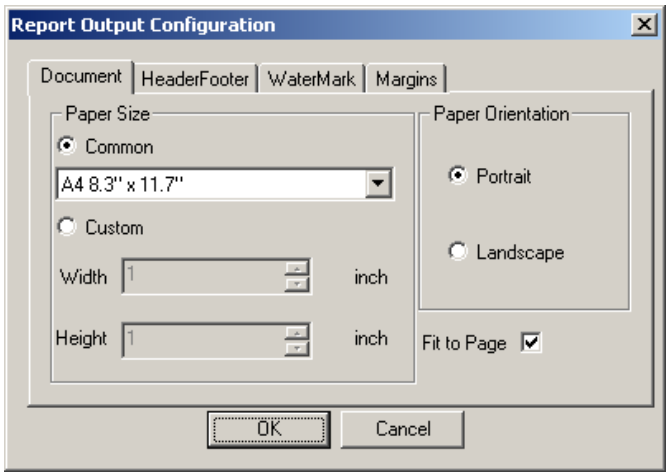


Figure 22: Report Output Configuration

User can define their own report output configuration.

Report Types: The following report types are avaliable**:**

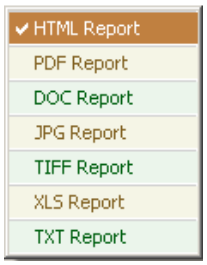


Figure 23: Report Types

HTML Report:

Select HTML Report.

The application prompts with a message as shown below:

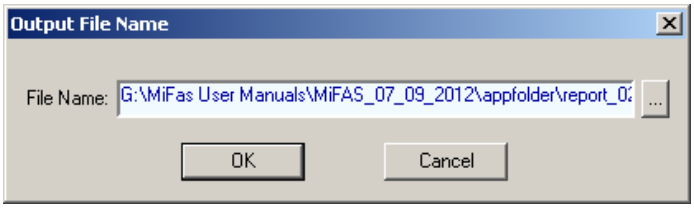
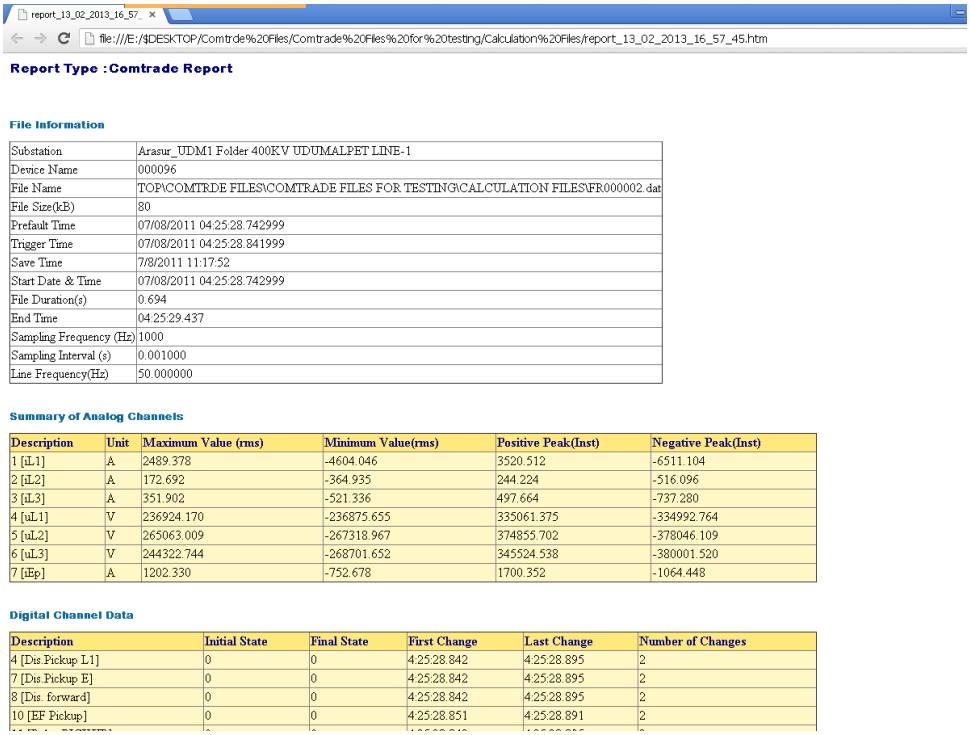


Figure 24: Output File Name

User can select the location by clicking the browse button & save the File.

Note: Same screen will be displayed when user selects other options say PDF Report, DOC Report, JPG Report & TIFF Report options.

HTML report is displayed as shown below:



report_13_02_2013_16_57_ ×

file:///E:/$DESKTOP/Comtrde%20Files/Comtrade%20Files%20for%20testing/Calculation%20Files/report_13_02_2013_16_57_45.htm

Report Type :Comtrade Report

File Information

Substation	Arasur_UDM1 Folder 400KV UDUMALPET LINE-1
Device Name	000096
File Name	TOP\COMTRDE FILES\COMTRADE FILES FOR TESTING\CALCULATION FILES\FR000002.dat
File Size(kB)	80
Prefault Time	07/08/2011 04:25:28.742999
Trigger Time	07/08/2011 04:25:28.841999
Save Time	7/8/2011 11:17:52
Start Date & Time	07/08/2011 04:25:28.742999
File Duration(s)	0.694
End Time	04:25:29.437
Sampling Frequency (Hz)	1000
Sampling Interval (s)	0.001000
Line Frequency(Hz)	50.000000

Summary of Analog Channels

Description	Unit	Maximum Value (rms)	Minimum Value(rms)	Positive Peak(Inst)	Negative Peak(Inst)
1 [iL1]	A	2489.378	-4604.046	3520.512	-6511.104
2 [iL2]	A	172.692	-364.935	244.224	-516.096
3 [iL3]	A	351.902	-521.336	497.664	-737.280
4 [uL1]	V	236924.170	-236875.655	335061.375	-334992.764
5 [uL2]	V	265063.009	-267318.967	374855.702	-378046.109
6 [uL3]	V	244322.744	-268701.652	345524.538	-380001.520
7 [iEp]	A	1202.330	-752.678	1700.352	-1064.448

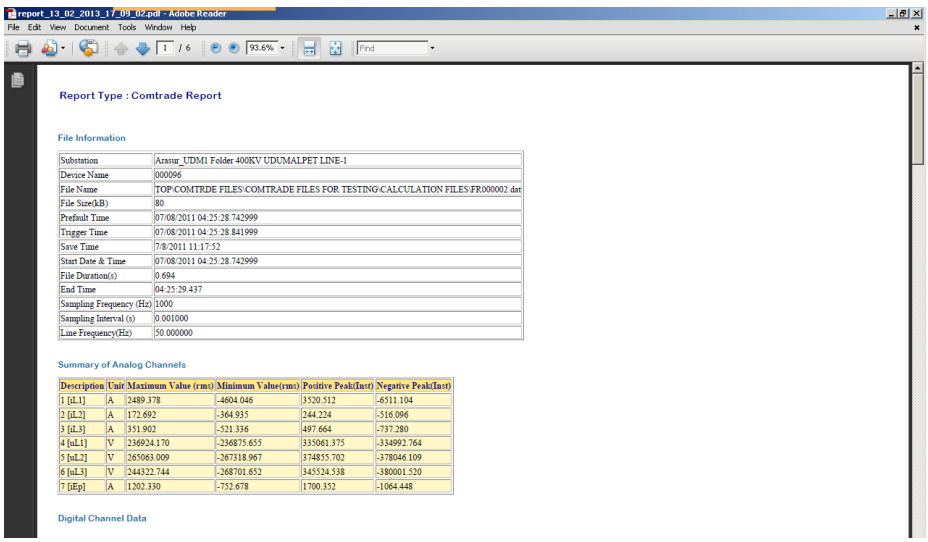
Digital Channel Data

Description	Initial State	Final State	First Change	Last Change	Number of Changes
4 [Dis.Pickup L1]	0	0	4:25:28.842	4:25:28.895	2
7 [Dis.Pickup E]	0	0	4:25:28.842	4:25:28.895	2
8 [Dis. forward]	0	0	4:25:28.842	4:25:28.895	2
10 [EF Pickup]	0	0	4:25:28.851	4:25:28.891	2

Figure 25: Report in HTML Format

PDF Report:

When PDF Report selected, report will be displayed in PDF format.



report_13_02_2013_17_09_02.pdf - Adobe Reader

File Edit View Document Tools Window Help

Report Type : Comtrade Report

File Information

Substation	Arasur_UDM1 Folder 400KV UDUMALPET LINE-1
Device Name	000096
File Name	TOP\COMTRDE FILES\COMTRADE FILES FOR TESTING\CALCULATION FILES\FR000002.dat
File Size(kB)	80
Prefault Time	07/08/2011 04:25:28.742999
Trigger Time	07/08/2011 04:25:28.841999
Save Time	7/8/2011 11:17:52
Start Date & Time	07/08/2011 04:25:28.742999
File Duration(s)	0.694
End Time	04:25:29.437
Sampling Frequency (Hz)	1000
Sampling Interval (s)	0.001000
Line Frequency(Hz)	50.000000

Summary of Analog Channels

Description	Unit	Maximum Value (rms)	Minimum Value(rms)	Positive Peak(Inst)	Negative Peak(Inst)
1 [iL1]	A	2489.378	-4604.046	3520.512	-6511.104
2 [iL2]	A	172.692	-364.935	244.224	-516.096
3 [iL3]	A	351.902	-521.336	497.664	-737.280
4 [uL1]	V	236924.170	-236875.655	335061.375	-334992.764
5 [uL2]	V	265063.009	-267318.967	374855.702	-378046.109
6 [uL3]	V	244322.744	-268701.652	345524.538	-380001.520
7 [iEp]	A	1202.330	-752.678	1700.352	-1064.448

Digital Channel Data

Figure 26: Report in PDF Format

DOC Report:

When DOC Report selected, report will be displayed in doc format.

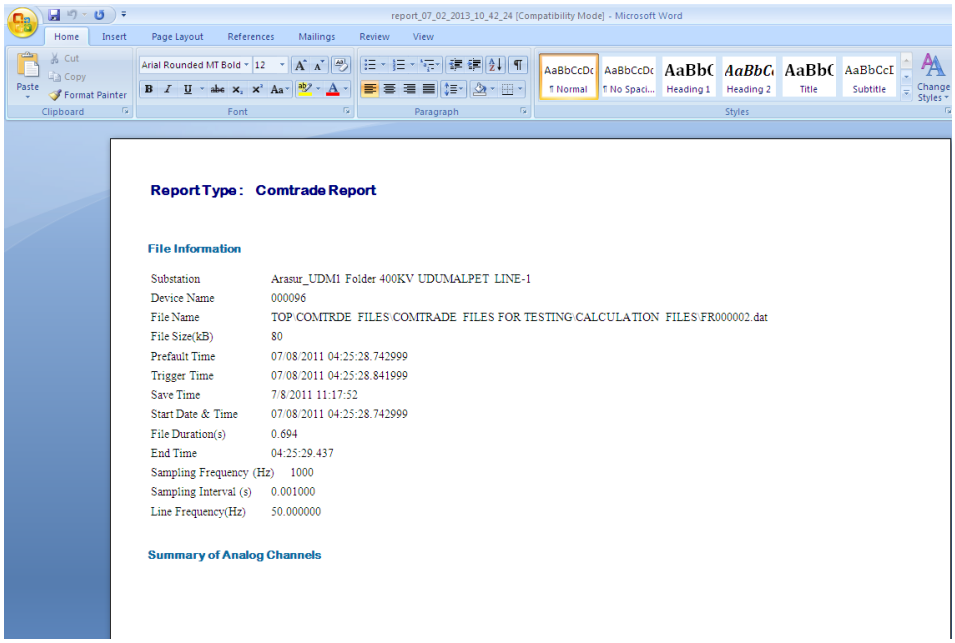


Figure 27: Report on Document Format

JPG Report:

When JPG Report selected, report will be displayed in .JPG format.

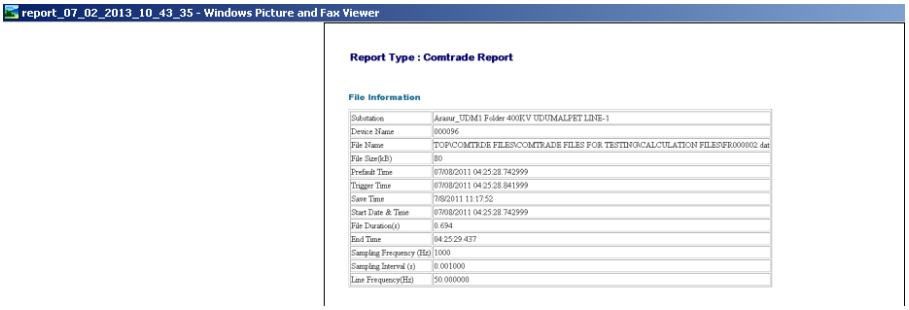


Figure 28: Report in .JPG Format

TIFF Report:

When TIFF Report selected, report will be displayed in TIFF format.

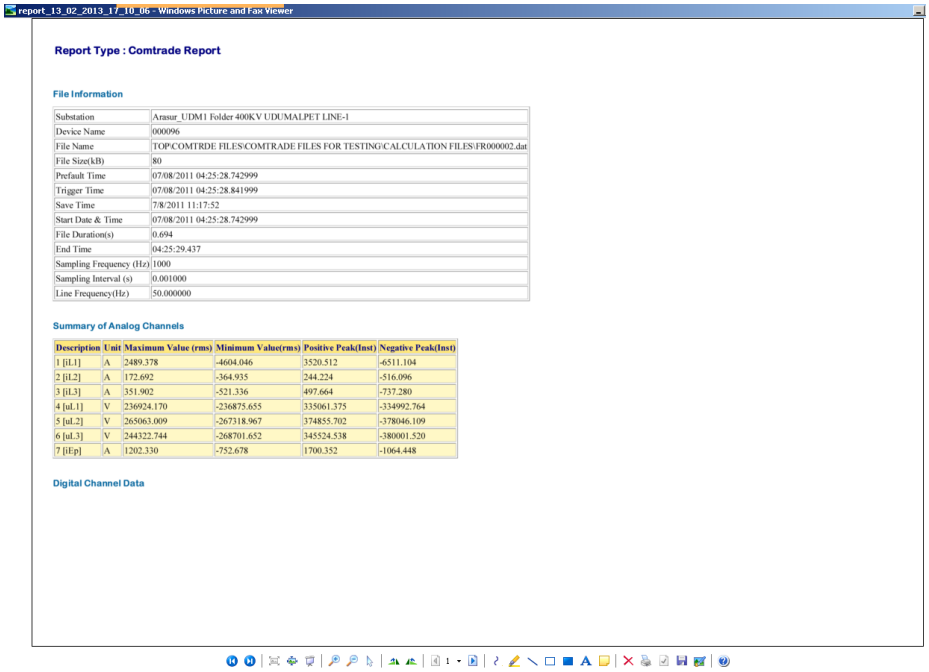


Figure 29: Report in TIFF Format

Xls Report: When Xls Report selected, report will be displayed in Xls format.

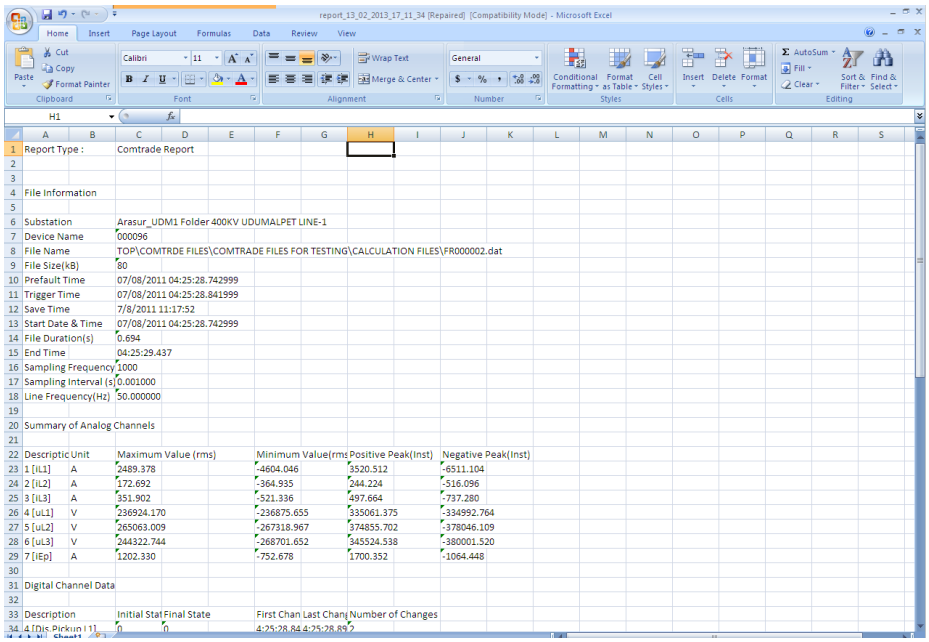


Figure 30: Report in XLS Format

Txt Report: When Txt Report selected, report will be displayed in .Txt format.

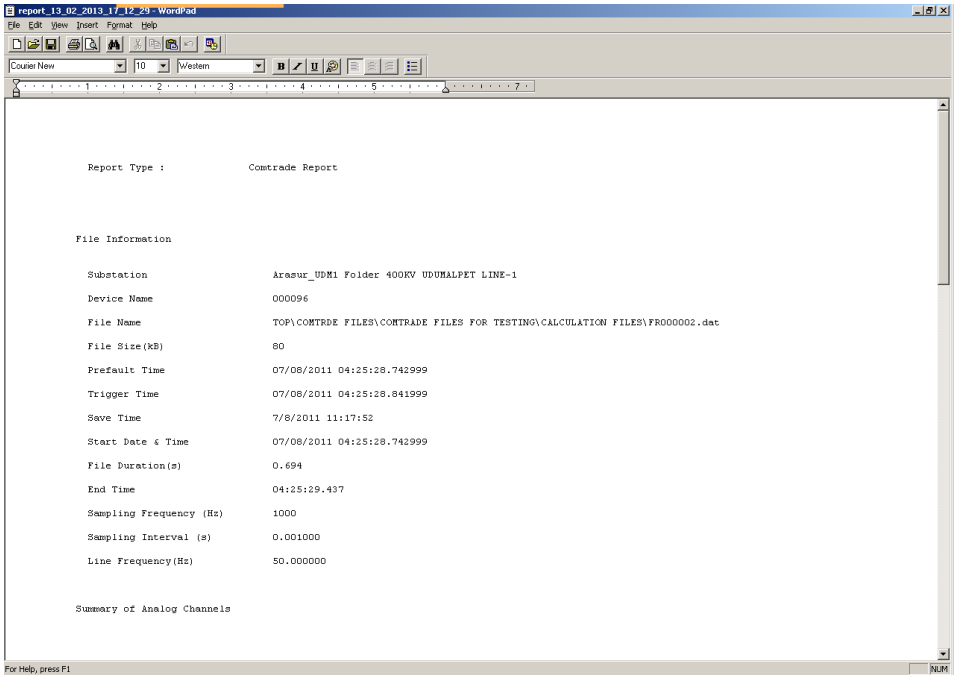


Figure 31: Report in Txt Format

Print: Click this button which brings the following window:

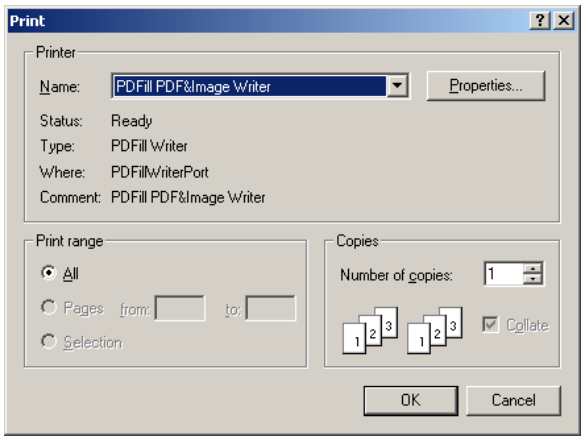


Figure 32: Print Properties

Name: Here the user can select the available printer name from the drop-down combo box.

Print range & Copies: User can select all the pages or selected page numbers and can select the number of copies for print. Click ok to print and click the cancel button to cancel the print.

Close: Click close to exit the view report screen.

Edit Comments: Click on the edit comments buttoon, which brings a small pop up window as shown below:

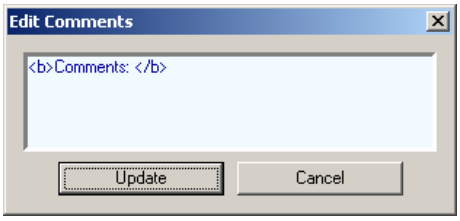


Figure 33: Edit Comments

You can enter the comments here and click update. The comments will be updated in the report.

Note: In comtrade viewer module there are four types of users. For the users who have permissions only to view the report, the edit comments button will be disabled.

3.1.7 Analog Plot

On the View menu, select **Analog Plot** to view only analog channels as shown in figure below:

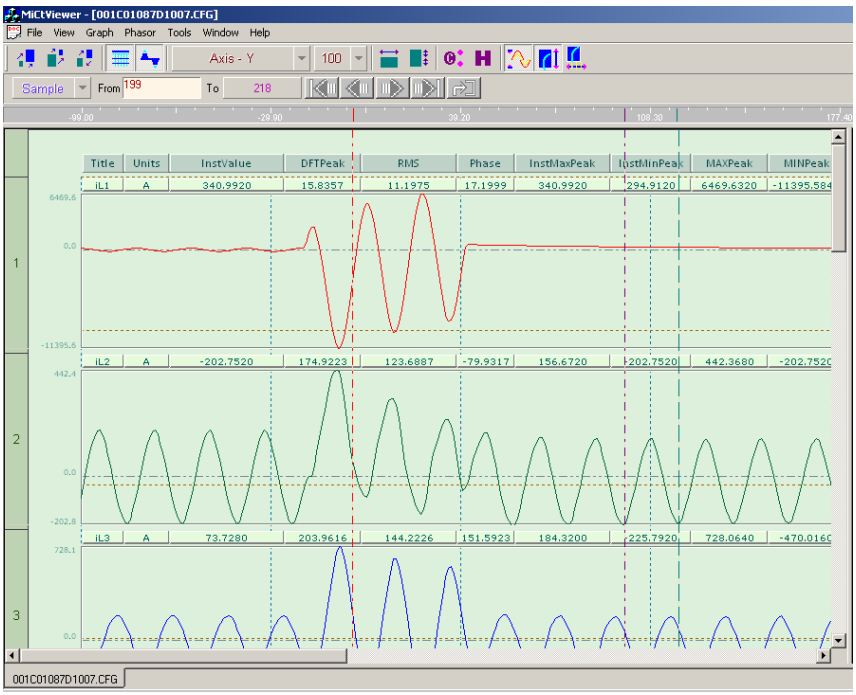


Figure 34: Analog Plot

On De-selecting the Analog Plot option takes out the Analog plot section from the active window.

3.1.8 Digital Plot

On the View menu, Select **Digital Plot** to view only digital channels as shown in figure below:

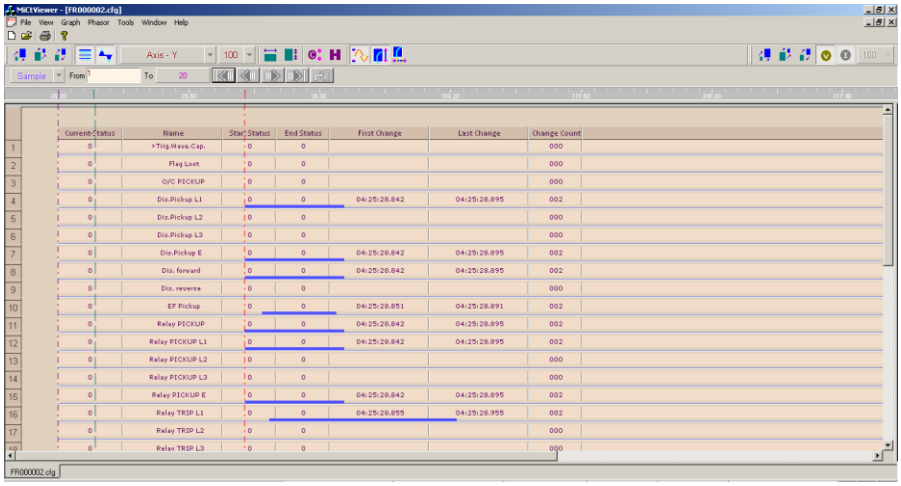


Figure 35: Digital Plot

On De-selecting the Digital Plot option takes out the Digital Plot section from the active window.

3.1.9 Phasor

On the View menu, click **Phasor** which brings the figure below:

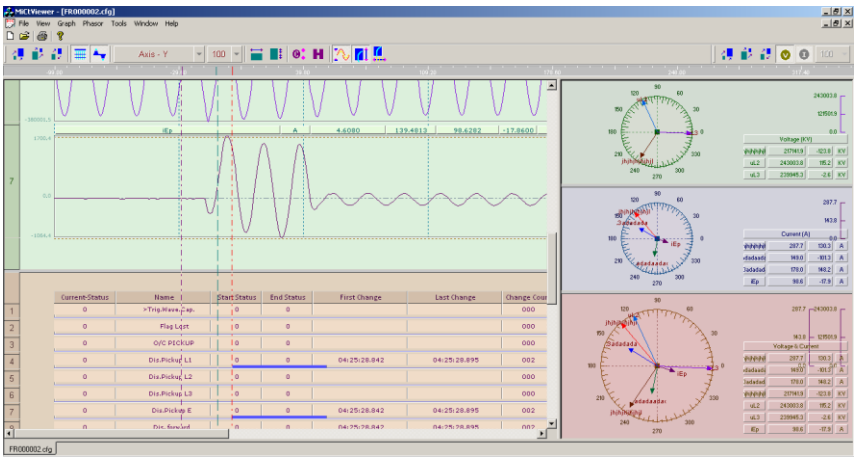
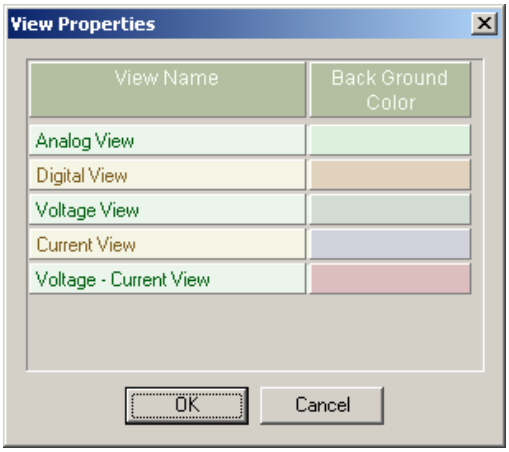


Figure 36: Phasor

On De-selecting the Phasor Plot option takes out the Phasor plot section from the active window.

3.1.10 Properties

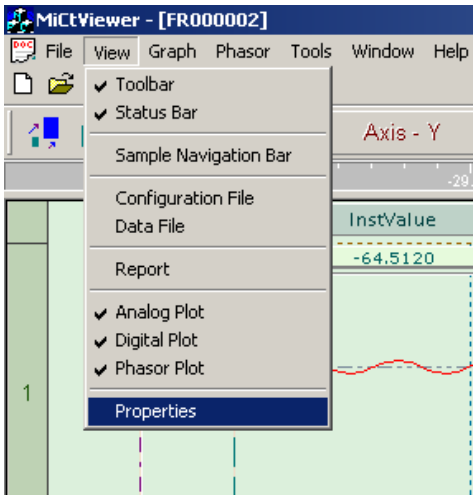
On the View menu, click **properties** which brings the figure below:



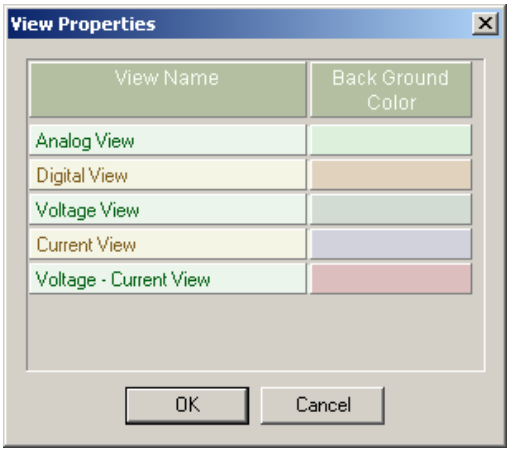
Viewer name: displays all sections of Comtrade viewer

Back Ground color: user can select the back ground color for the section

On the Graph menu, Select **View> View Properties** as shown below:

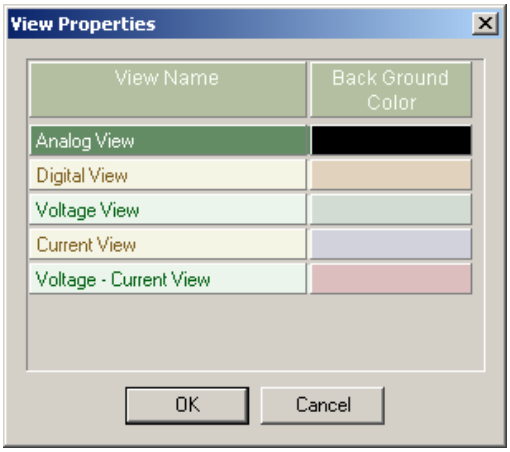


Following page appears:

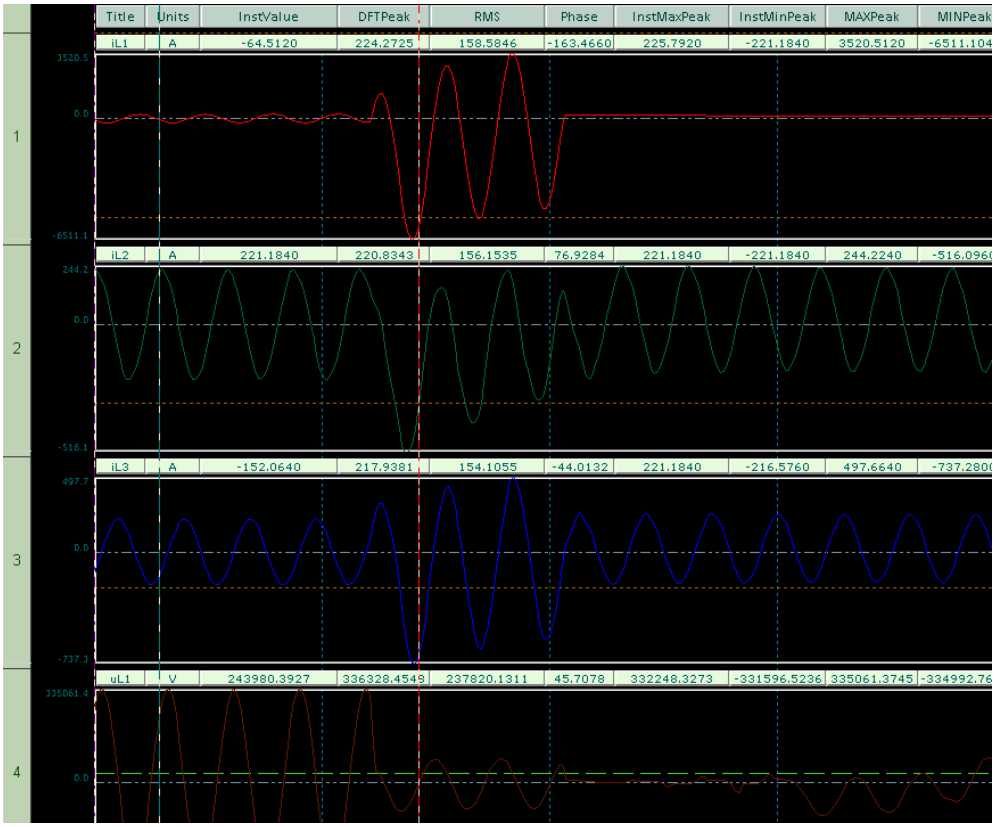


If the use wants to change any particular section color, then select the particular section and double click on the color. Which brings the color palette box as shown below:

Here user can select any color and click ok.



Now the color for that particular section is changed and is reflected in comtrade viewer.



4 Graph

4.1 Graph Menu

The view menu consists of the following options as shown in figure below:

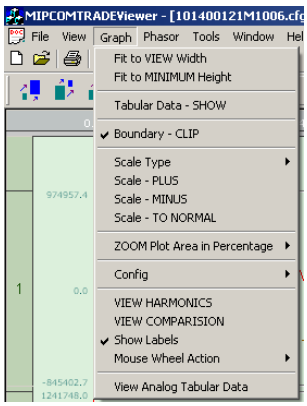


Figure 37: Graph Menu

4.1.1 Fit to View Width

On the Graph menu, select **Fit to View Width** which brings the following screen:

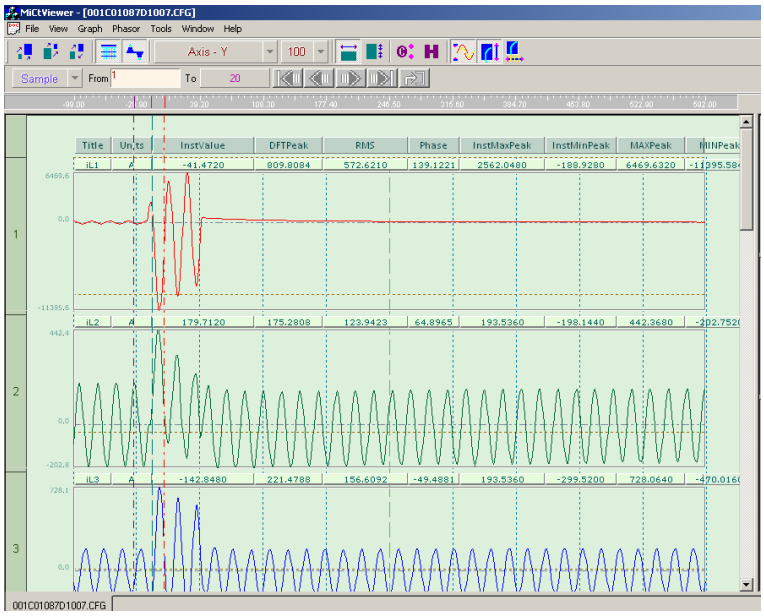


Figure 38: Fit to View Width

Now the analog and digital plots are squeezed to width. It has got a toggle option. On de-selection of this option, width will be retained as default:

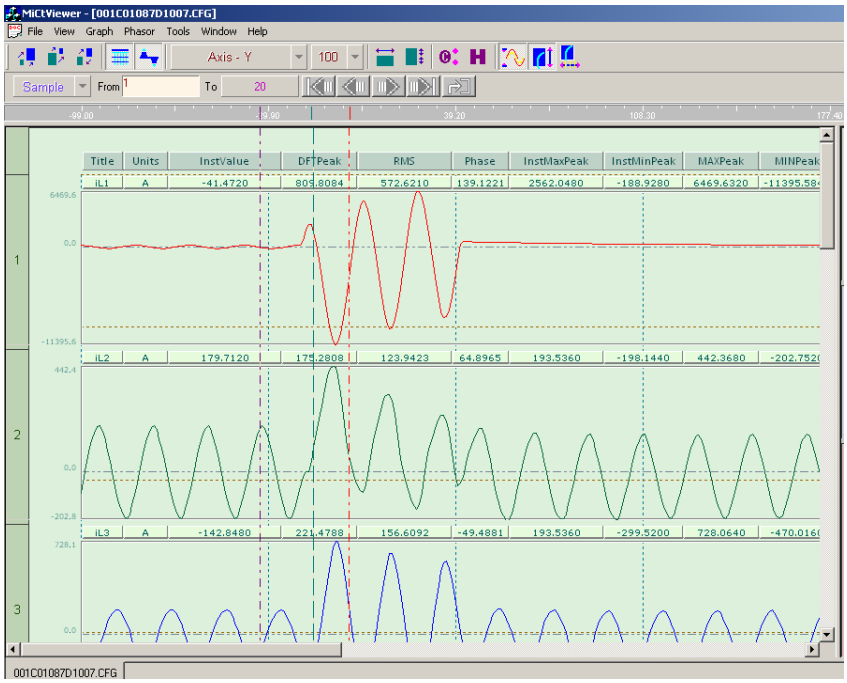


Figure 39: Fit to View Width – De-selection

4.1.2 Fit to Minimum Height

On the Graph menu, click **Fit to Minimum Height** which brings the following page:

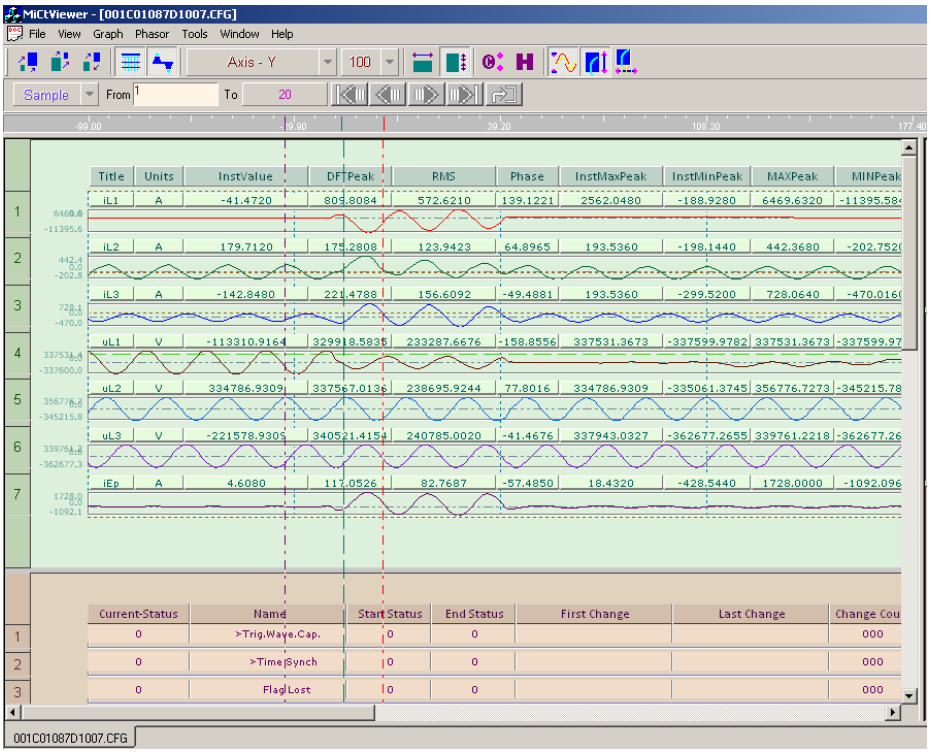


Figure 40: Fit to Minimum Height

Now the analog and digital plots are squeezed to height. It has got a toggle option. On de-selection of this option, height will be retained as default:

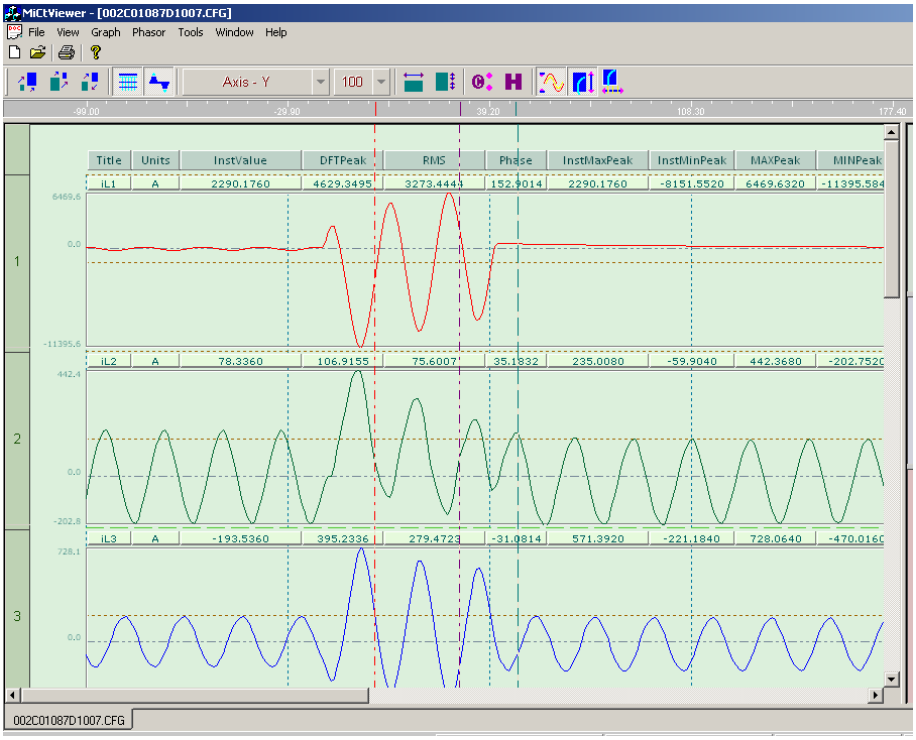


Figure 41: Fit to Minimum Height – De-selection

4.1.3 Tabular Data Show

On the Graph menu, select **Tabular Data Show** which brings the following page:

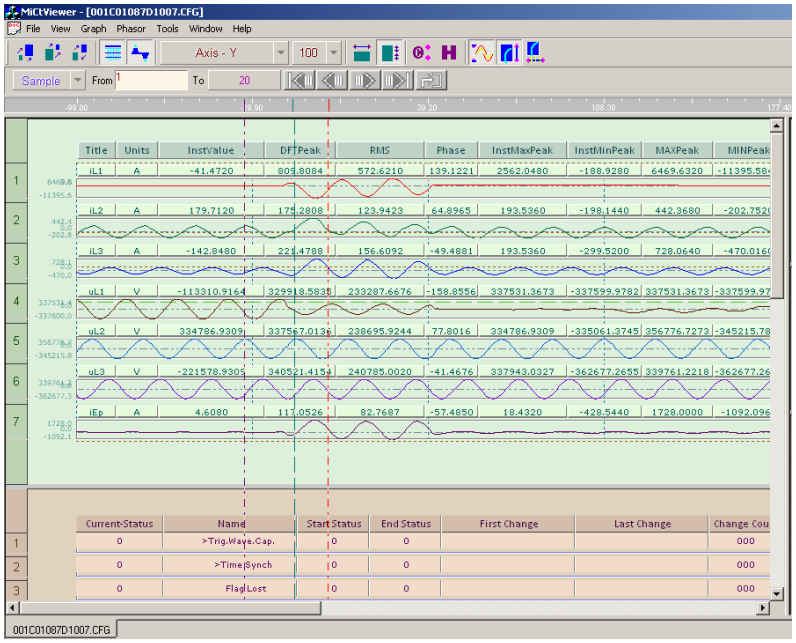


Figure 42: Tabular Data Show

On de-selection, tabular data option brings the following page:

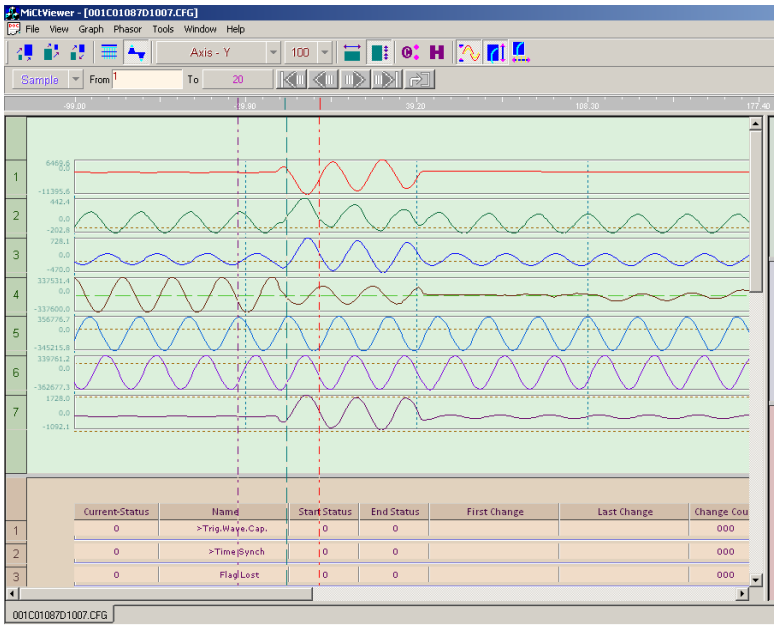


Figure 43: Tabular Data De-select

Note: When the tabular data button is in de-select mode it hides the data.

4.1.4 Boundary Clip

On the Graph menu, select **Boundary Clip** which brings the following page:

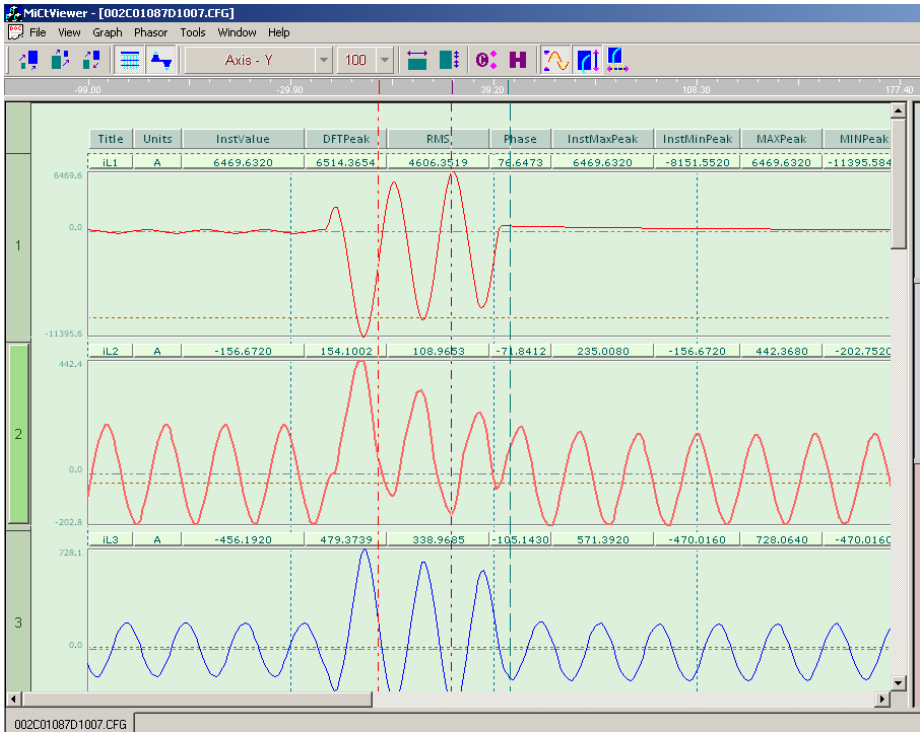


Figure 44: Boundary Clip

Clip boundary is a toggle button. User can select or de-select the button.

Clip boundary – on: Overlapped portion is clipped.

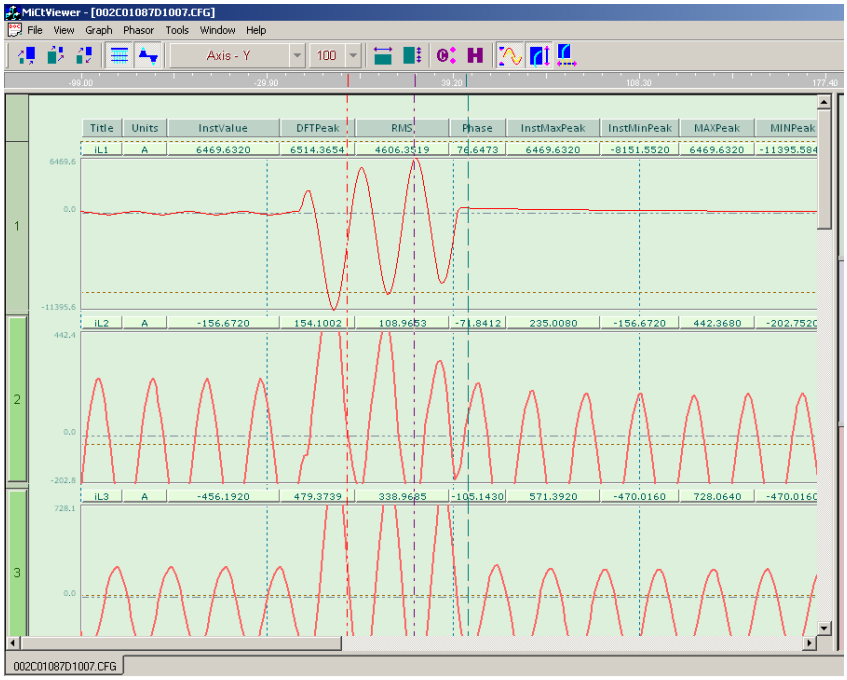


Figure 45: Clip Boundary - on

Clip boundary – off: Overlapped portion is Unclipped.

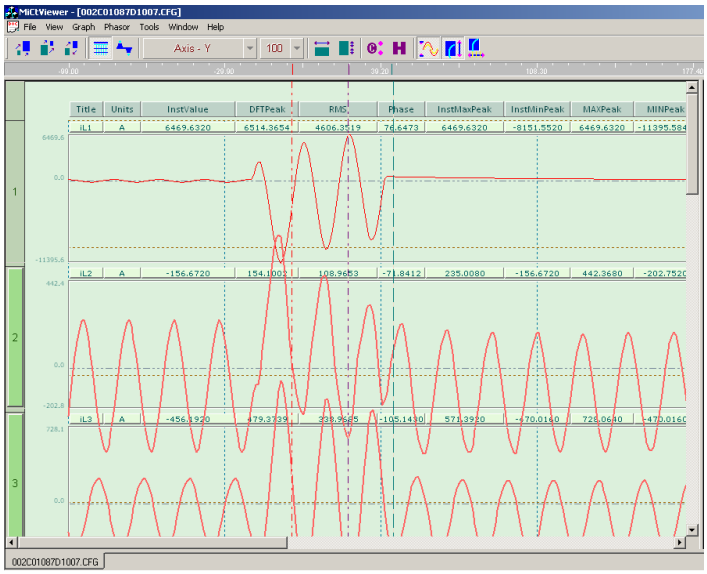


Figure 46: Clip Boundary - Off

4.1.5 Scale Type

There are four scale types available. Those are:

- **Axis Y:** When you choose this option, the selected channels are scaled/re-scaled vertically.
- **Axis X right:** When you choose this option, all the channels are scaled towards right side.
- **Axis X left:** When you choose this option all the channels are scaled towards left direction.
- **Axis X left and right:** When you choose this option, all the channels are scaled towards both left and right.
- **Scale plus:** this option all option work according to the selected axis type.
- **Scale minus:** this option all option work according to the selected axis type.
- **Scale to normal:** On click of option, it will set to normal.

4.1.6 Zoom Plot Area in Percentage

On the Graph menu, click **Zoom Plot Area in Percentage** as shown below:

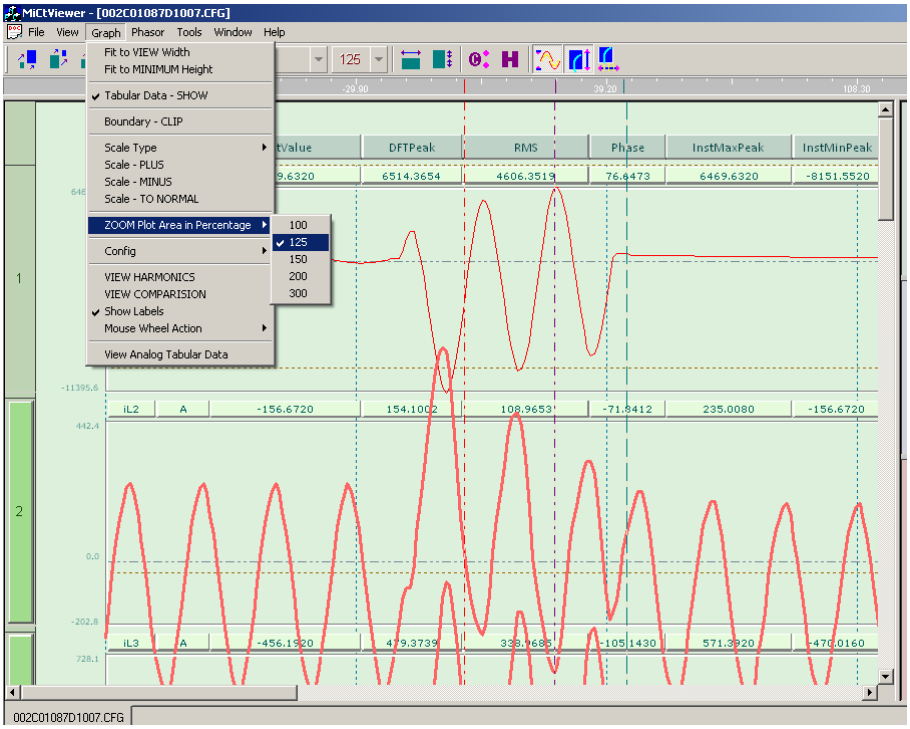


Figure 47: Zoom Plot Area in Percentage

The percentage of the plot area is zoomed as per the selection.

4.1.7 Config Channel Color

On the Graph menu, Select **Config > Channel Color** as shown below:

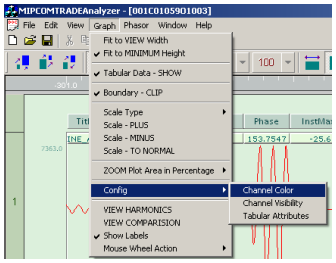


Figure 48: Config Channel Color

Following page appears:

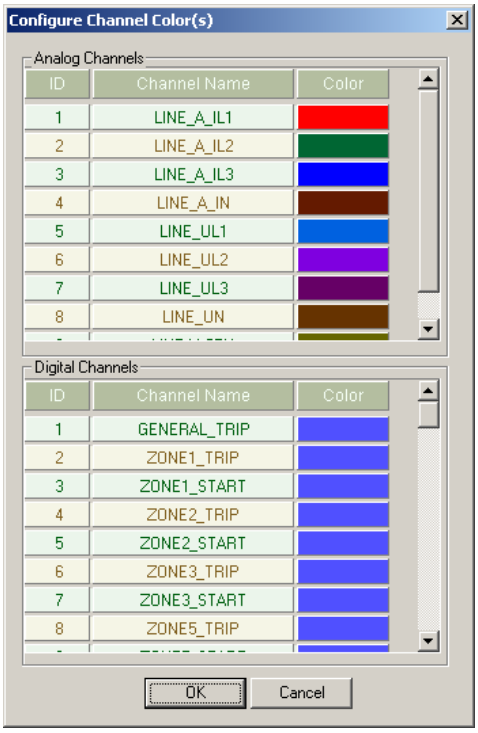


Figure 49: Config Channel Colors 1

If the use wants to change any particular analog / digital channel color, then select the particular channel and double click on the color. Which brings the color palette box as shown below:

Figure 50: Color

Here user can select any color and click ok.

Now the color for that particular channel is changed and is reflected in comtrade viewer.

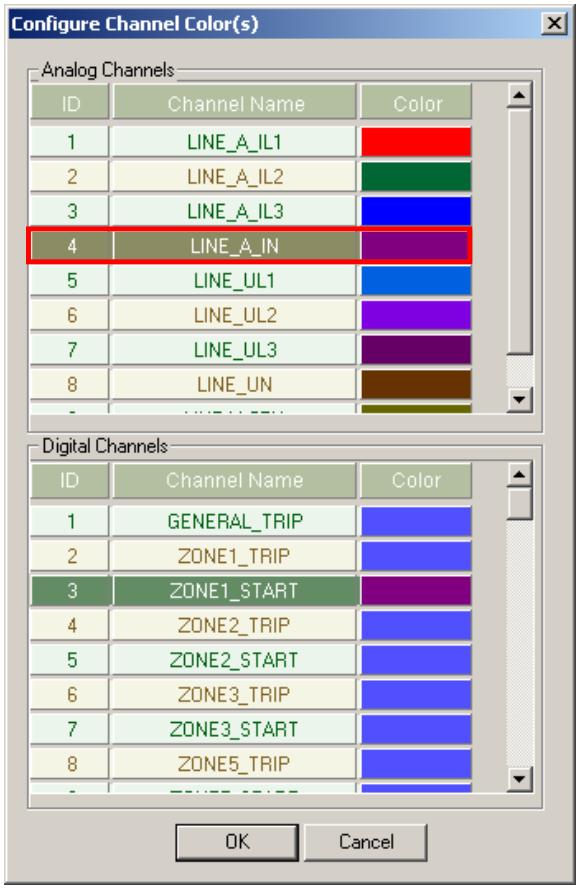


Figure 51: Changed Color

4.1.8 Channel Visibility

On the Graph menu, click **Config > Channel Visibility** which brings the following page:

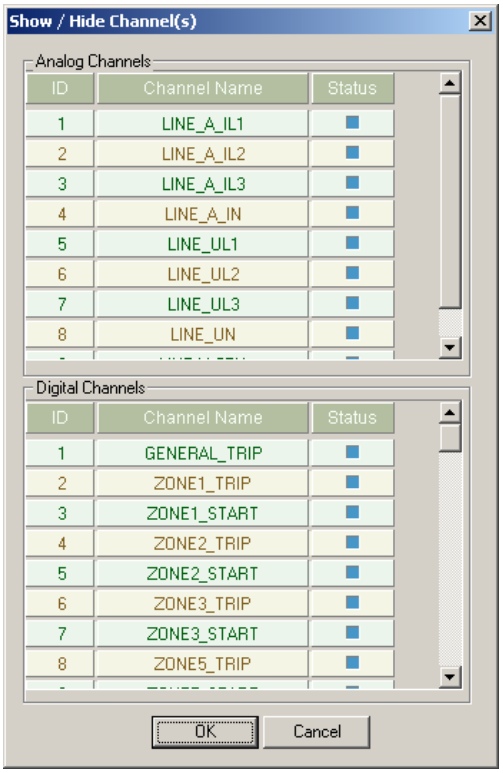


Figure 52: Channel Visibility

The fields for Analog and Digital channels are described below:

Analog Channel: Under the Analog Channles following attributes are available:

ID: This is the ID for the analog channel.

Channel Name: Channel name is displayed as per the opened .cfg file.

Status: This is the status of the channel. If selected by user it displays on the Comtrade Viewer main window. If de-selected then it will not be displayed in the comtrade viewer window.

Digital Channel: Under the digital channels following attributes are available:

ID: This is the ID for the digital channel.

Channel Name: Channel name is displayed as per the opened .cfg file.

Status: This is the status of the channel. If selected by user it displays on the Comtrade Viewer main window. If de-selected then it will not be displayed in the comtrade viewer window.

Here the user can select or de-select the required channels. If you want to de-select few channel ID's then clear the check boxes for those particular ID's. For example in the above screen shot user does not want the first and second channel to appear

on the main window. In that case clear the check boxes for the channels as shown below:

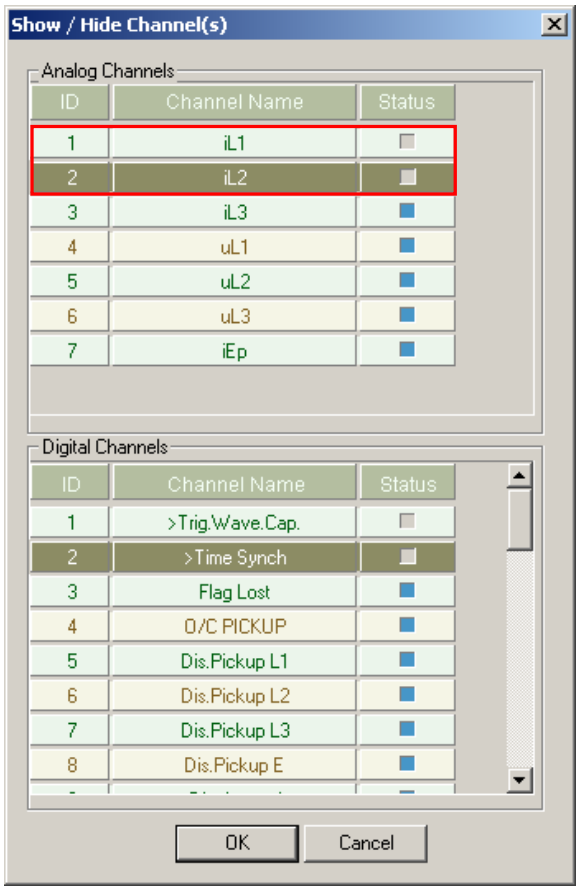


Figure 53: Select/Deselect Channel

and click OK.

On click of **OK** the De-selected channels will be hidden.

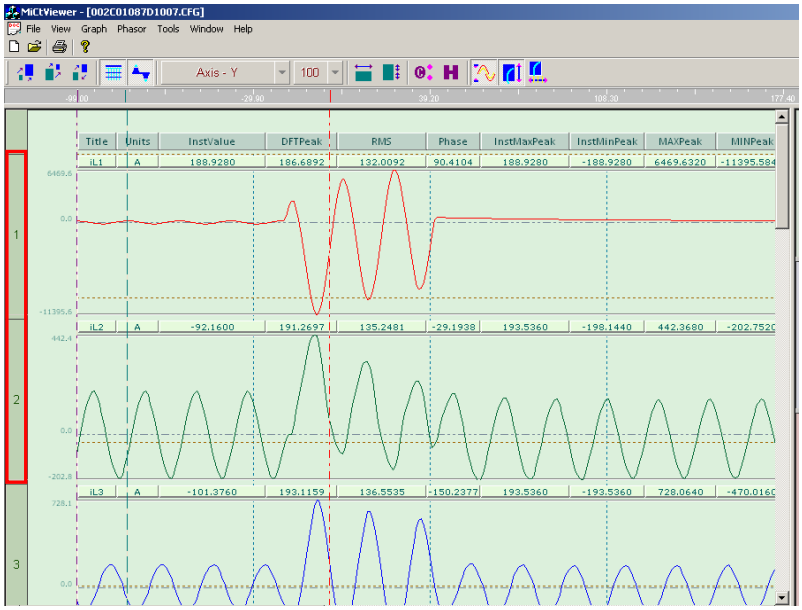


Figure 54: Selected Channels

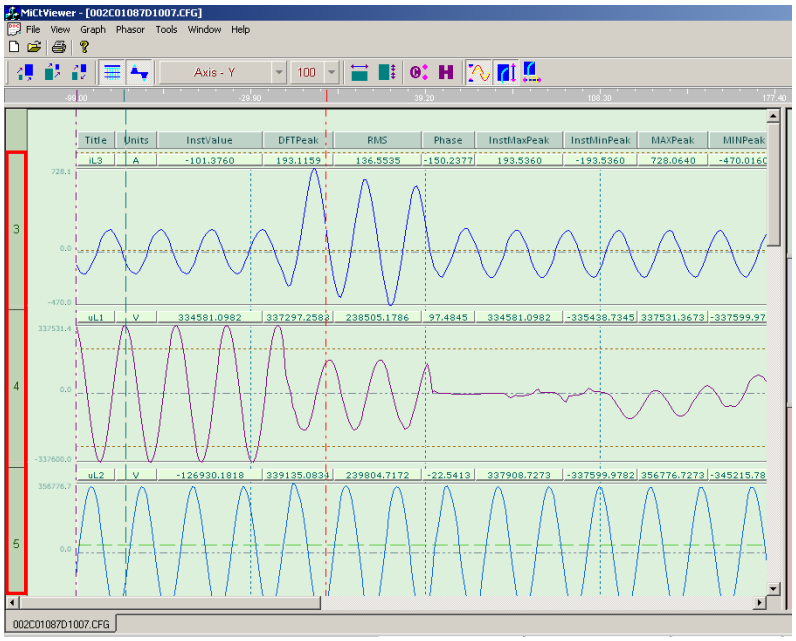


Figure 55: 1 & 2 Channels Hidden

4.1.9 Tabular Attributes

On the Graph menu, click **Config > Tabular Attributes** which bring the following page:

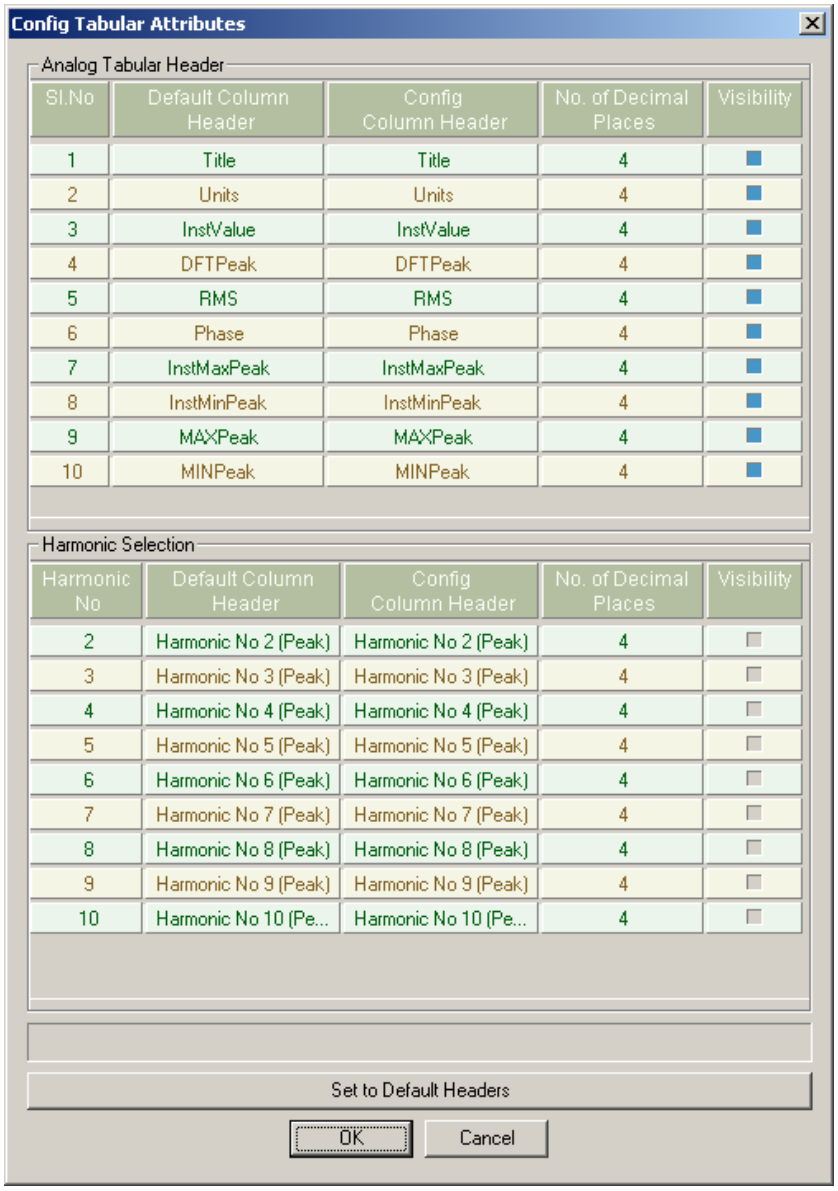


Figure 56: Config Table

The fields for Analog Tabular header and Harmonic section are described below:

SL. No: This is the serial number. The number of rows/coloumns allowed in this table is ten.

Default Column Header: Default column header is read-only.

Config Column Header: User can change the config column header. Maximum of 10 entries are allowed in this column.

No. of Decimal Places: Application accepts up to 4 decimal points. If the value is greater then 4 and less then 1 then it will not accept.

Visibility: User can select and clear the check boxes for the visibility on comtrade viewer.

Set to Default: Used to retain the default values.

Ok: Click this to make the changes.

Cancel: Click the cancel button to cancel the changes.

Note: Same is applicable for harmonic section**.** Config Column Header is allowed to accept upto 25 characters,Under harmonic section user can select and view only two harmonics on comtrade viewer at a time.

4.1.10 View Harmonics

Comment [p1]: Need to update as per the new changes

On the Graph menu, select **View Harmonics**.

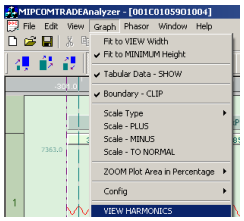
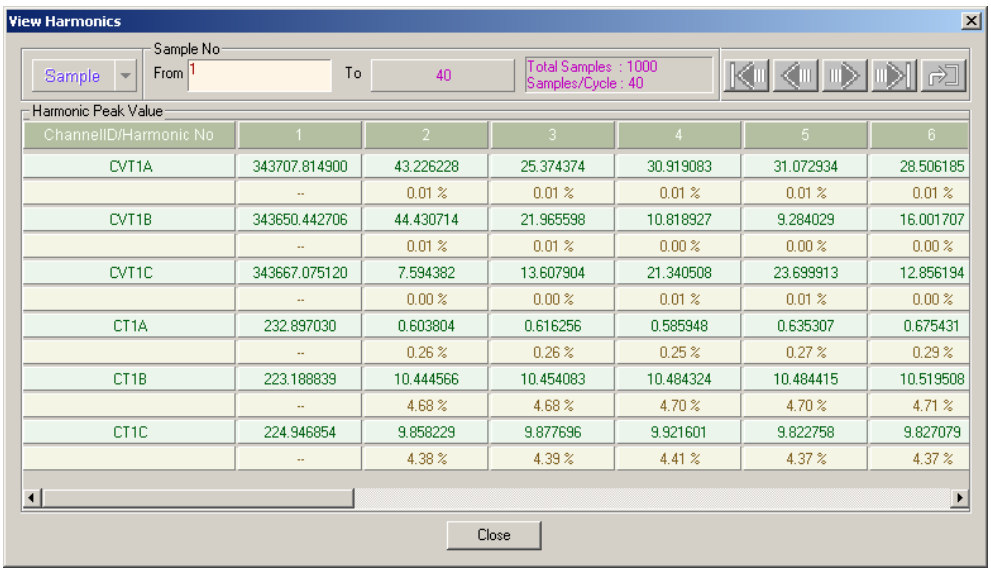


Figure 57: View Harmonics

The following screen appears as shown below:



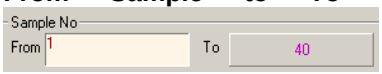
ChannelID/Harmonic No	1	2	3	4	5	6
CVT1A	343707.814900	43.226228	25.374374	30.919083	31.072934	28.506185
	--	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %
CVT1B	343650.442706	44.430714	21.965598	10.818927	9.284029	16.001707
	--	0.01 %	0.01 %	0.00 %	0.00 %	0.00 %
CVT1C	343667.075120	7.594382	13.607904	21.340508	23.699913	12.856194
	--	0.00 %	0.00 %	0.01 %	0.01 %	0.00 %
CT1A	232.897030	0.603804	0.616256	0.585948	0.635307	0.675431
	--	0.26 %	0.26 %	0.25 %	0.27 %	0.29 %
CT1B	223.188839	10.444566	10.454083	10.484324	10.484415	10.519508
	--	4.68 %	4.68 %	4.70 %	4.70 %	4.71 %
CT1C	224.946854	9.858229	9.877696	9.921601	9.822758	9.827079
	--	4.38 %	4.39 %	4.41 %	4.37 %	4.37 %

Figure 58: View Harmonics Table

Sample: When sample is selected the harmonics values in the table are displayed according to sample. Sample moves by one number at a time. For example if the sample is at 1 and you click move next it will go to 2.

Cycle: When cycle is selected the harmonics values in the table are displayed according to cycle. When the user selects cycle, one cycle moves at a time. For

example if the cycle number is 1 and you click move next the next cycle will jump to 21 if number of samples per cycle is 20.

From Sample to To Sample: From sample and to sample 

reflects the sample number/cycle number in the field. Enter specific sample number or cycle number and click on tab it will go to particular sample/cycle.

Total Samples: It displays the total samples as per the.cfg files. Total number of samples recorded by the device in comtrade file.

Samples/cycle: It displays the samples/cycles as per the .cfg file.

Move First: Clicking this button takes you to the first sample/cycle.

Move Previous: Clicking on this button takes you to the previous sample/cycle.

Move Next: Clicking on this button takes you to the next sample/cycle.

Move Last: Clicking on this button takes you to the last sample/cycle.

Trigger Point: Clicking on this button takes you to trigger the point.

Close: Clicking on close button closes the window.

4.1.11 View Comparison

On the Graph menu, select **View Comparison**

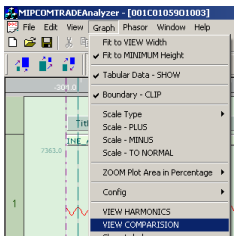


Figure 59: View Comparison

View comparison option allows the user to see the comparison between the channel attributes. User can select any number of channels to view the comparison.

Now to view comparison select two channles from .cfg file as shown below:

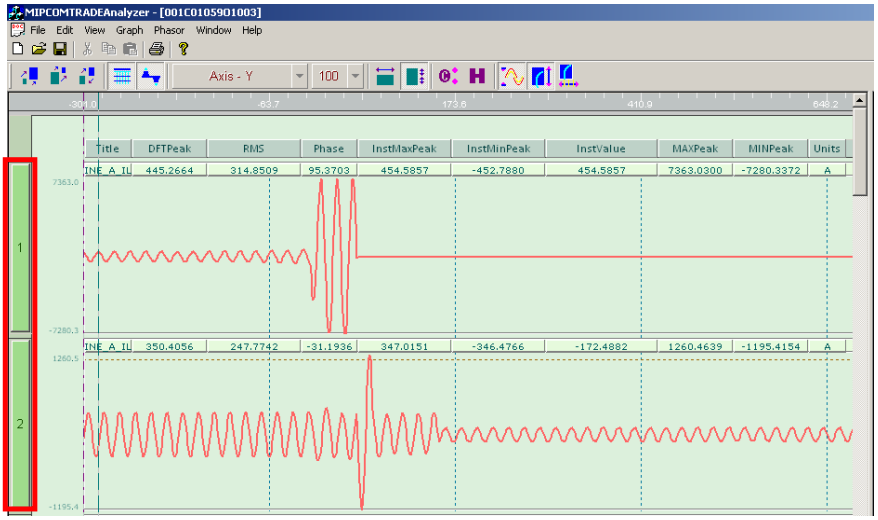


Figure 60: View Comparison 1

Once the channels are selected go to **Graph > View Comparison** which brings the following page:

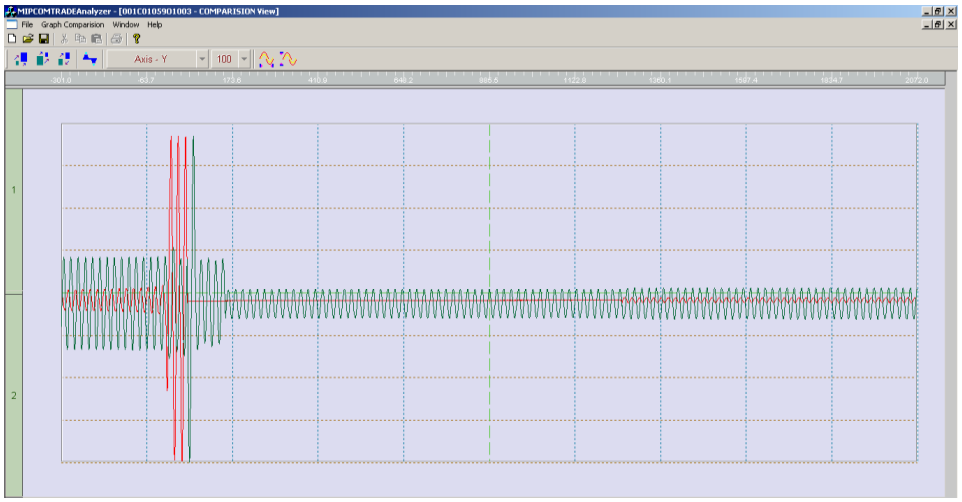


Figure 61: View Comparison 2

In this page the comparison of the two channels has been displayed.

Note: This option should get enabled only when user selects the channel on comtrade viewer.

4.1.12 View Compuataional

On the Graph menu, select **View Computational**

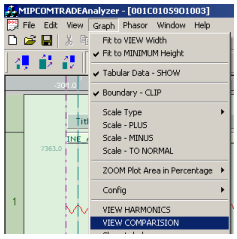


Figure 62: View Comparison

View Compuation option allows the user to see the compuation waveforms. User can select any number of channels to view the Computaional.

Now to view computaional select one Analog and Two digital channles On comtrade viewer shown below:

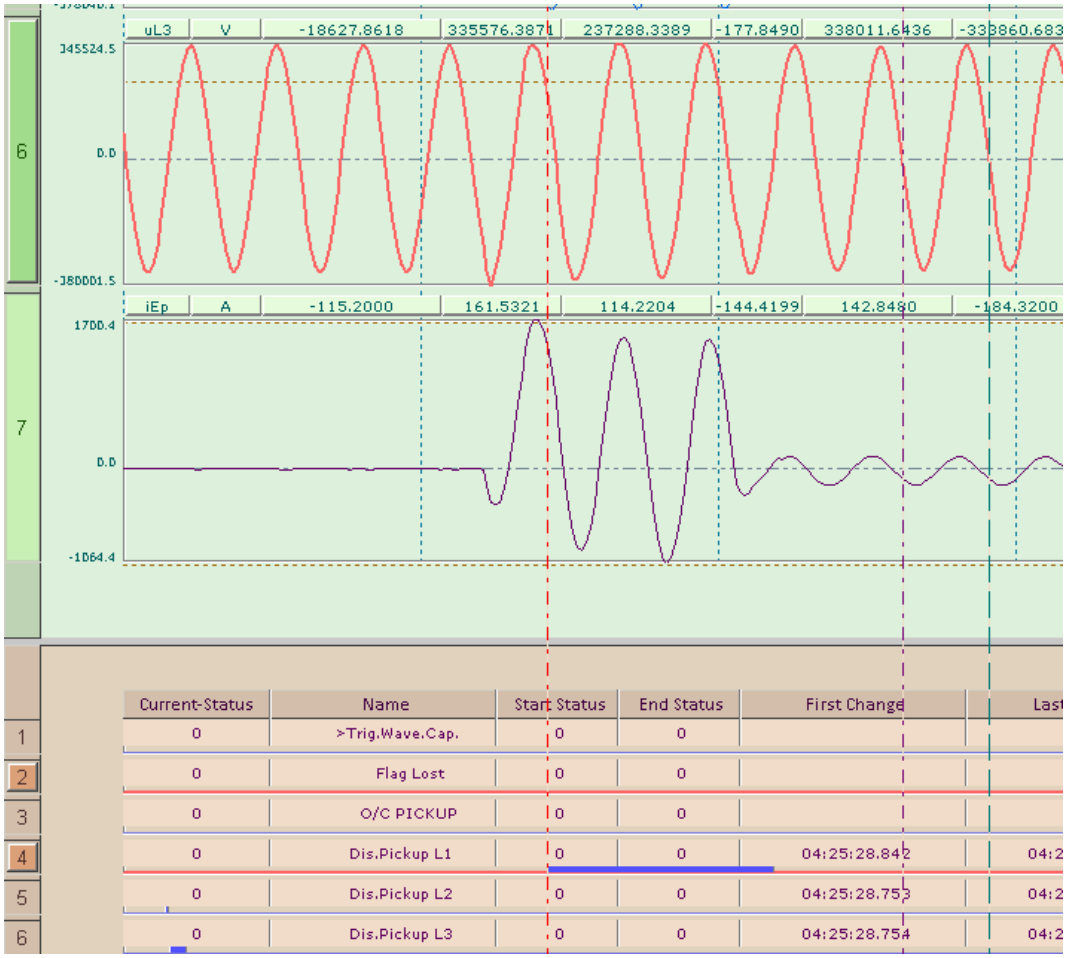
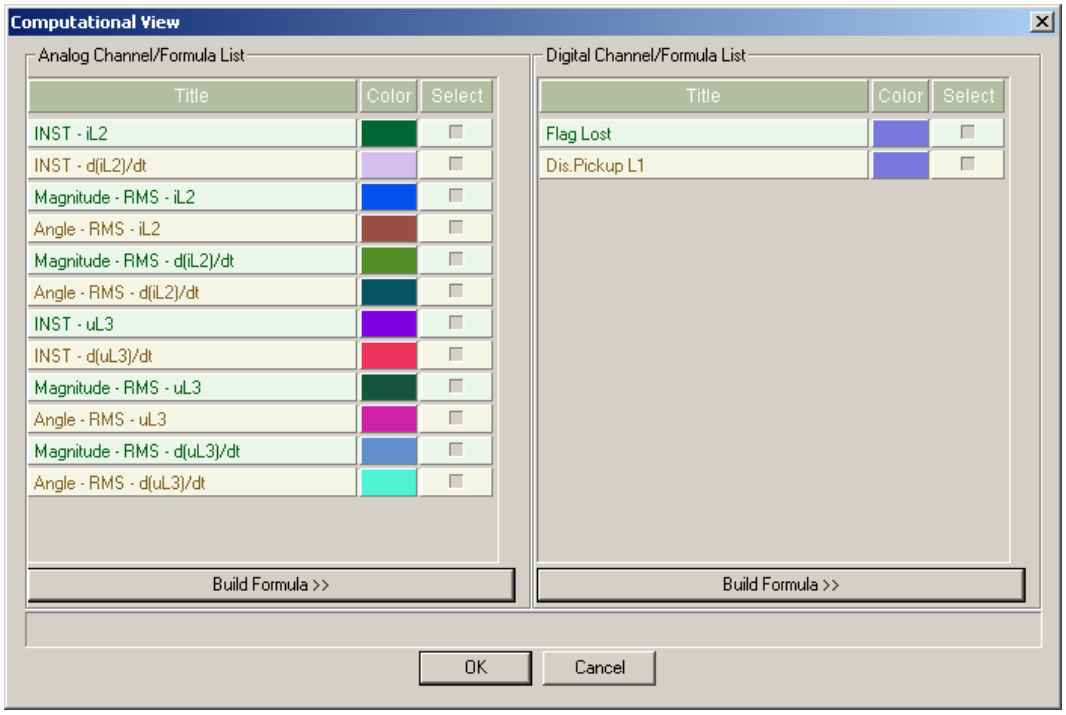
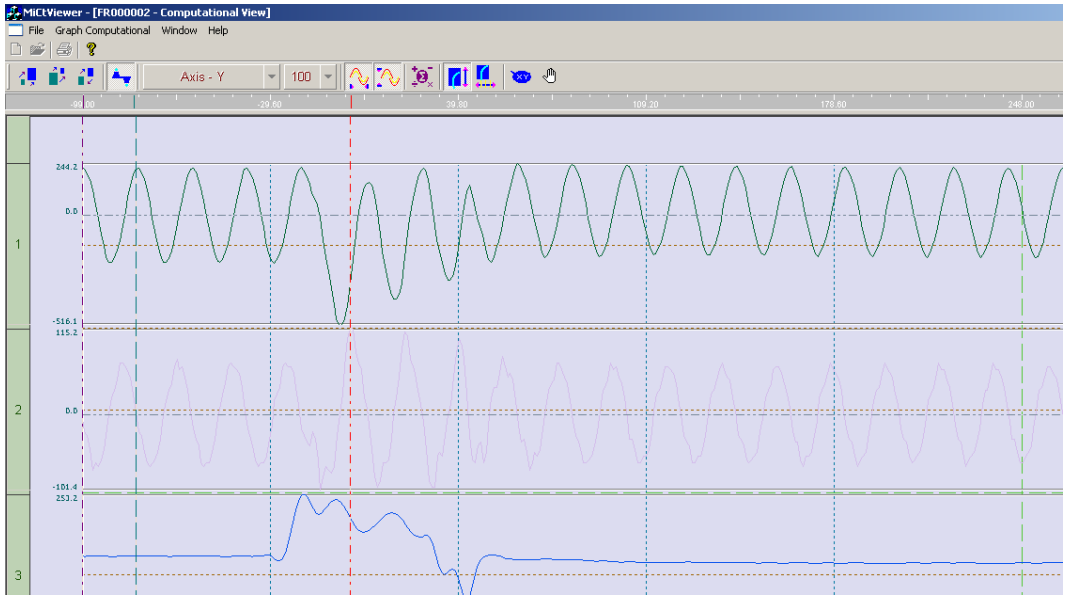


Figure 63: View Computational

Once the channels are selected go to **Graph > View Computational** which brings the following page:



Select one or more select check box's and click on Ok button which brings the following page :



In this page the Compuataional view has been displayed.

Note: This option should get enabled only when user selects the channel on comtrade viewer.

4.1.13 Show Labels

This is a toggle button. Selecting show label option will display the maximum and minimum value for all the channels as shown below:

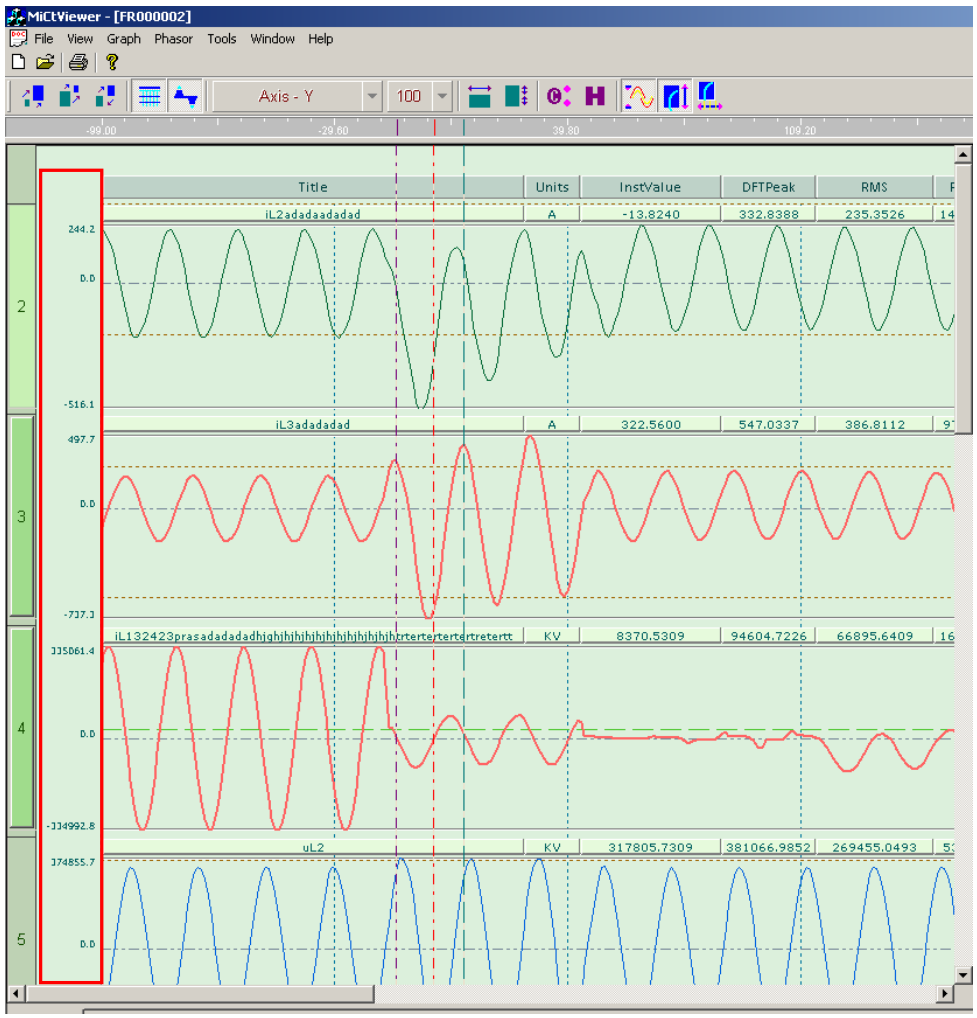


Figure 64: Labels

De-selecting the Show Label option takes out the Label data from the active window.

4.1.14 Mouse Action - Scroll view

Selecting this option scrolls the comtrade viewer window vertically.

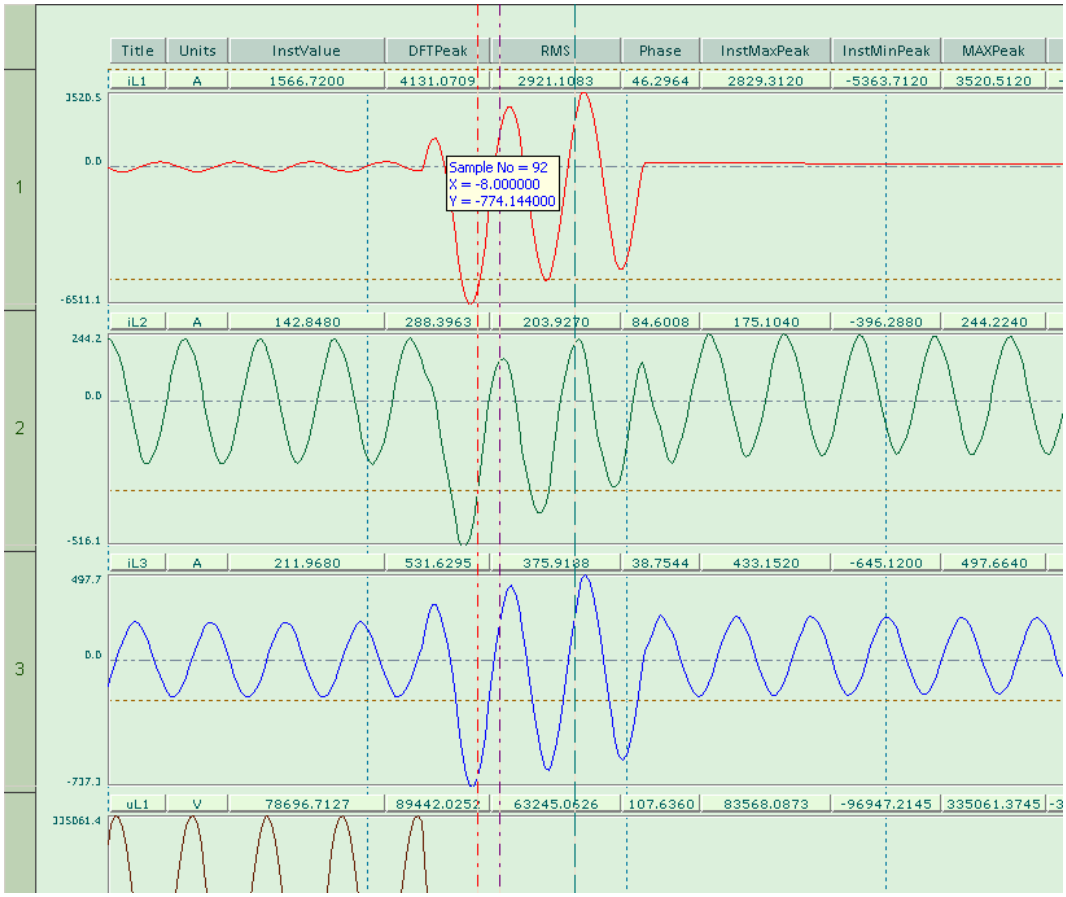
4.1.15 Mouse Action - Scroll reference

Selecting this option scrolls Reference axis on comtrade viewer.

Note: Both the buttons cannot work simultaneously.

4.1.16 Show x-y Axis Tool tip

Selecting this option tool tip box is displayed on comtrade viewer.



4.1.17 View Analog Tabular Data

On the Graph menu, select **View Analog Tabular Data.** The following window appears:

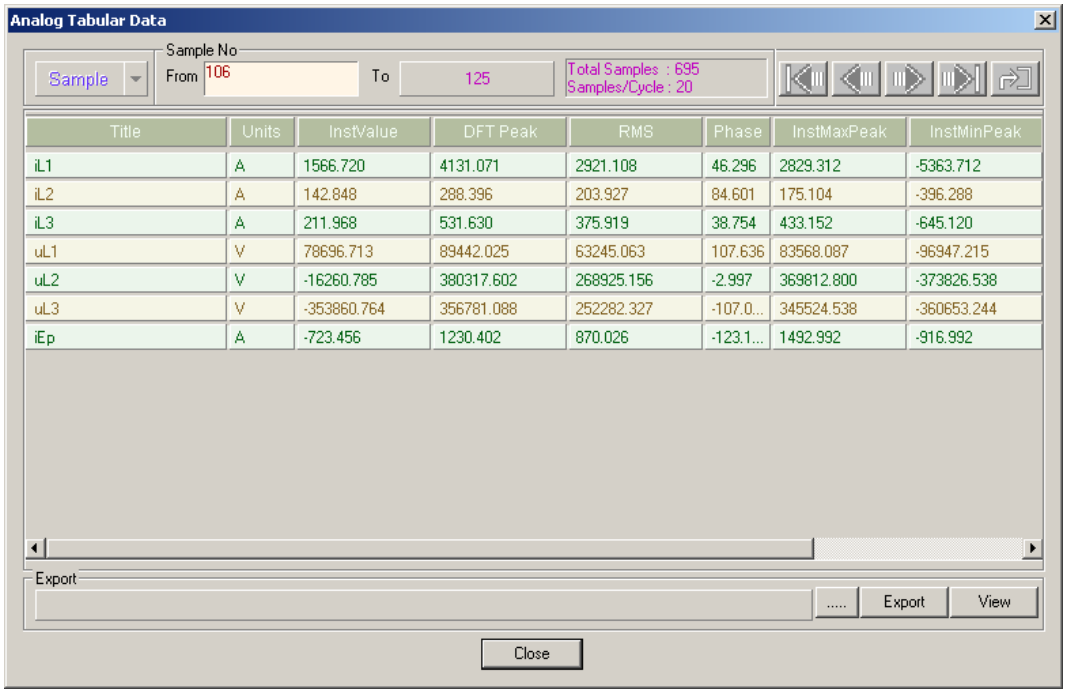


Figure 65: View Analog Tabular Data

Sample: Sample is read from the .cfg files. When user selects sample, the reference axis moves based on samples. Sample moves by one number at a time. For example - if the sample number is 1 and move next is clicked, the sample number is increased by 1 and hence displays 2. This sample number depends on the .cfg files.

Cycle: A cycle consists of fixed number of samples. When the user selects cycle, the analog and digital data windows are moved by one cycle at a time. For example if the cycle number is 1 and you click move next the next cycle will jump to 21. Here the sample per cycle value is 20. This cycle number depends on the .cfg files.

From Sample to To Sample: From sample and to sample

reflects the sample number in the field. Here sample or cycle number gets displayed wherever the reference axis is clicked.. User can enter the desired number and press tab. The reference axis will move to that particular sample/cycle number.

Move First: Clicking this button moves the reference axis to the first sample/cycle.

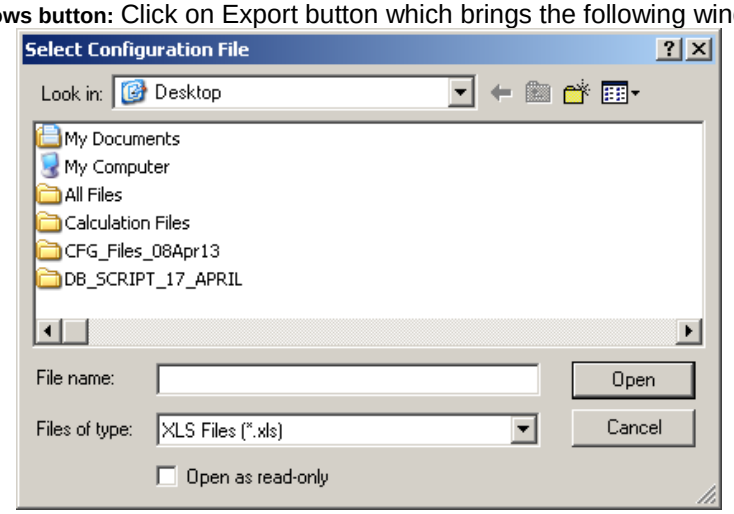
Move Previous: Clicking on this button moves the reference axis to the previous sample/cycle.

Move Next: Clicking on this button moves the reference axis to the next sample/cycle.

Move Last: Clicking on this button moves the reference axis to the last sample/cycle.

Trigger Point: Clicking on this button moves the reference axis to the trigger point.

Export Brows button: Click on Export button which brings the following window



Select the XLS file and click on Ok button

Export button: Click on Export button export the selected channel data to the XLX sheet

View: Click on View button opens the Exported Data

Analog tabular data shows the computed values of the channels. The table is having ten columns and those are:

- **Title:** Title is the user defined naming convention for the channel as per the .cfg file
- **Units:** Unit of the particular channel.
- **InstValue:** The instant value in the selected cycle.
- **DFT Peak:** DFT Peak is the peak magnitude calculated for one cycle from the reference.
- **RMS:** This is the RMS value for fundamental.
- **Phase:** This is the vector phase angle.
- **InstMaxPeak:** The positive peak value in the selected cycle.
- **InstMinPeak:** The negative peak value in the selected cycle.
- **MAXPeak:** MaxPeak is the maximum positive Instantaneous value of the corresponding channel for the entire recorded period.
- **MINPeak:** MinPeak is the Minimum negative Instantaneous value of the corresponding channel for the entire recorded period.
- **Ok:** clicking on Ok button closes the screen.

- **Cancel:** Clicking on cancel button closes the screen.

5 Phasor

5.1 Phasor Menu

The Phasor menu consists of the following options as shown in figure below:

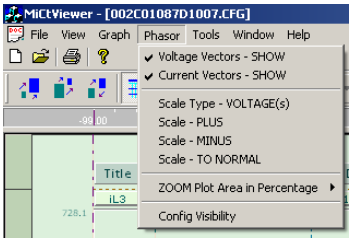


Figure 66: Phasor Menu

5.2 Voltage Vectors - Hide

On the Phasor menu, click **Voltage Vectors – Hide** as shown below:

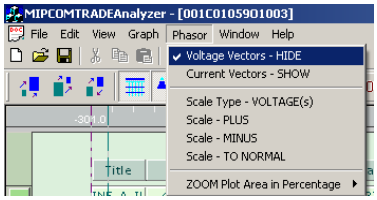


Figure 67: Voltage Vectors - Hide

This will hide the voltage vectors as shown below:

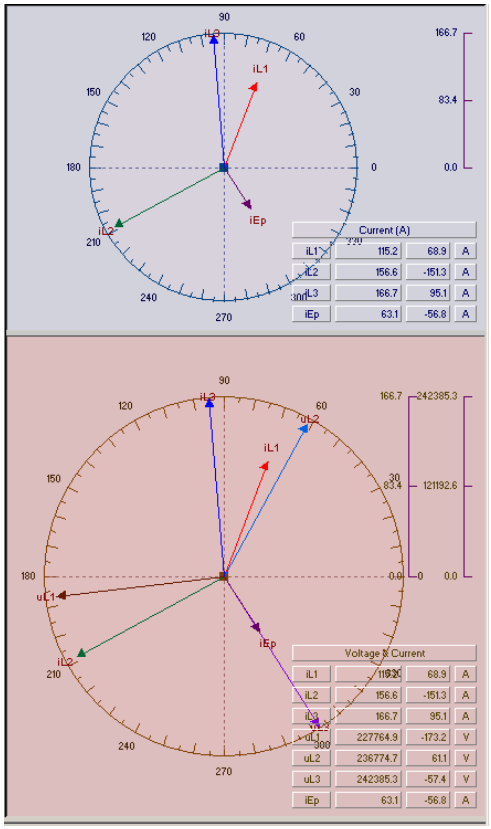


Figure 68: Voltage Vectors Hide

5.3 Voltage Vector – Show

On the Phasor menu, click **Voltage Vectors – Show** as shown below:

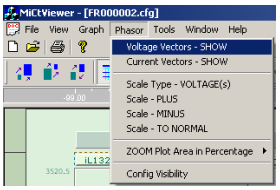


Figure 69: Voltage Vector - Show

This will show the voltage vectors as shown below:

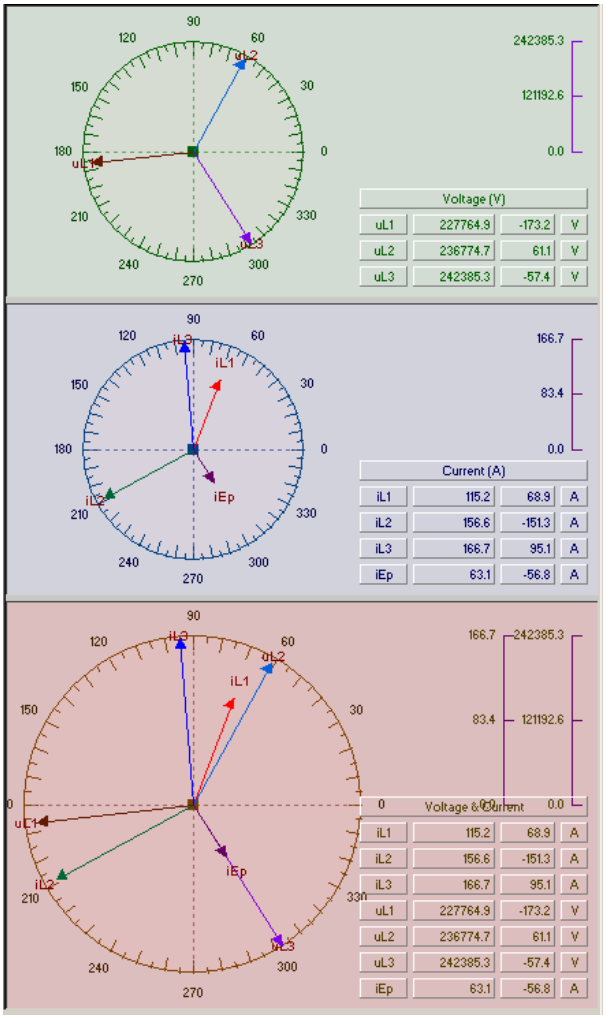


Figure 70: Voltage Vector – Show

5.4 Current Vectors – Hide

On the Phasor menu, click **Current Vectors – Hide** as shown below:

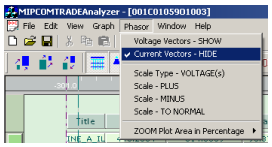


Figure 71: Current Vectors Hide

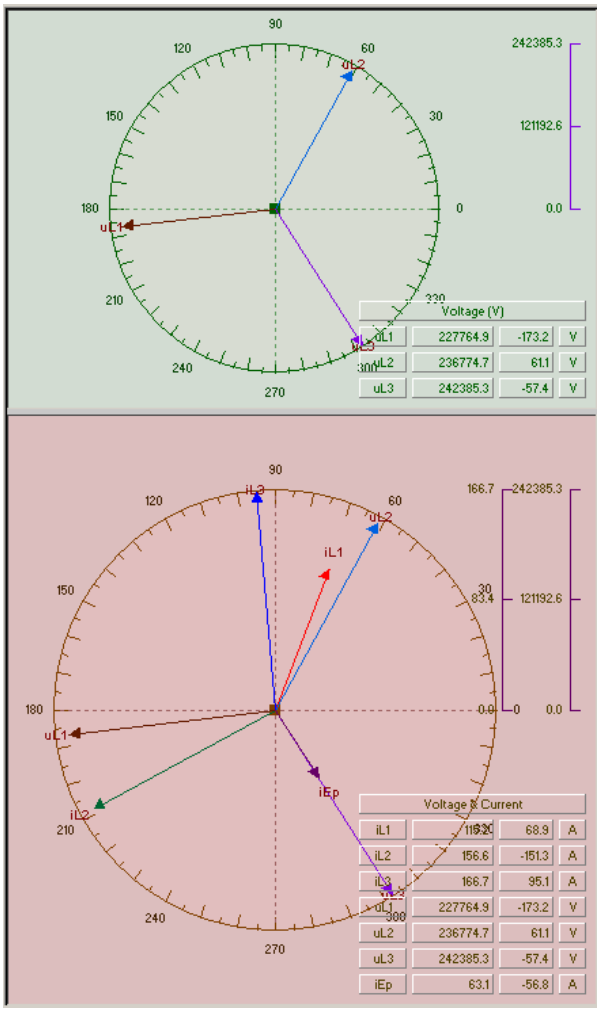


Figure 72: Current Vectors Hide

5.5 Current Vectors – Show

On the Phasor menu, click **Current Vectors – show** as shown below:

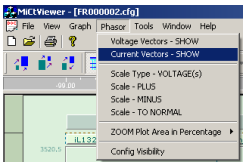


Figure 73: Current Vectors - Show

This will show the current vectors as shown below:

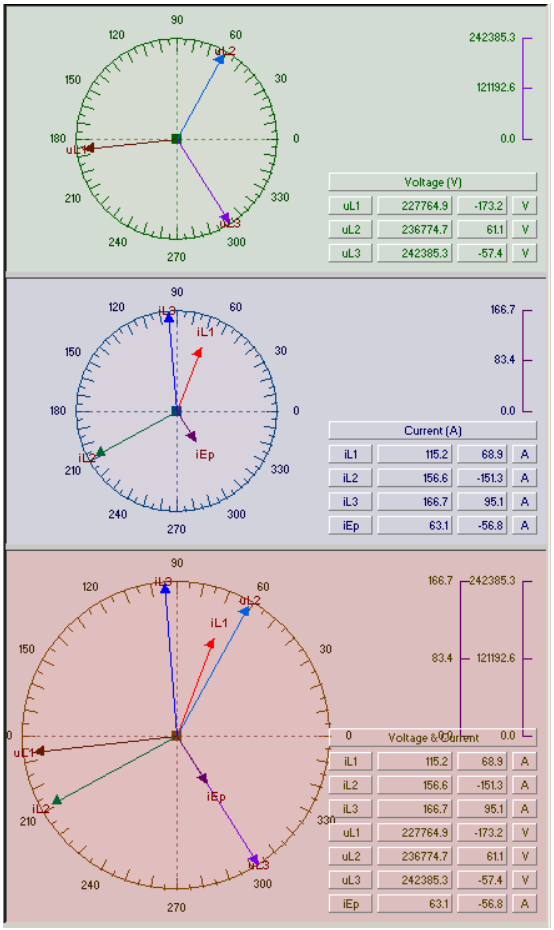


Figure 74: Current Vectors – Show

If both Voltage and Current are hidden than voltage & current diagrams will be displayed as shown below:

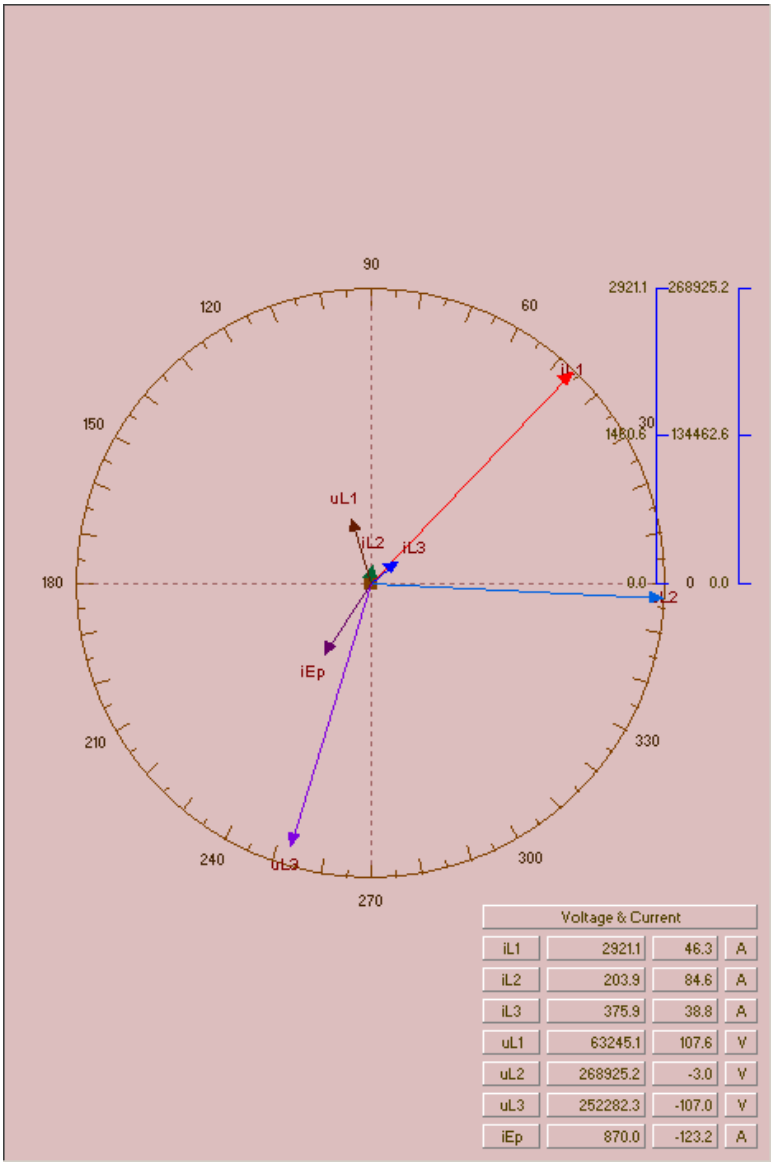


Figure 75: Voltage and Current Vectors – Show

5.6 Scale Type – Current (s)

On the Phasor menu, click **Scale Type – Current (s)** as shown below:

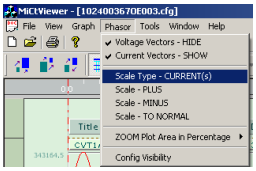


Figure 76: Scale Type Currents

Scale/Rescale of vectors happens according to the selected options. If selected option is current then current vectors will be scaled /rescaled.

5.7 Scale Type – Voltage (s)

On the Phasor menu, click **Scale Type – Voltage (s)** as shown below:

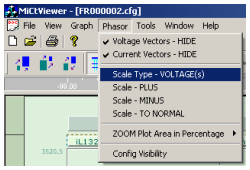


Figure 77: Scale Type – Voltage (S)

5.8 Scale Plus

On the Phasor menu, click **Scale – Plus** as shown below:

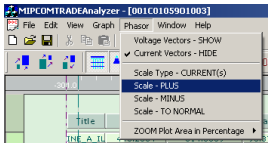


Figure 78: Scale Plus

On selection of this it changes the phasor magnitude. Scale plus is used for a better view of the phasor when the magnitude is less. Scale plus also happens according to the scale type's selection.

5.9 Scale Minus

On the Phasor menu, click **Scale – Minus** as shown below:

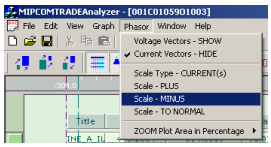


Figure 79: Scale Minus

On selection of this option the phasor magnitude is reduced. Scale minus also happens according to the scale type's selection.

5.10 Scale to Normal

On the Phasor menu, click **Scale – To Normal** as shown below:

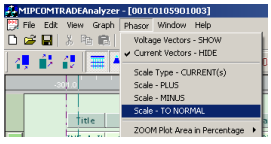


Figure 80: Scale to Normal

On selection of this option the phasor magnitude is set to normal.

Note: Scale Pluse and Scale minus will not work if all the vector having equal or aproximattly equal magnitude

5.11 Zoom Plot Area in Percentage

On the Phasor menu, click **Zoom Plot area in Percentage** as shown below:

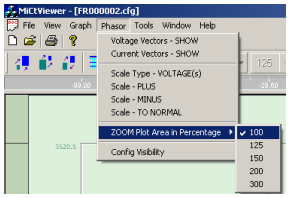


Figure 81: Zoom Plot Area in Percentage

Note: Plot Area in Percentage option gets enabled when user clicks on the phasor section in the comtrade viewer screen.

5.11.1 Config Visibility

On the Phasor menu, click **Config Visibility** as shown below:

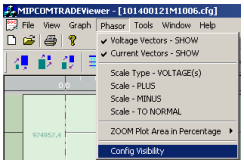


Figure 82: Config Visibility

The following window appears:

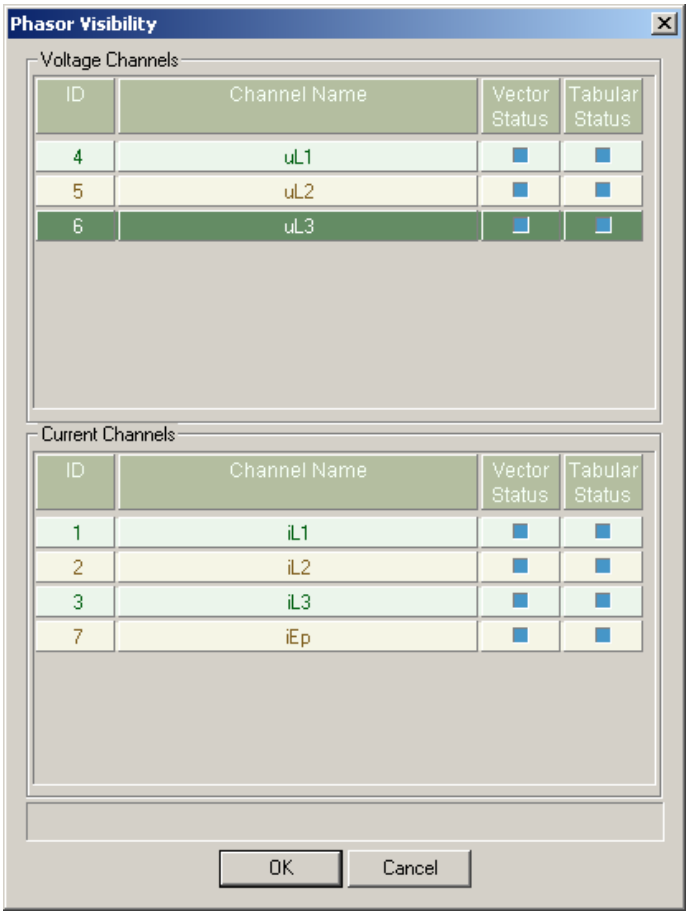


Figure 83: Phasor Visibility

The fields for voltage and current channels are described below:

ID: This is the ID for the voltage/current channel.

Channel Name: Channel name will be displayed as per the opened .cfg file.

Status: This is the status of the channel. If selected by user, channel vector displays on the phasor diagram. If de-selected then it won't be displayed in the diagram on comtrade viewer phasor section.

Tabular Status: This is the status of the tabular data in phasor section . If selected by user, tabular data displays on the phasor diagram. If de-selected then it won't be displayed in the diagram on comtrade viewer phasor section.

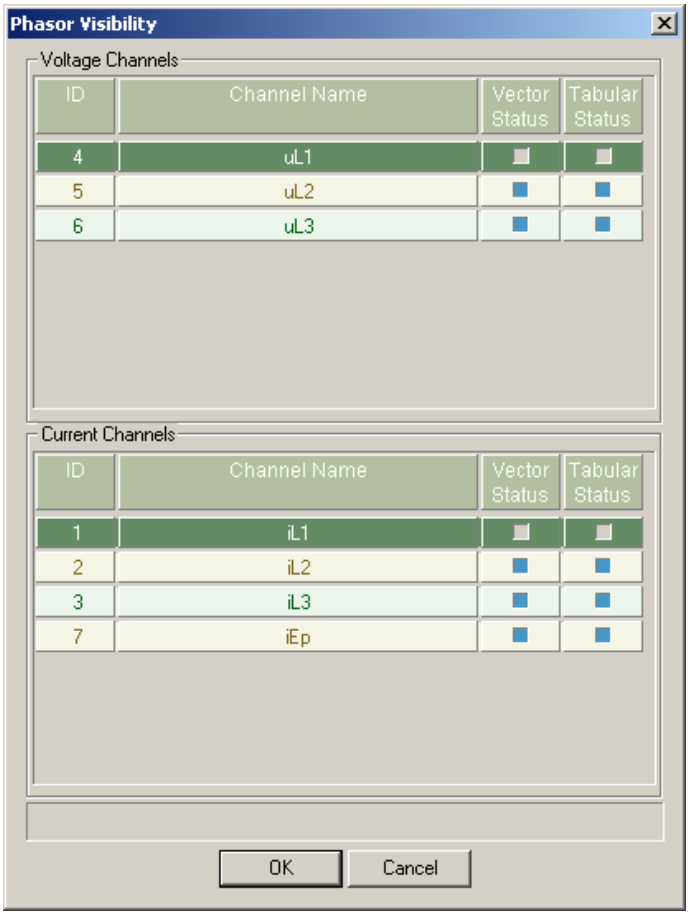


Figure 84: Phasor Visibility – De-selected

In this window the voltage and current channels are there along with the status. If the user clears the check boxes for particular channels then the same will not be reflected in the phasor window. The example of the same is explaned below.

Phasor visibility before clearing the check box:

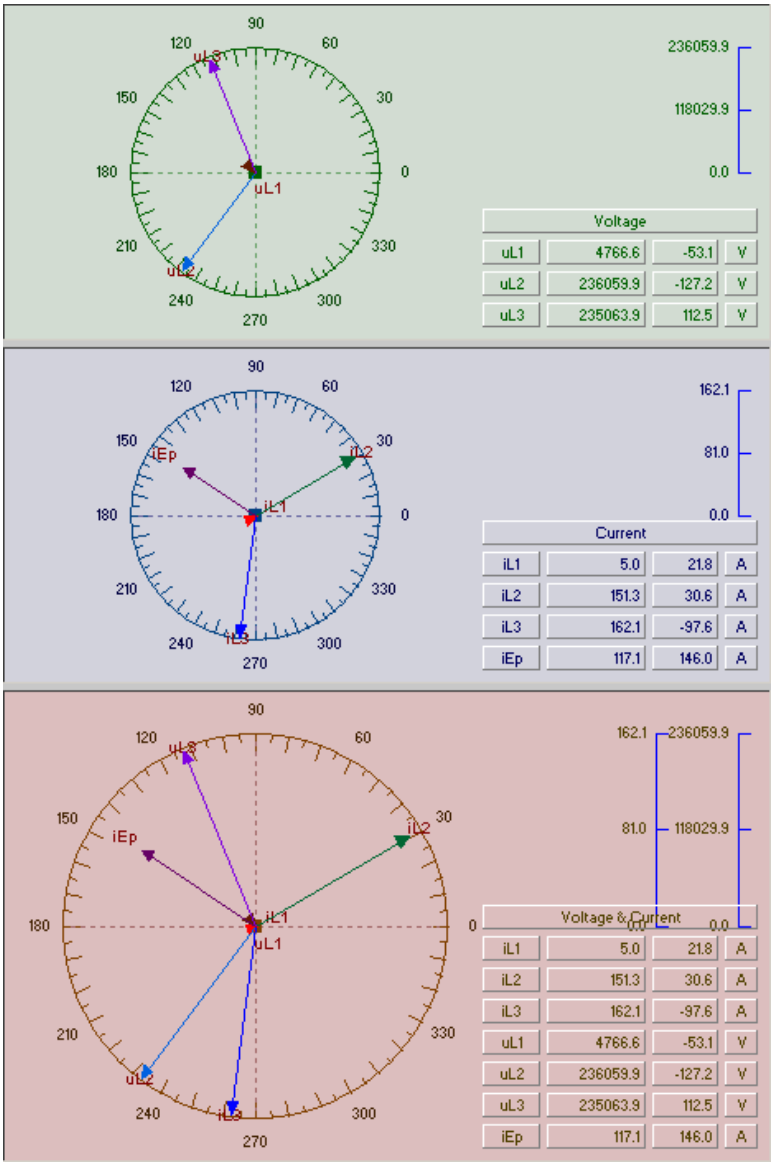


Figure 85: Voltage and Current Phasor Visibility before De-selection

Phasor visibility after clearing the check box:

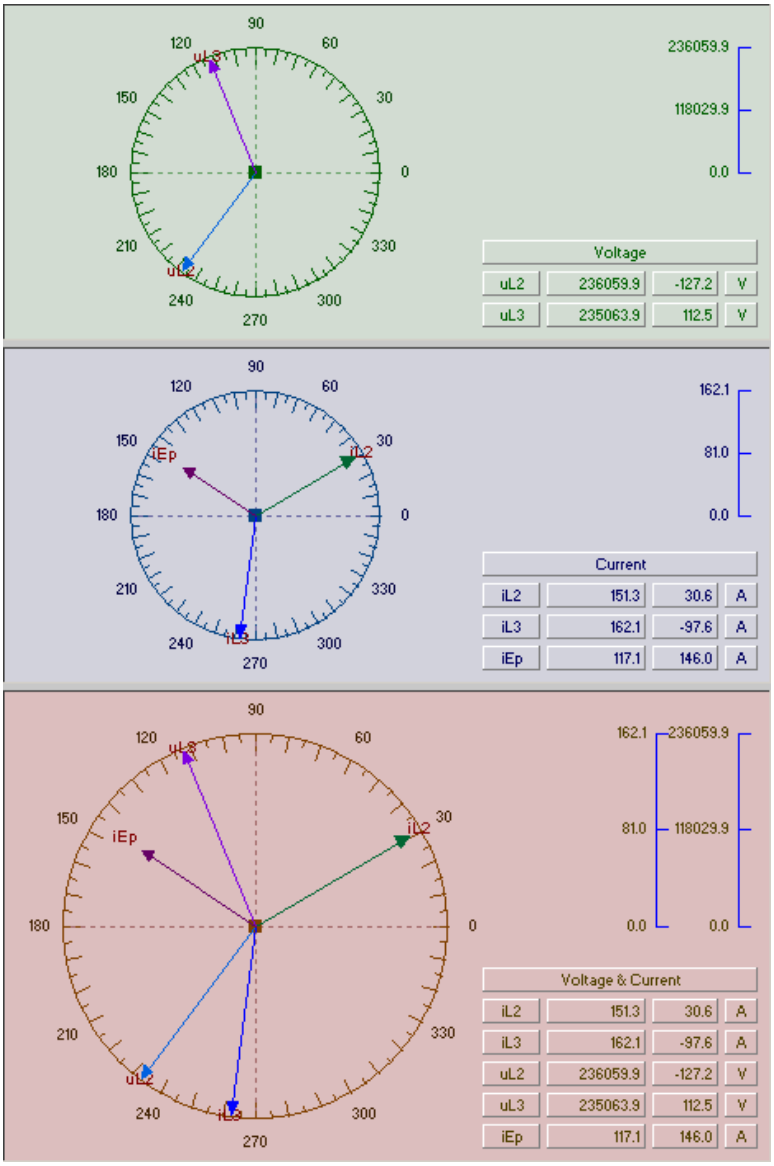


Figure 86: Voltage & Current Phasor Visibility after clearing the check box

Note: channels other than Voltage and current will not be displayed here.

6 Tools

6.1 File Merge

Comment [p2]: File merging need to update as per the new changes

On the tools menu select file merge.

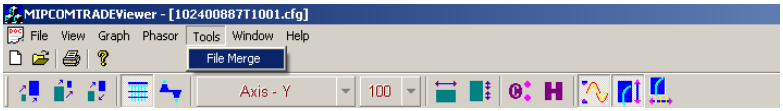


Figure 87: File Merge

The below screen appears:

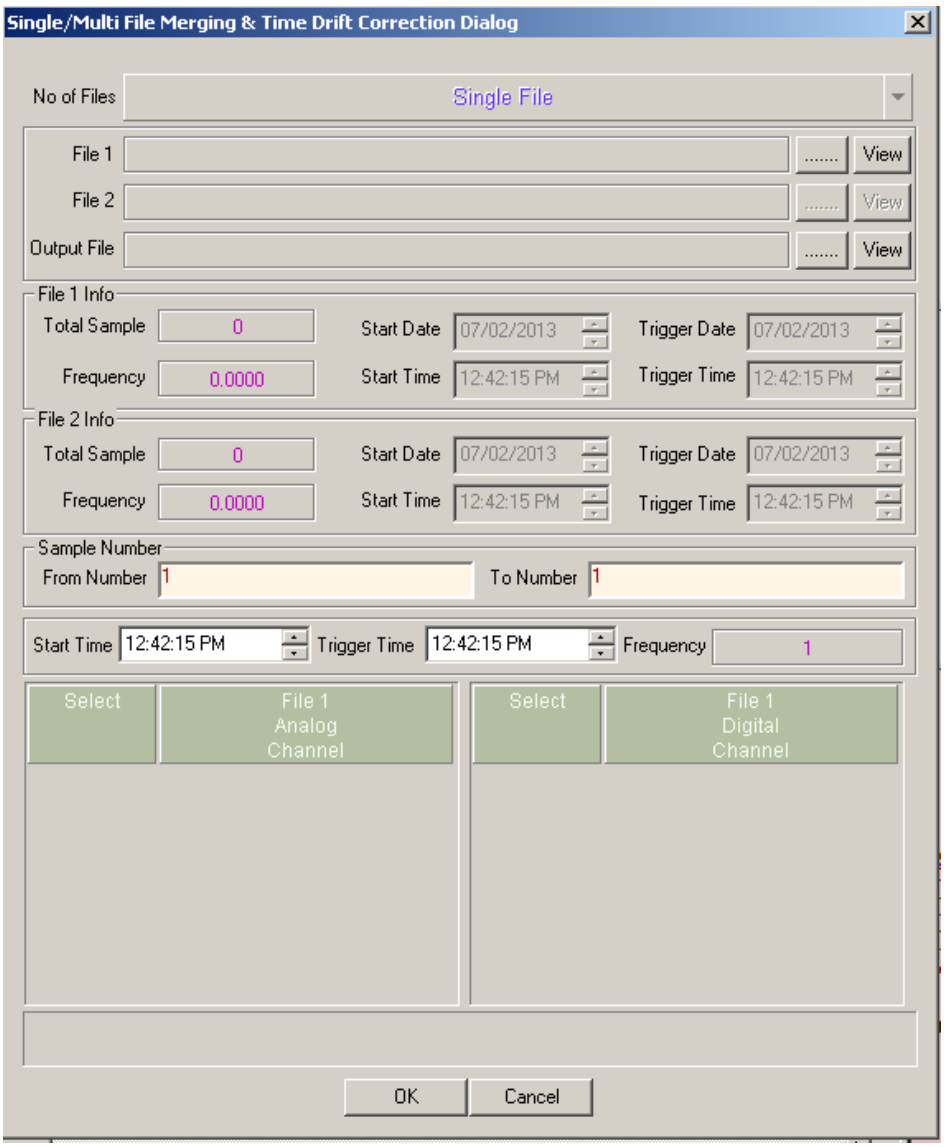
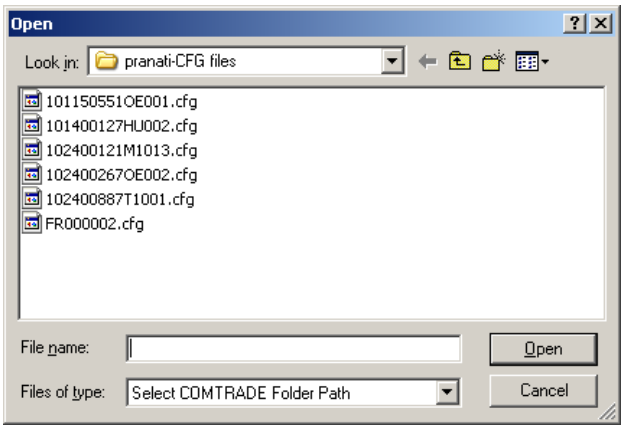


Figure 88: File Merge Window

File merge helps the user to merge two file types. In this screen user can do single or double file merge operation.

No of Files: Select the number of files either single or double.

File 1: Click ... brows button, the following window appears:



Select the file and click open.

View: Click View button, to read the .cfg file as shown in figure below:

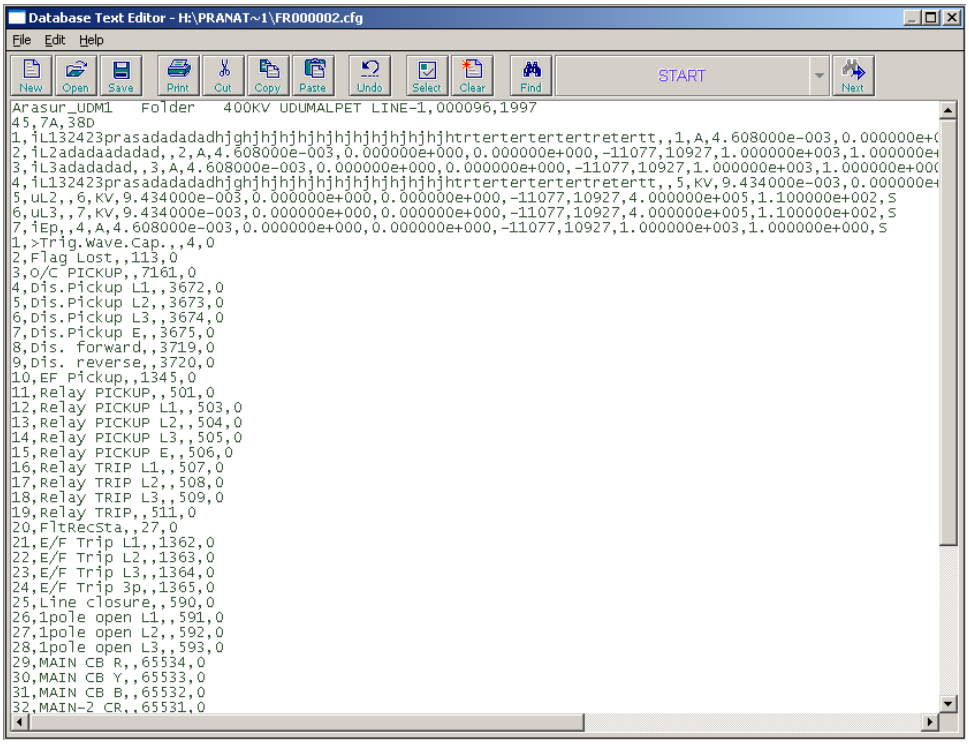


Figure 89: File 1 - View

New: Clicking on this button displays a blank page. Here user can create a new file.

Open: Click this button to open an existing file.

Save: Click this button to save a new file.

Print: Click this button to print the file.

Cut: Click this button to cut the selected text.

Copy: Click this button to copy the selected text.

Paste: Click this button to paste the selected text.

Undo: Click this button to undo the selected text.

Select: Click this button to select the entire file.

Clear: Clicking this button clears all the data.

Find: Click this button which brings a pop up window as shown below:

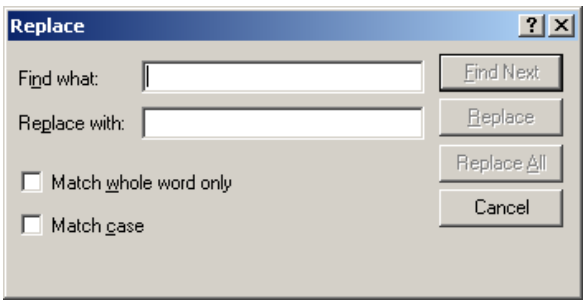


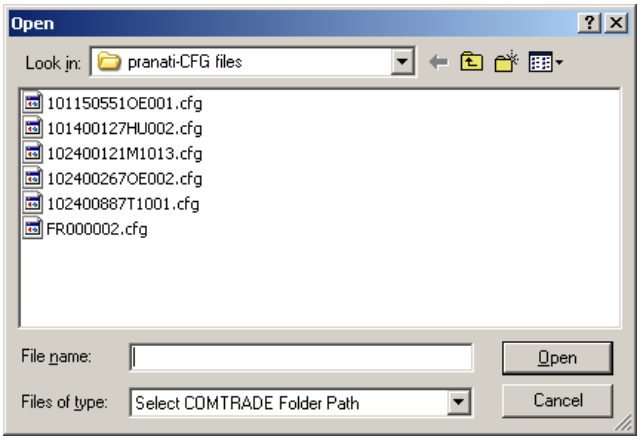
Figure 90: Replace

User can replace any word and do the modifications.

Start/End: A number of data is available in the file. To view the last set of data select end which takes you to the end of the file. Selecting start will come back to the first set of data.

Next: Click this button to go to the next text.

File 2:. Click browse button for selecting 2nd file. If number of files is selected as single, this option will be disabled.



Select the file and click open.

View: Click [View] this button, the following window appears:

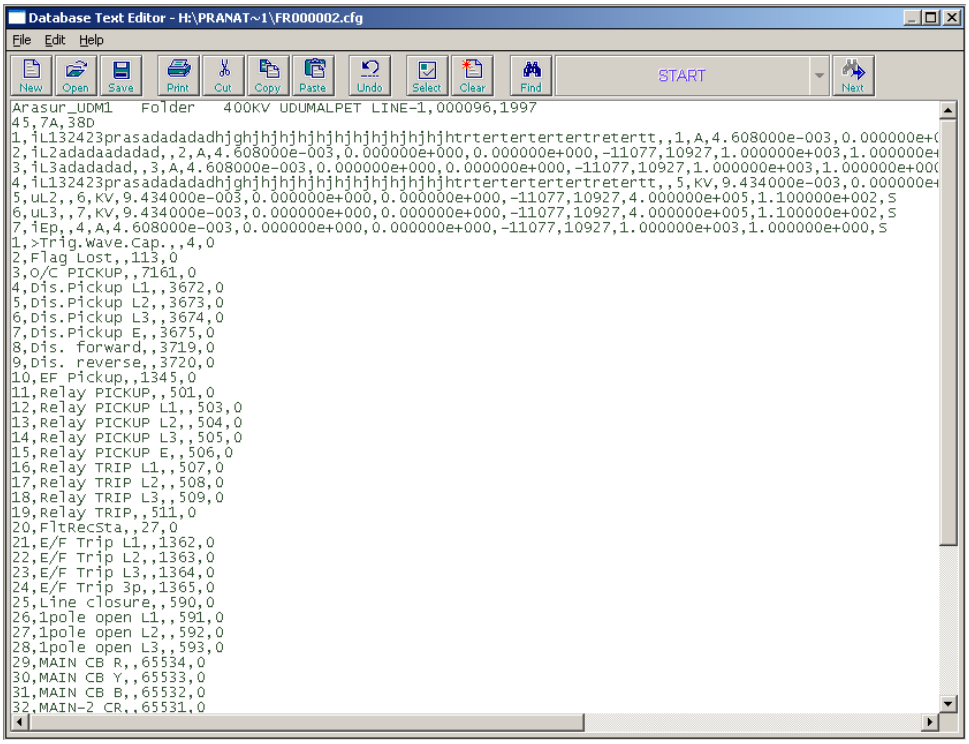


Figure 91: File 2 - View

New: Clicking on this button displays a blank page. Here user can create a new file.

Open: Click this button to open an existing file.

Save: Click this button to save a new file.

Print: Click this button to print the file.

Cut: Click this button to cut the selected text.

Copy: Click this button to copy the selected text.

Paste: Click this button to paste the selected text.

Undo: Click this button to undo the file.

Select: Click this button to select the entire file.

Clear: Clicking this button clears all the data.

Find: Click this button which brings a pop up window as shown below:

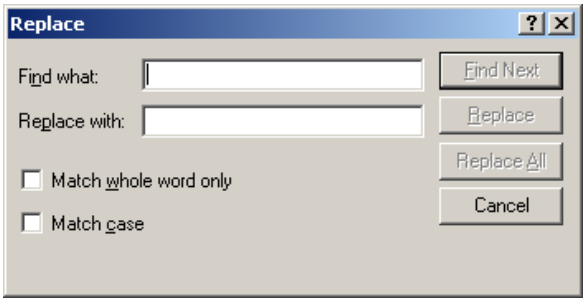


Figure 92: Replace

User can replace any word and do the modifications.

Start/End: A number of data is available in the file. To view the last set of data select end which takes you to the end of the file. Selecting start will come back to the first set of data.

Next: Click this button to go to the next text.

Output File: Click on brows button which brings the following dialog box:

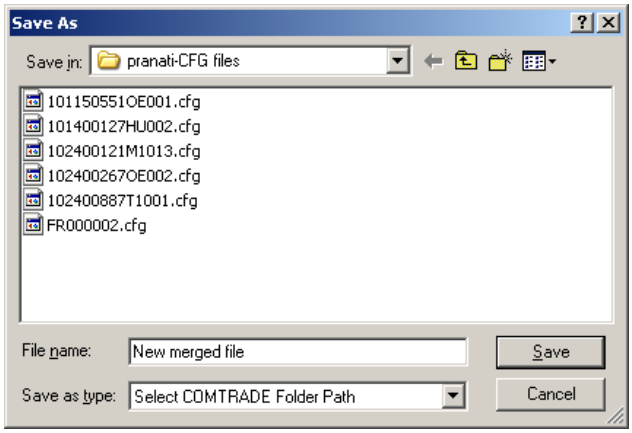


Figure 93: Save As File

Here the you can specify the path where you want to save the file.

File no 1 info: After selecting 1st file, aapplication displays the following information.

Sample Number (From to To Number): Sample number should get reflected in this field according to .cfg files.

Frequency: The frequency is as per the selected .cfg file.

Start Date: Start day will be displayed as per the selected .cfg file.

Start Time: Start time will be displayed as per the selected .cfg file.

Trigger Date: Trigger date will be displayed as per the selected .cfg file.

Trigger Time: Trigger timewill be displayed as per the selected .cfg file.

File no 2 Info: After selecting 2nd file, aapplication displays the following information.

Application displays the following information.

Total Sample: Sample number should get reflected in this field according to selected .cfg file.

Frequency: The frequency is as per the selected .cfg file.

Start Date: Start day will be displayed as per the selected .cfg file.

Start Time: Start time will be displayed as per the selected .cfg file.

Trigger Date: Trigger date will be displayed as per the selected .cfg file.

Trigger Time: Trigger time will be displayed as per the selected .cfg file

From number : From number displays 1 by default.

To number: To number is displayed according to the total sample present in the .cfg file

Note: User can change from sample number and To sample number according to their choice.

When two files are selected for merging, the sample number which has got the minimum value should be displayed on the screen.

Start time: This is the start time. User can change this time according to the convenience.

Trigger time: User can also set the trigger time.

Frequency: User can set the frequencey .

Select: Merging of files depends on the selection of analog and digital channels. If you want to select particular channles to be merged then select the check boxes in the file.

File 1 Analog channel: This is analog channels for file-1.

Select: Merging of files depends on the selection of analog and digital channels. If you want to select particular channles to be merged then select the check boxes in the file.

File 2 Analog Channel: This is analog channels for file-2.

Select: Merging of files depends on the selection of analog and digital channels. If you want to select particular channles to be merged then select the check boxes in the file.

File 1 Digital Channel: This is digital channels for file-1.

Select: Merging of files depends on the selection of analog and digital channels. If you want to select particular channles to be merged then select the check boxes in the file.

File 2 Digital Channel: This is analog channels for file-2.

The sample file merging window is shown in figure below:

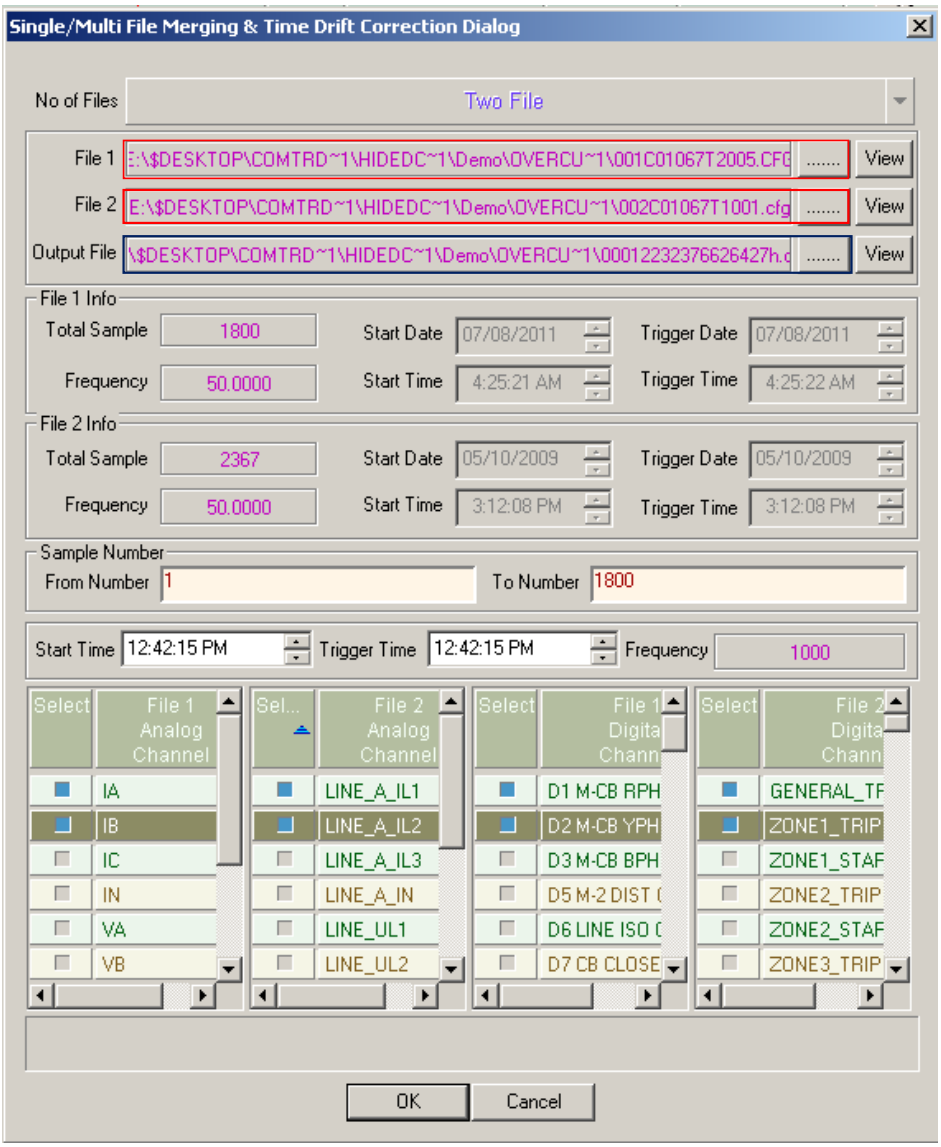


Figure 94: Single/Two File Merging

Clicking on the ok button new file should be generated in specified output path and same should be displayed in comtrade viewer

Click Cancel to cancel the above actions.

7 Window

7.1 Cascade

The window menu consists of the following options as shown in figure below:

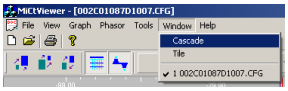


Figure 95: Cascade

On selection of cascade option, the window is set to cascade style.

On selection of tile option, the window is set to tile style.

8 MiCtViewer Data Display Screen

The data display screen has three sections, analog, digital and phasor as shown below:

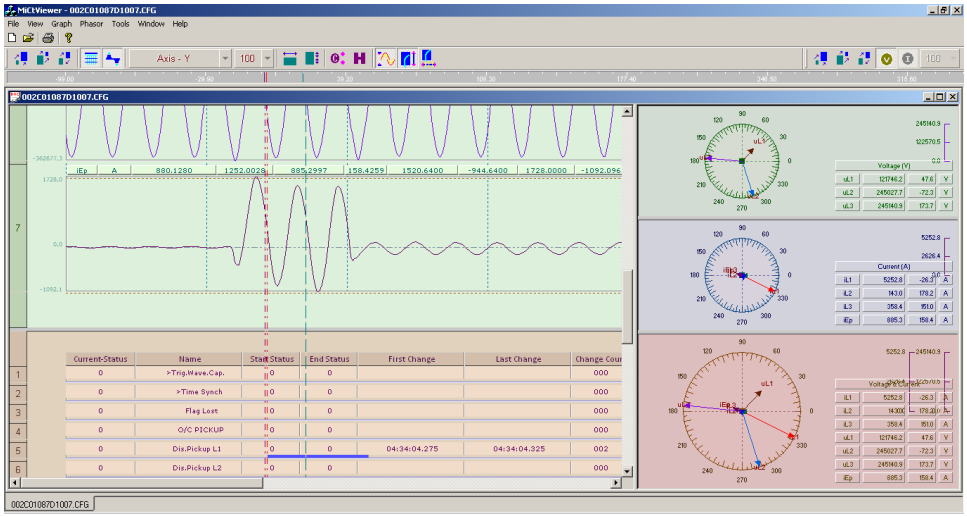


Figure 96: MiCtViewer Data Display Screen

8.1 Analog and Digital Viewer Options

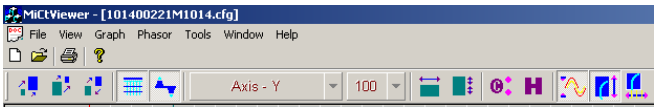


Figure 97: Analog View

Analog view section has fourteen buttons, these are:

- **Scale plus for X/Y axis:** On click of this button channel will get scale for a better view. Scale plus happens according to the scale types(X or Y-axis) selection.
- **Scale minus for X/Y axis:** On click of this button, channel will get rescale negative direction. Scale minus happens according to the scale type's X or Y-axis) selection.
- **Restore:** Click this button to restore the previous action.
- **Display Tabular Data:** Click this button to display tabular data.
- **Clip Boundary:** Clip boundary helps to control the overlapping of the channels.
- **Axis Selector:** This is the axis selector for the X and Y axis.
- **Zoom plot area in percentage:** This is the percentage area for zoom.
- **Fit to View Width:** Click this button to view the window in width direction.

- **Fit to Minimum Height:** Click this button to view the window in minimum height direction.
- **View Comparison:** Click this button to view the comparison of channels.
- **View Computational :** this button to view Computational of channels

  [Note: View comparison and View Computational buttons will get enable only if channels are selected on comtrade viewer screen]
- **View Harmonics:** Click this button to view the harmonics.
- **Show Label:** Click this button to view the label.
- **Mouse Action - Scroll View:** Clicking this button enables the screen to scroll view.
- **Mouse Action - Scroll Reference:** Clicking this button the reference axis is set to move.

Tabular Data: Tabular data shows the computed values of the channels. Tabular data is having ten columns and those are:

- **Title:** Title is the user defined naming convention for the channel as per the .cfg file.
- **Units:** Unit of the particular channel.
- **InstValue:** This is the instantaneous value of the waveform.
- **DFT Peak:** DFT Peak is the peak magnitude calculated for one cycle from the reference.
- **RMS:** This is the RMS value for fundamental.
- **Phase:** This is the vector phase angle.
- **InstMaxPeak:** The positive peak value in the selected cycle.
- **InstMinPeak:** The negative peak value in the selected cycle
- **InstValue:** Value of the sample where the reference is pointing to.
- **MAXPeak:** MaxPeak is the maximum positive Instantaneous value of the corresponding channel for the entire recorded period.
- **MINPeak:** MinPeak is the Minimum negative Instantaneous value of the corresponding channel for the entire recorded period.

8.2 Scale plus for X/Y Axis

Scale plus for X/Y Axis works according to the selected axis type. Select a channel and click the scale plus for X/Y axis button. This will zoom the channel as shown below:

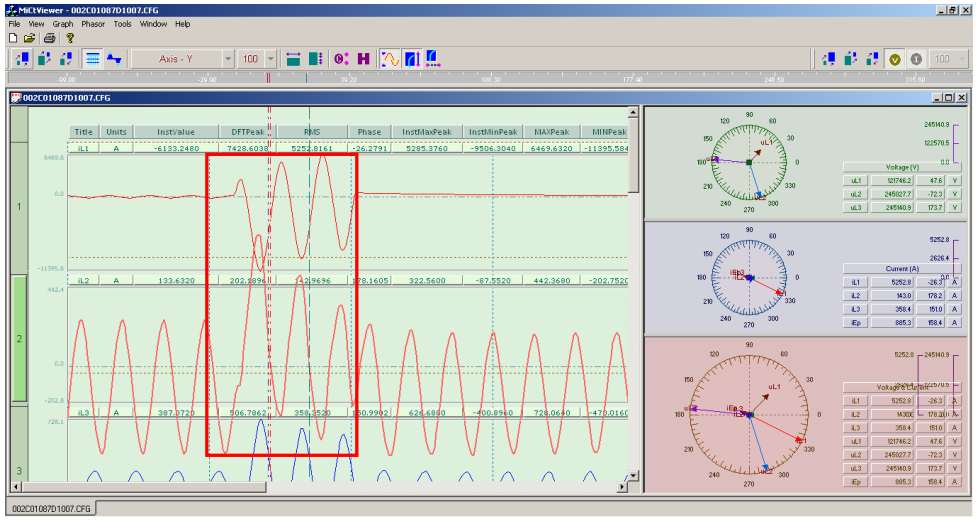


Figure 98: Channel Scale Plus

8.3 Scale minus for X/Y Axis

Scale minus for X/Y Axis works according to the selected axis type. Select a channel and click the scale minus for X/Y axis button. This will zoom out the channel as shown below:

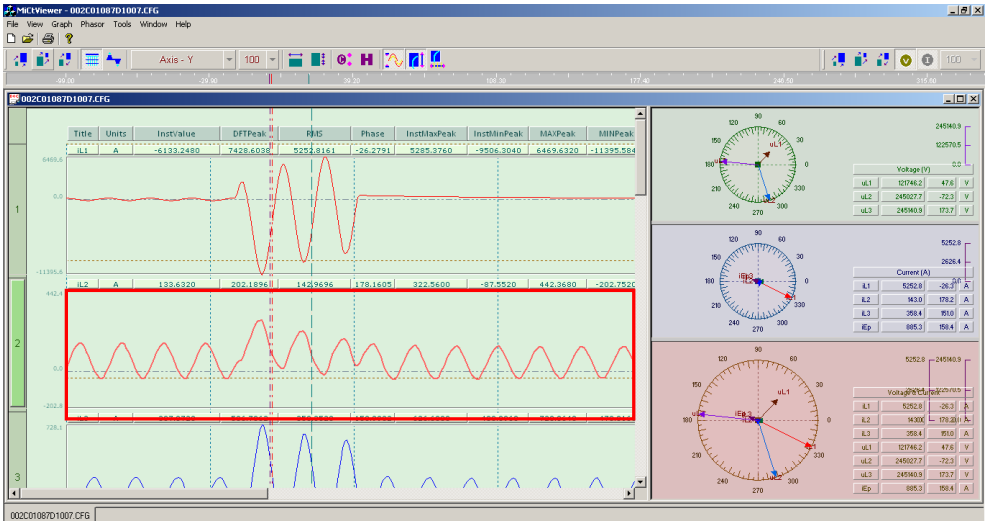


Figure 99: Channel Scale Minus

8.4 Restore Button

Click this button to go back to the earlier settings.

8.5 Tabular Data

You can select or deselect the tabular data. Click the tabular data tab which brings the following page as shown below:

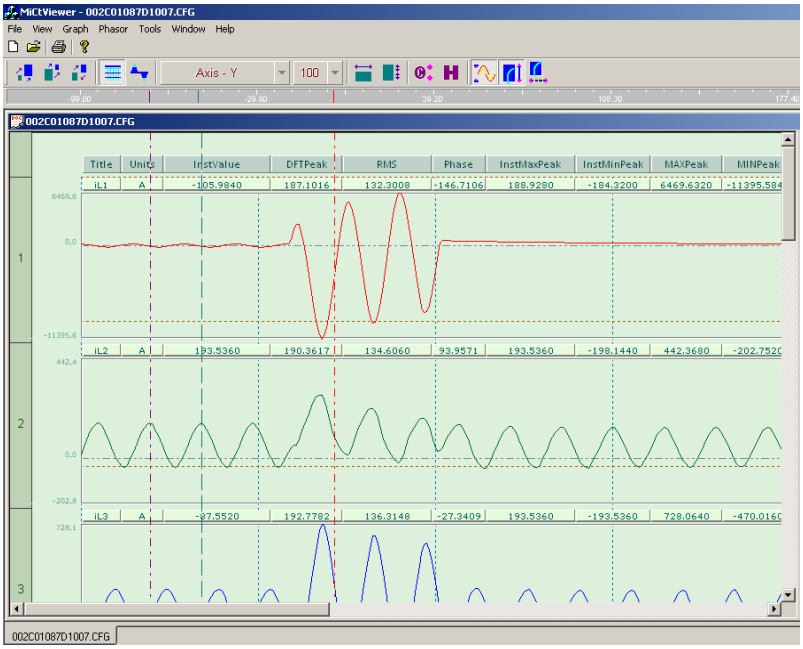


Figure 100: Tabular Data

This displays the column name and all the information related to the channels. Once the user deselects the tab, the detailed information goes off as shown below:

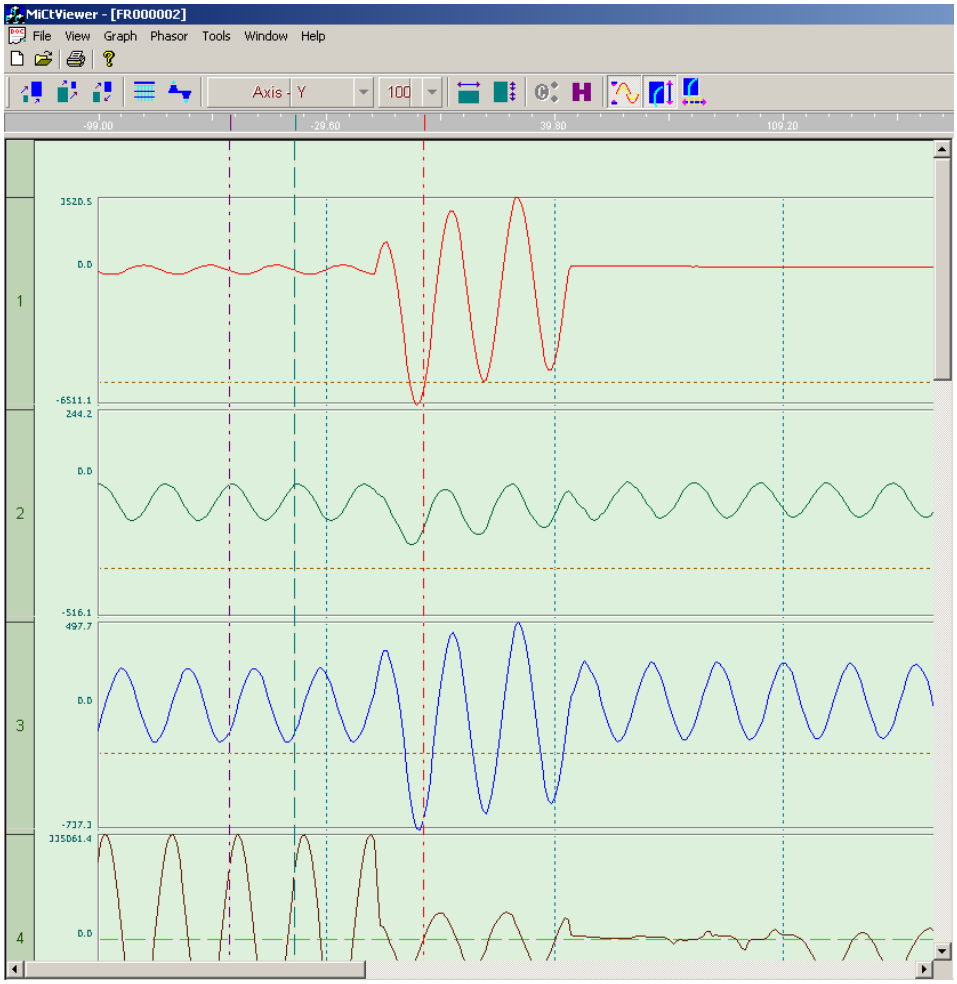


Figure 101: Tabular Data without any Information

8.6 Clip Boundary

Clip boundary tab helps to control the overlapping of channels. When user selects the clip option the overlapping portion of the channel will get clipped:

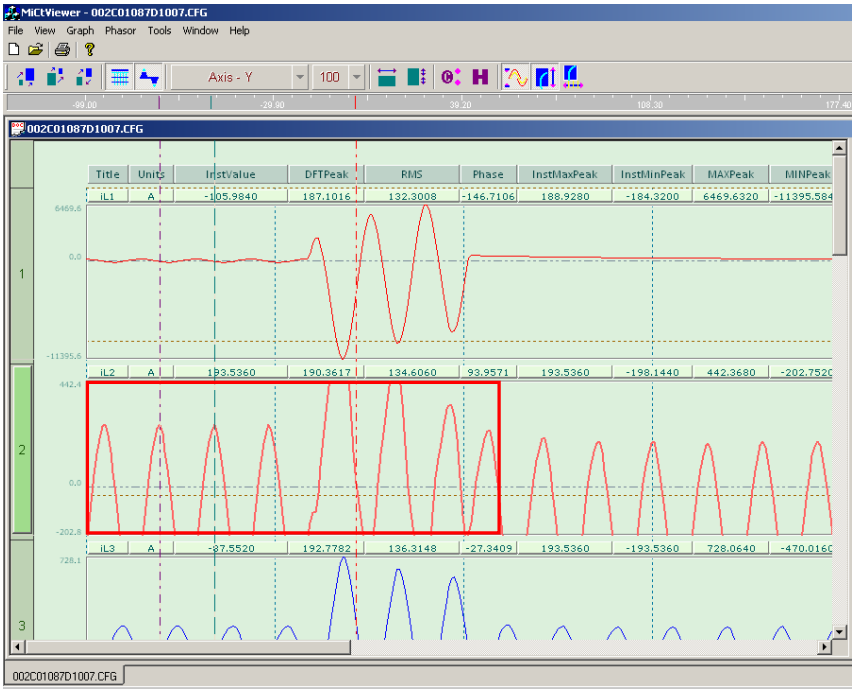


Figure 102: Clip Boundary on

When user de-selects the clip portion the clipped portion will get unclip as shown below

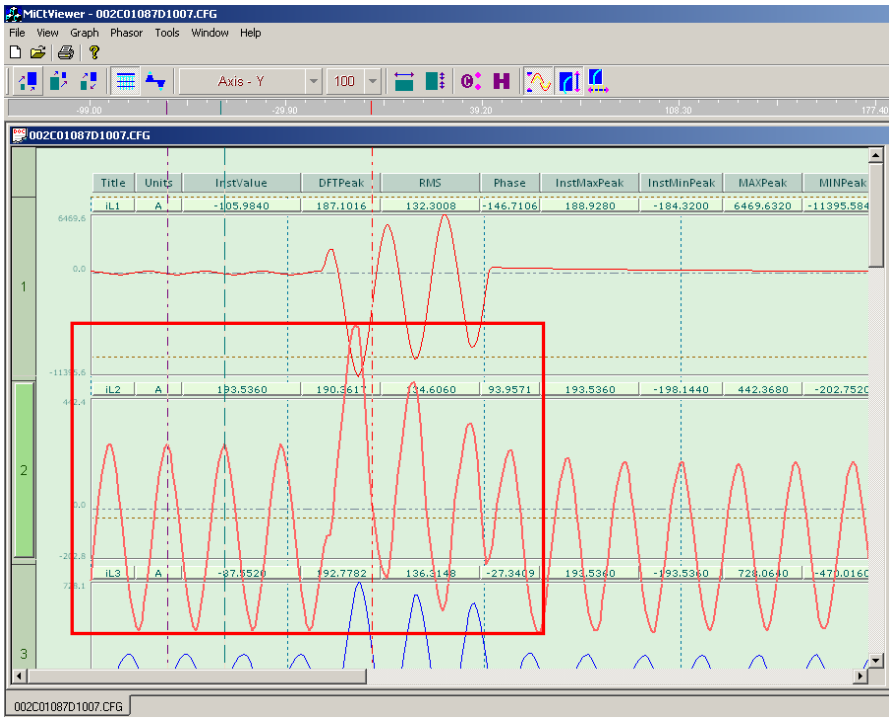


Figure 103: Clip Boundary off

8.7 Axis Selector

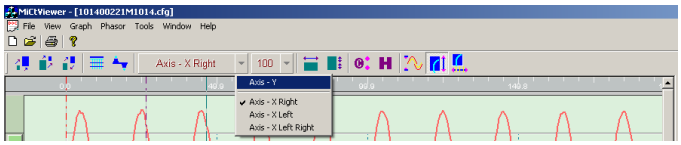


Figure 104: Axis Selector

Axis - Y: When you choose this option, then the selected channels are scaled in Y axis direction as shown below:

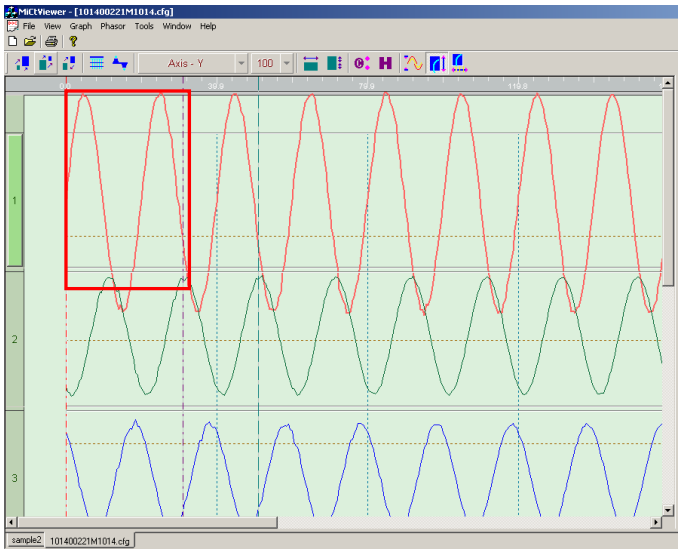


Figure 105: Y Axis Zoom

Axis - X right: When you choose this option, all the selected channels are scaled towards right side as shown below:

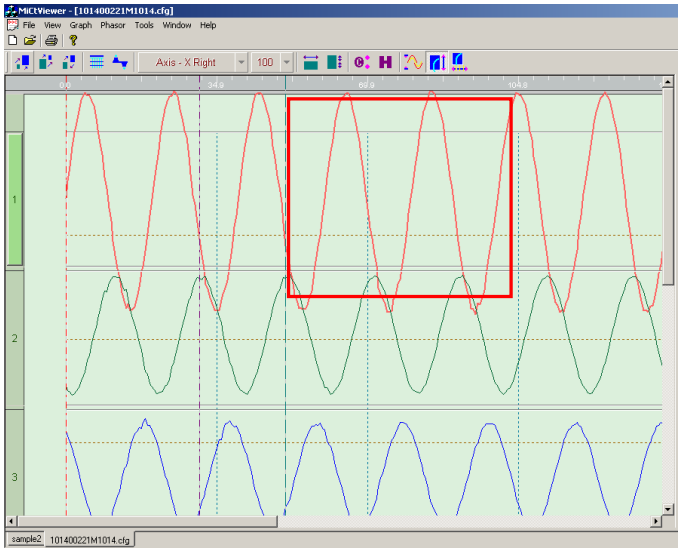


Figure 106: Zoomed in X Axis

Axis - X left: When you choose this option all the selected channels are scaled towards left direction as shown below:

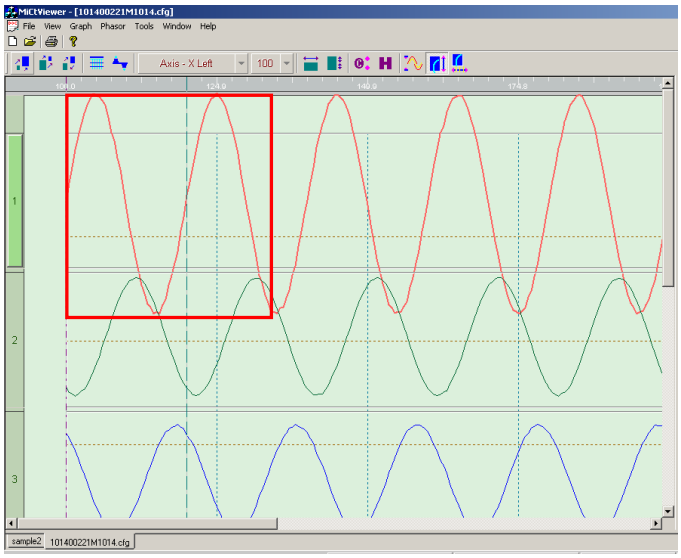


Figure 107: Zoomed in X Axis Left

Axis - X left and right: When you choose this option, all the selected channels are scaled towards both left and right as shown below:

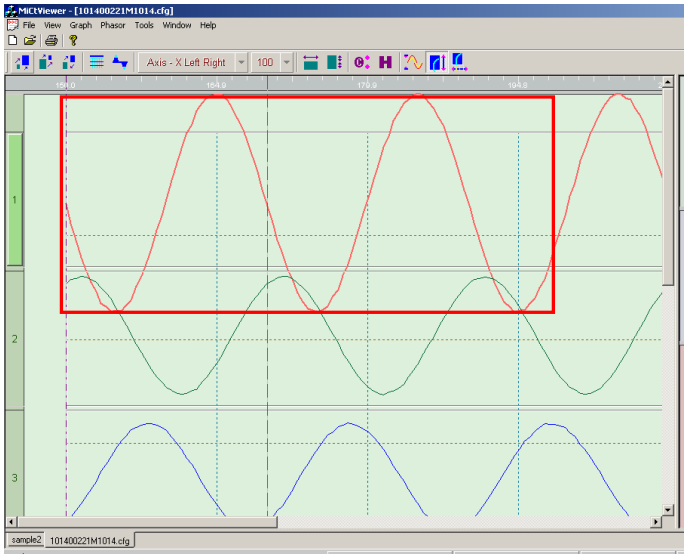


Figure 108: Zoomed in X and Y Axis Right

8.8 Plot Area Zoom

The plot area can be zoomed from 100 to 300 hundred percent as shown below:

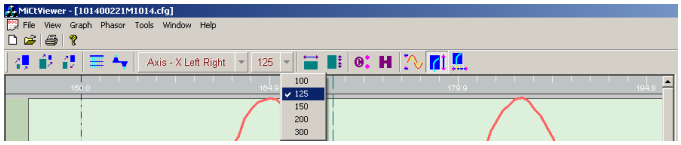


Figure 109: Plot Area Zoom

Once the percentage is selected, for the whole window the plotted area will be zoomed as shown below:

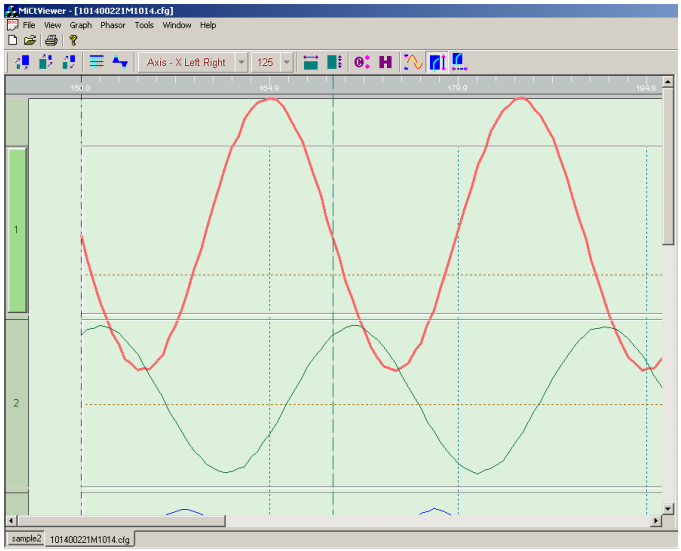


Figure 110: Plot Area Zoomed

8.9 Fit to View Width

When this button is clicked the plot area width will be fit to the view window width as shown below:

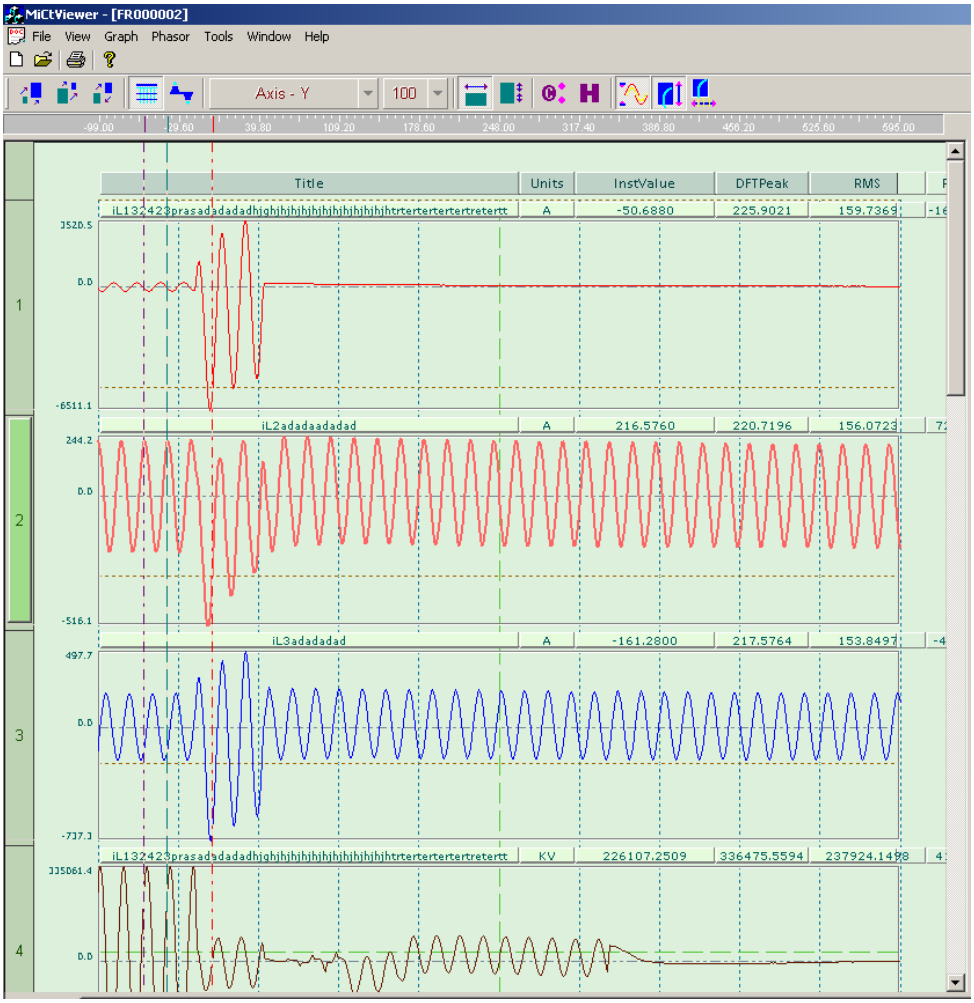


Figure 111: Fit to View Width

Once you deselect it comes back to its normal position.

8.10 Fit to Minimum Height

When this button is clicked the plot area height will be fit to minimum height of the window as shown below:

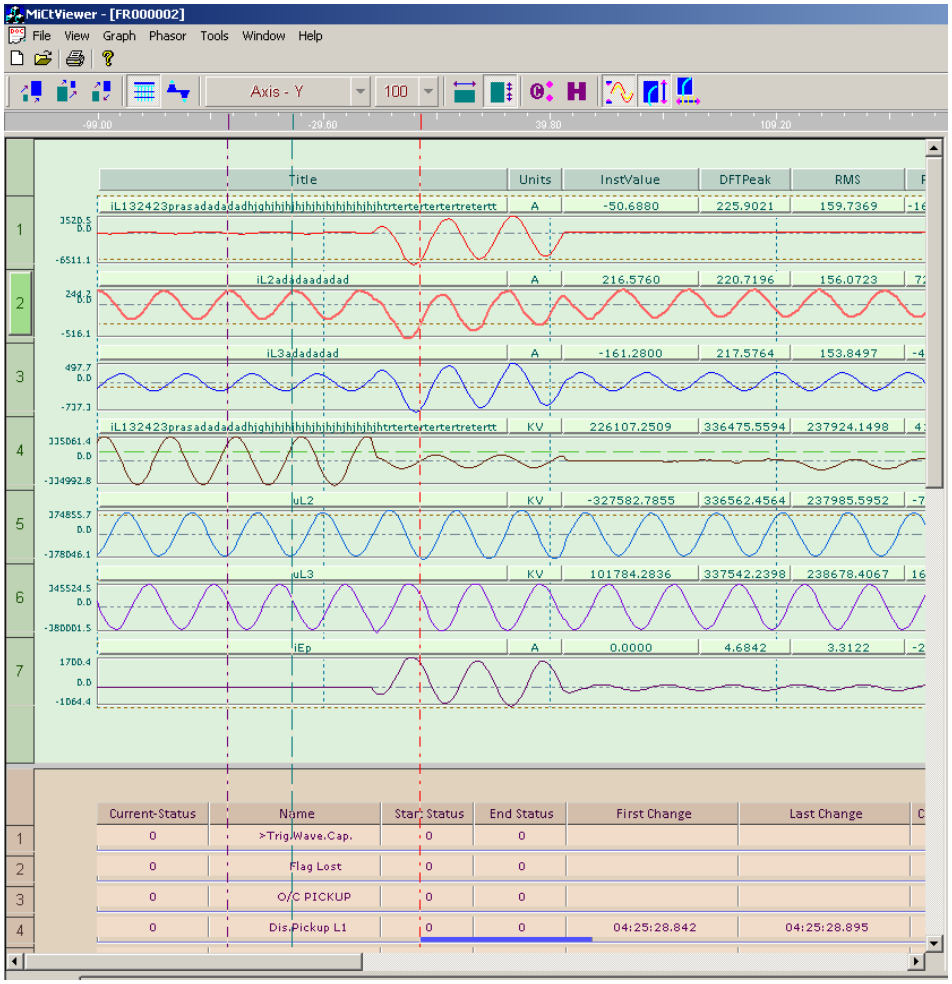


Figure 112: Fit to Minimum Height

Once you deselect, it comes back to its normal position.

8.11 View Comparison

View comparion button helps to do comparison between any number of channels. User can open and select the required number of channles on comtrade viewer and then clicking on the view comparison button comparison window will get display with selected channels as shown below:

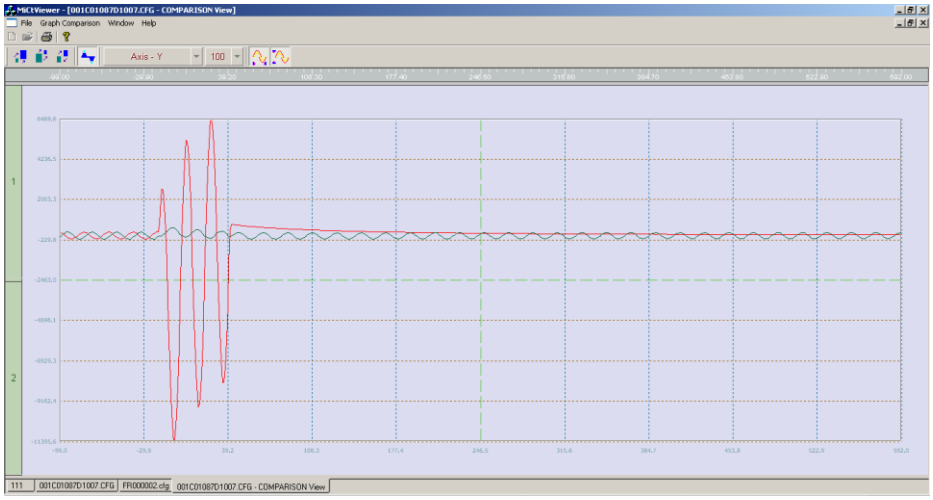
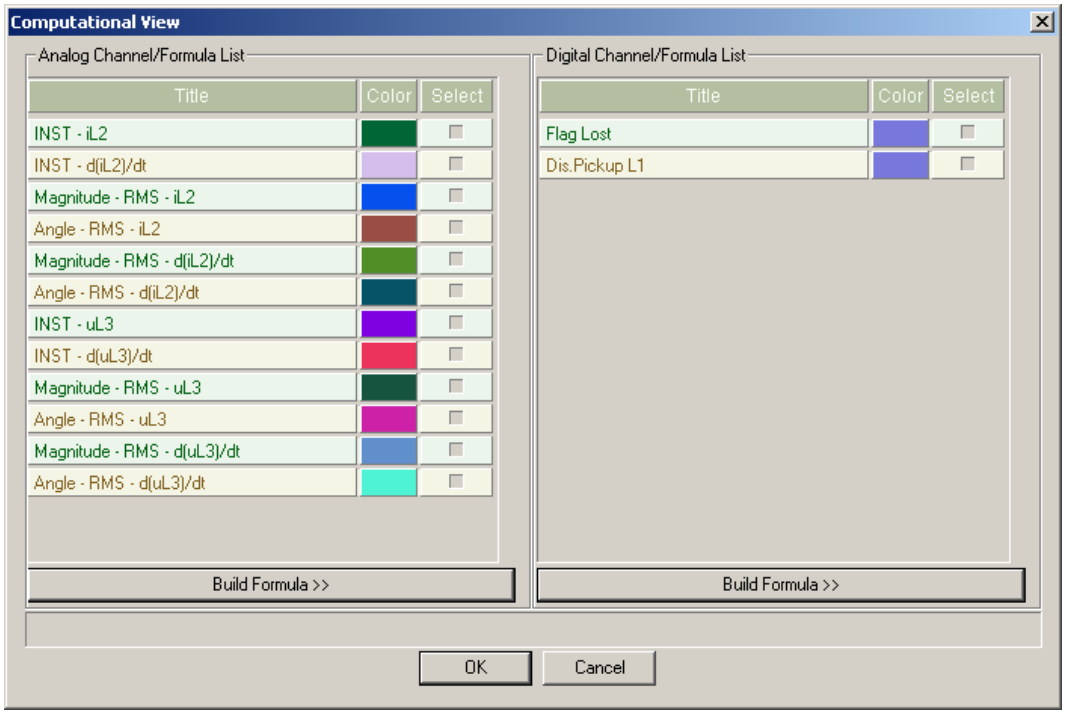


Figure 113: Comparison Screen

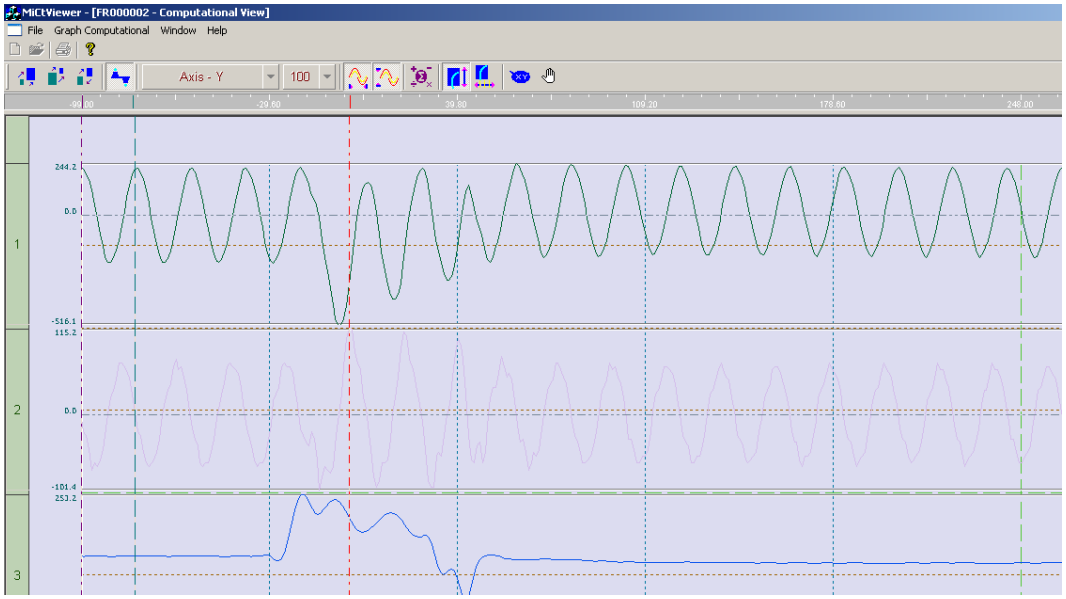
Click close to go back to the Comtrade viewer screen.

8.12 View Computaional

View Computaional button helps computaional view of channels. User can open and select the required number of channles on comtrade viewer and then clicking on the view Computaional button Computaional Viewe window will get display with selected channels as shown below:



Select one or more select check box's and click on Ok button which brings the following page :

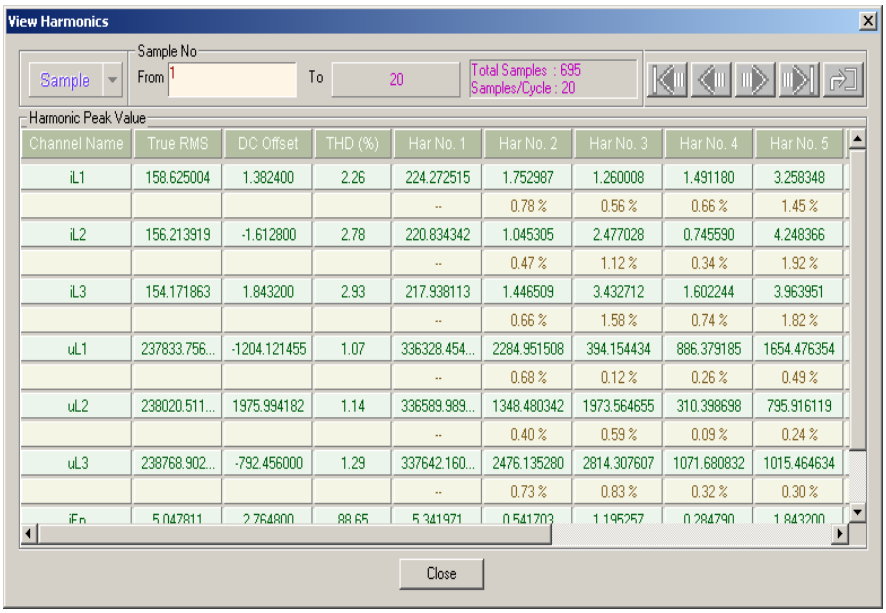


In this page the Compuataional view has been displayed.

8.13 View Harmonics

Comment [p3]: Need to update as per the new changes

Harmonic values are displaying according to the selected sample or cycle as shown below:



Channel Name	True RMS	DC Offset	THD (%)	Har No. 1	Har No. 2	Har No. 3	Har No. 4	Har No. 5
iL1	158.625004	1.382400	2.26	224.272515	1.752987	1.260008	1.491180	3.258348
				--	0.78 %	0.56 %	0.66 %	1.45 %
iL2	156.213919	-1.612800	2.78	220.834342	1.045305	2.477028	0.745590	4.248366
				--	0.47 %	1.12 %	0.34 %	1.92 %
iL3	154.171863	1.843200	2.93	217.938113	1.446509	3.432712	1.602244	3.963951
				--	0.66 %	1.58 %	0.74 %	1.82 %
uL1	237833.756...	-1204.121455	1.07	336328.454...	2284.951508	394.154434	886.379185	1654.476354
				--	0.68 %	0.12 %	0.26 %	0.49 %
uL2	238020.511...	1975.994182	1.14	336589.989...	1348.480342	1973.564655	310.398698	795.916119
				--	0.40 %	0.59 %	0.09 %	0.24 %
uL3	238768.902...	-792.456000	1.29	337642.160...	2476.135280	2814.307607	1071.680832	1015.464634
				--	0.73 %	0.83 %	0.32 %	0.30 %
iEn	5.047811	2.764800	88.65	5.341971	0.541703	1.195257	0.284790	1.843200

Figure 114: View Harmonics

Sample: When sample is seleccted then harmonics values in the table are displayed according to sample. Sample moves by one number at a time. For example if the sample is at 1 and you click move next it will go to 2.

Cycle: When cycle is seleccted then harmonics values in the table are displayed according to cycle. When the user selects cycle, one cycle moves at a time. For example if the cycle number is 1 and you click move next the next cycle will jump to 21 if number of samples per cycle is 20.

From Sample to To Sample: From sample and to sample

reflects the sample number/cycle number in the field. Enter specific sample number or cycle number and click on tab it will go to particular sample/cycle.

Total Samples: should display as per the opened .cfg file.

Samples/cycale: should display as per the opened .cfg file.

Move First: Clicking this button takes you to the first sample/cycle.

Move Previous: Clicking on this button takes you to the previous sample/cycle.

Move Next: Clicking on this button takes you to the next sample/cycle.

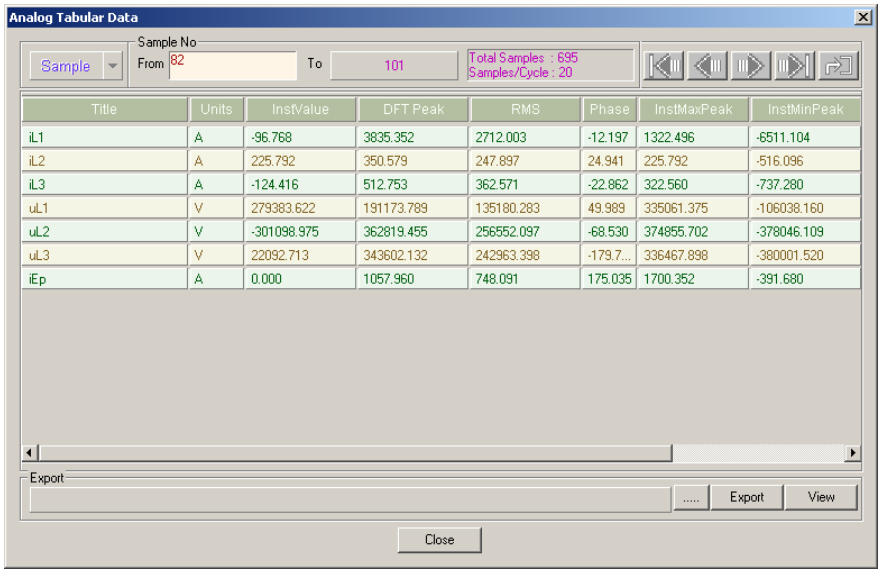
Move Last: Clicking on this button takes you to the last sample/cycle.

Trigger Point: Clicking this button will trigger point.

Close: clicking on close button window should get close.

8.14 View Analog tabular Data:

Tabular Data values are displaying according to the selected sample or cycle as shown below:



8.15 Labels

This is a toggle button. Clicking this button will display the maximum and minimum value for all the channels as shown below:

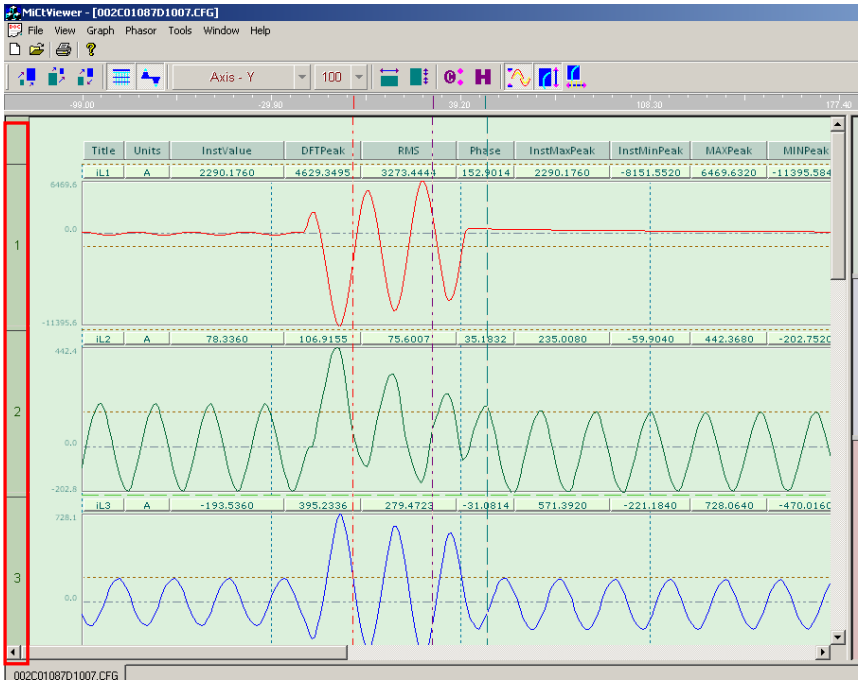


Figure 115: Labels - Selected

Once you deselect label data should not display as show below:

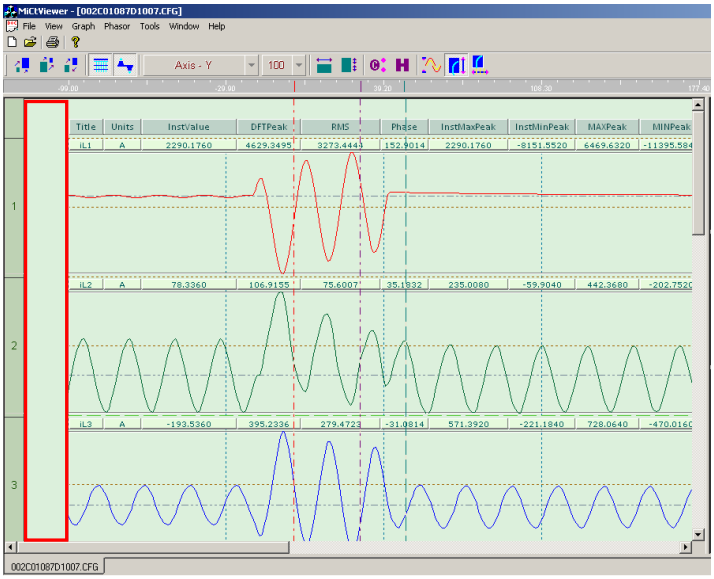


Figure 116: Labels – De-selected

8.16 Mouse Action - Scroll view

Clicking on this button scrolls the window vertically.

8.17 Mouse Action - Scroll reference

Clicking on this button moves the Y axis.

Note: Both the buttons cannot work simultaneously.

8.18 Mose Action –Tool tip X-Y Values

Clicking on this button displayes the tool tip edit box on comtrade viewer accoring to the selected sample .

8.19 Pan Graph

Clicking on this button enables the paning option for the comtrade viewer graphs section

8.20 Analog Plot – Right-click Options

Comment [p4]: Need to mention set as reference Axis option

In the analog plot there are several right-click options available for the user. Those are:

- Channel Color
- Show all
- Show Voltage Channels
- Show Current Channels
- Show Other Channels

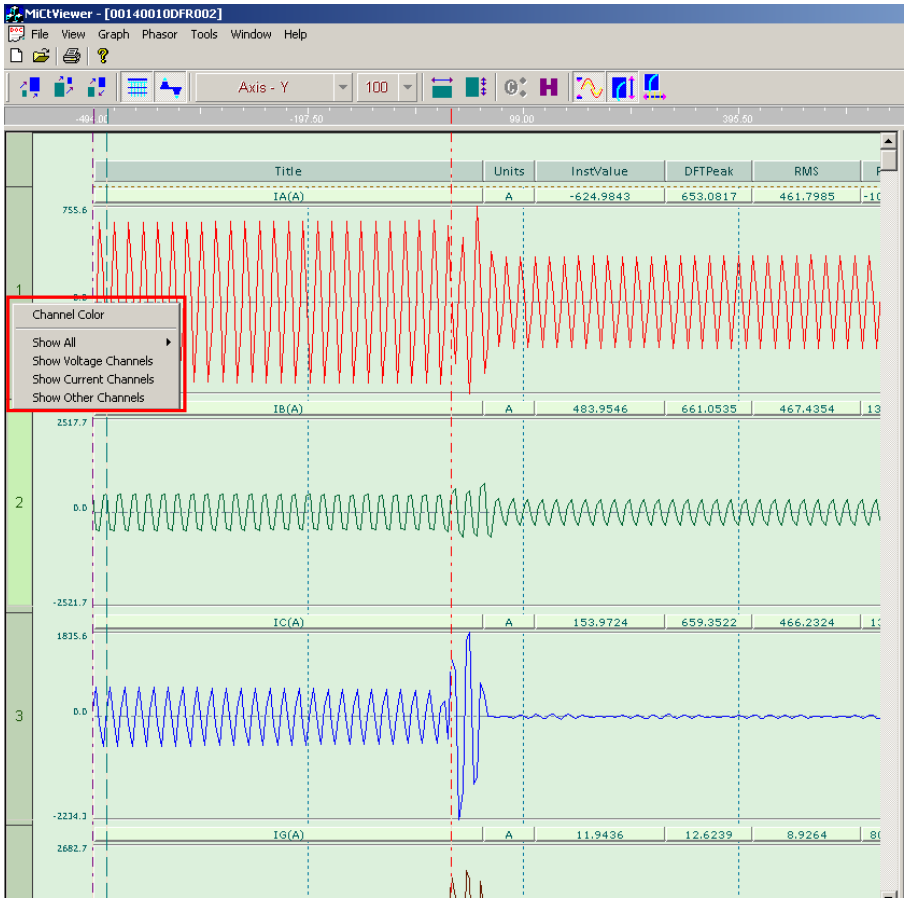


Figure 117: Analog Plot – Right-click Options

Channel Colour: This option will be enabled when you right-click on analog channel number. Now right-click and select Channel colour. The color palette will be available as shown below:

Figure 118: Colour Palette

Now select the particular color and click Ok. The color for that number will be changed as shown below:

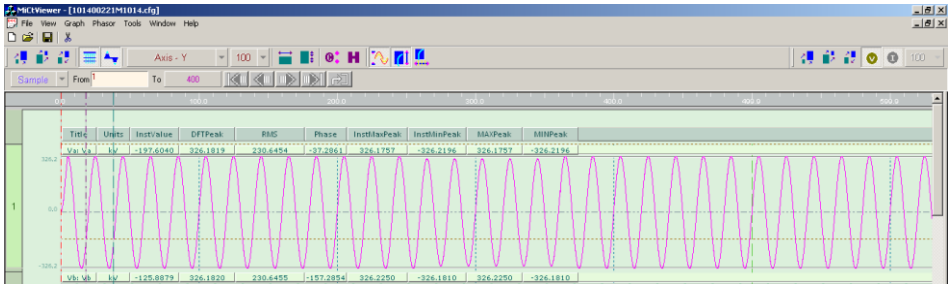


Figure 119: Changed Channel Colour

Show all: Upon right-click on the channel number, you get the option show all. Under show all there are three sub-menus as shown below:

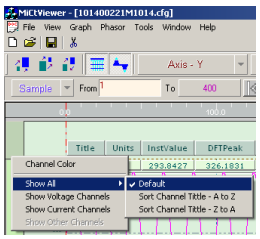


Figure 120: Show All

Default: Select **Show All > Default**. All the analog channels will be displayed with default options.

Sort Channel Title A to Z: Select **Show All > Sort Channel Title A to Z**. All the analog channels will be sorted according to title ascending order.

Sort Channel Title Z to A: Select **Show All > Sort Channel Title Z to A**. All the channels will be sorted according to title descending order.

Show Voltage Channel: On selection of this option, only voltage channels will be displayed.

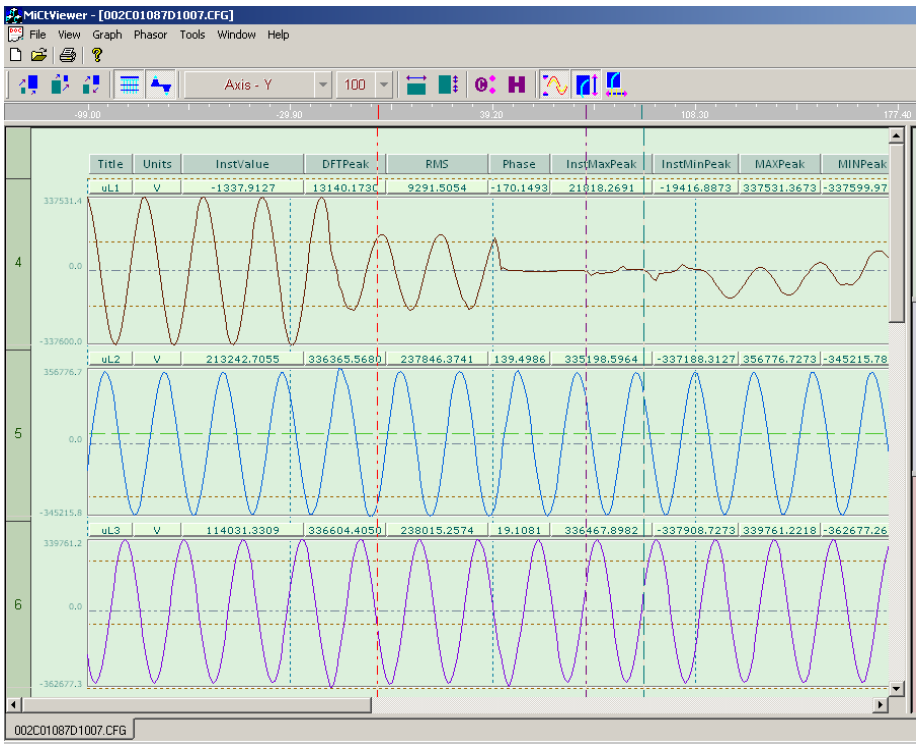


Figure 121: Show Voltage Channel

Show Current Channel: On selection of this option, only current channels will be displayed.

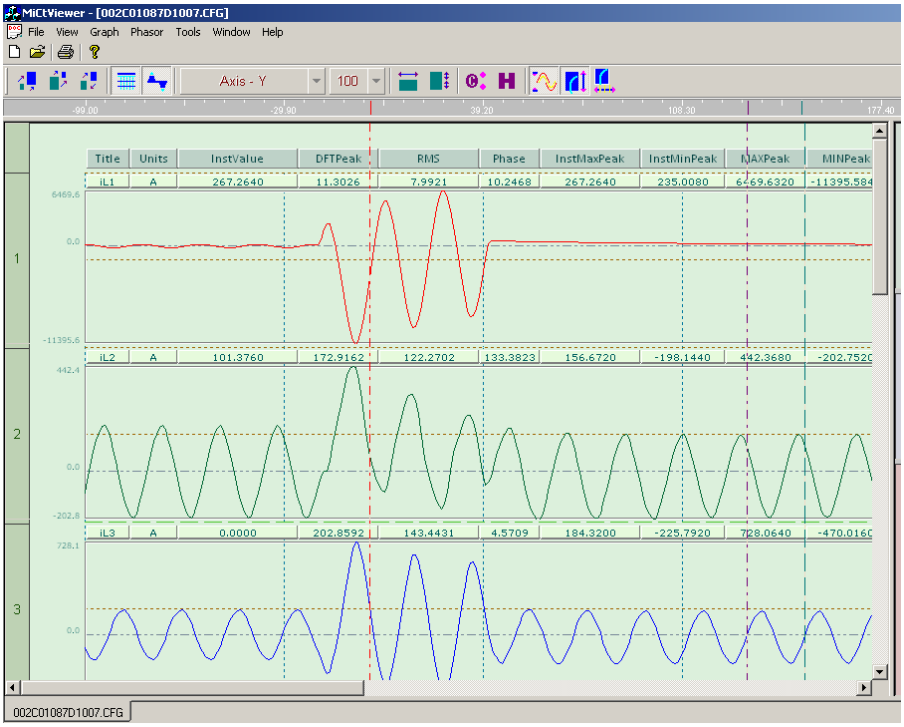


Figure 122: Show Current Channels

Show Other Channels: This option will be enabled if the .cfg file contains other than voltage and current channels like frequency, neutral etc.

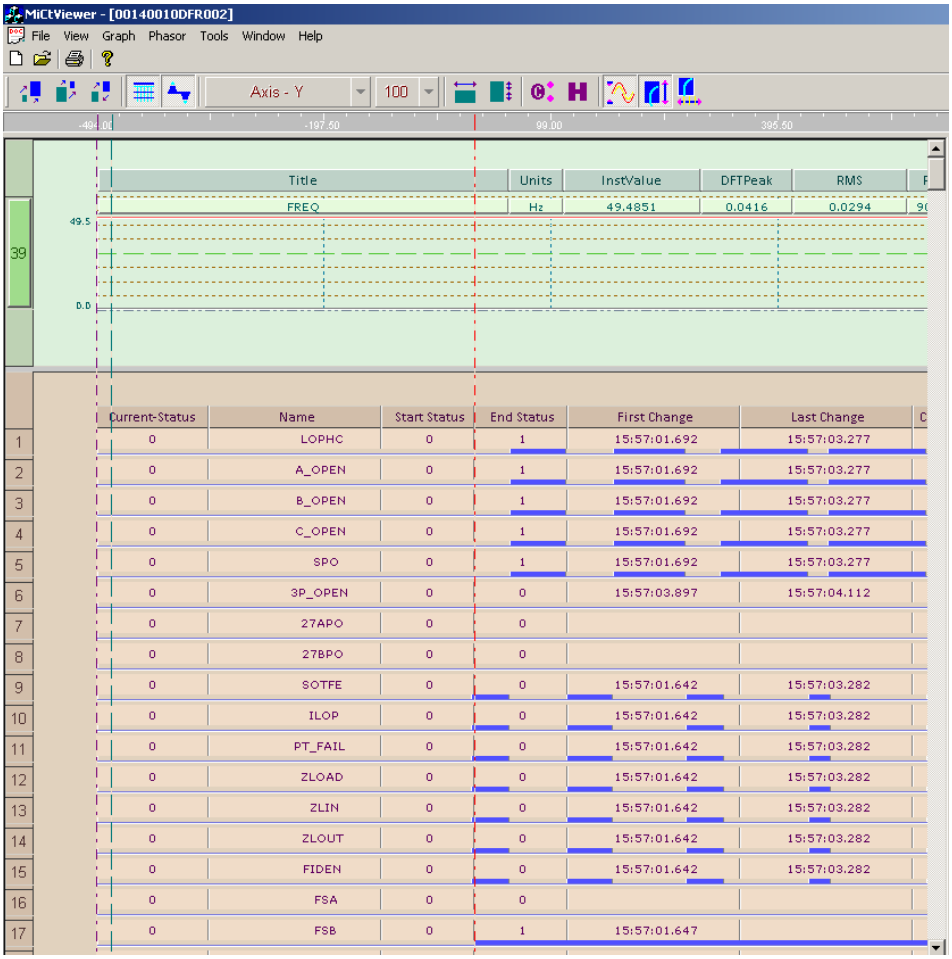


Figure 123: Show Other Channels

Note: If there is no analog channel in the .cfg file then analog and phasor option in the view menu will be in disabled state.

8.21 Phasor View Options

The phasor window displays the voltage, current and both voltage and current diagram. The phasor diagram shows the vector for each voltage and current channel. When the user navigates through the samples its corresponding values reflect in phasor diagram. User can increase or decrease the size of the phasor window. The length of a channel's vector mark can be scaled or rescaled. User can change the display of the voltage and current diagram by checking/unchecking the voltage and current tabs available in the window.

8.21.1 Voltage

This shows the vector for all voltage channels.

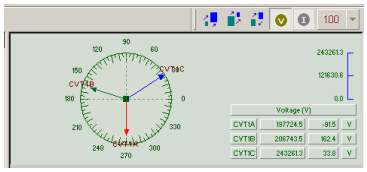


Figure 124: Voltage Channel

8.21.2 Current

This shows the vector for all current channels.

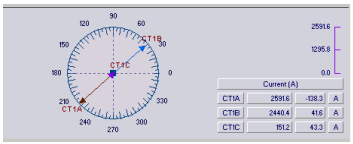


Figure 125: Current Channel

8.21.3 Voltage and Current

This shows the vector for both volate and currnet channels.

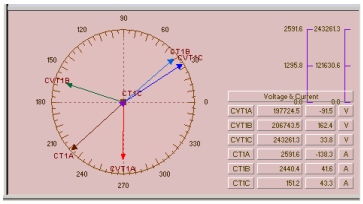


Figure 126: Voltage and Current Channel

8.22 Digital View

The digital display shows all the digital channels along with the status at each sample. The present status values of the channels is updated as the user navigates through the samples. A user can mark /unmark, hide/show the channels. The digital view screen is as shown below:

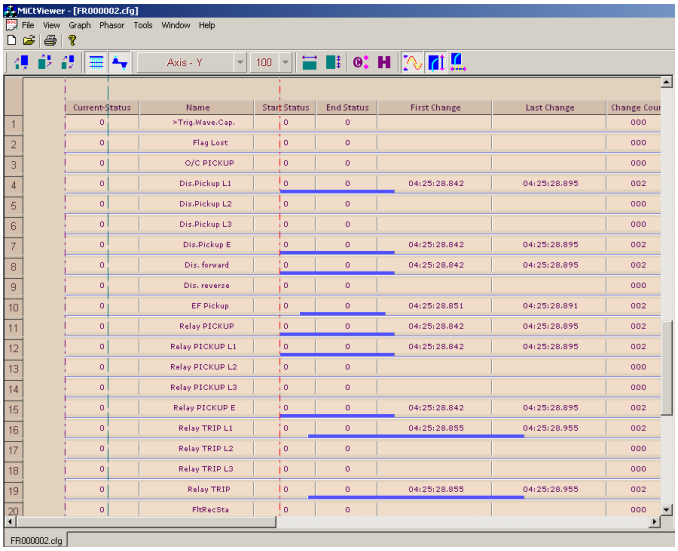


Figure 127: Digital View

The digital view is consists of seven columns. Those are:

- **Current-Status:** User can see the current status as 1/0. If the status is 1 means The current status is on. If the status is 0 means the current status is off.
- **Name:** The name is read from the .cfg file.
- **Start Status:** Start status reflects the current status of that channel at the beginning.
- **End Status:** End status means the current status of that channel at end. If the channel is ended with current status is on will reflect 1, if it is not then it will show as 0.
- **First Change:** The time when the first change happened in the channel.
- **Last Change:** The time the Last change happened in the channel.
- **Change Count:** It is number of variations in channel.

Note: If there is no digital channel in the .cfg file then the digital channel option in the view menu will be in disabled state.

8.23 Digital Plot – Right-click Options

In the digital plot there are several right-click options available for the user. Those are:

- Channel Colour

- Show all
- Show Operated
- Show not Operated

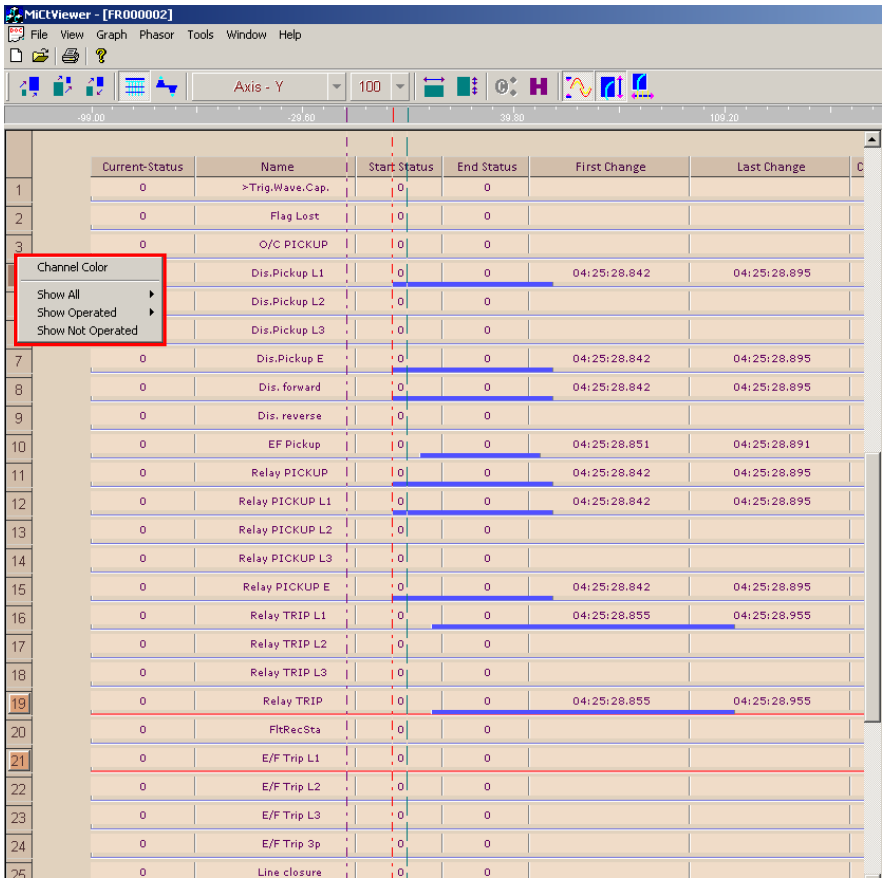


Figure 128: Digital Plot – Right-click Options

Channel Colour: This option will be enabled when you right-click on digital channel number. Now right-click and select Channel Colour. The colour palette will be displayed as shown below:

Figure 129: Colour Palette

Now select the particular colour and click Ok. The colour for that number will be changed as shown below:

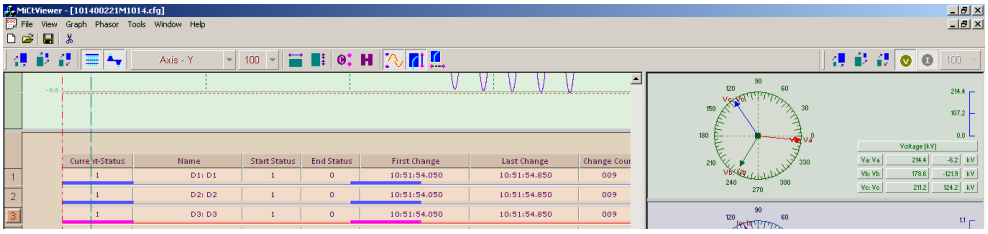


Figure 130: Changed Channel Colour

Show All: Upon right-click on the channel number, you get the option show all. Under show all there are five sub-menus as shown below:

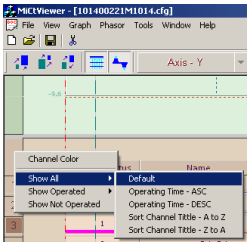


Figure 131: Show All

Default: Select **Show All > Default**. All the digital channels will be displayed with default options.

Operating Time ASC: Select **Show All > Operating Time ASC**. All the channels will be sorted according to operating time in ascending order.

Operating time DSC: Select **Show All > Sort Channel Title Z to A**. All the channels will be sorted according to operating time in descending order.

Sort Channel Title A to Z: Select **Show All > Sort Channel Title A to Z**. All the channels will be sorted according to title in ascending order.

Sort Channel Title Z to A: Select **Show All > Sort Channel Title Z to A**. All the channels will be sorted according to title in descending order.

Show Operated: Upon right-click on the channel number, you get the option Show Operated. Under Show Operated there are three sub-menus as shown below:

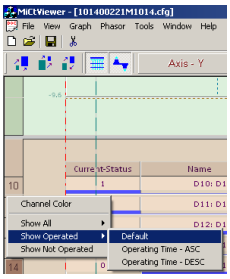


Figure 132: Show Operated

Default: Select **Show Operated > Default**. All the operated channels will be displayed with default options.

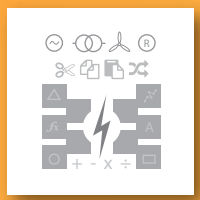
Operating Time - ASC: Select **Show Operated > Operating Time ASC**. All the operated channels will be sorted according to the time in ascending order.

Operating Time - DSC: Select **Show Operated > Sort Channel Title Z to A**. All the channels will be sorted according to the time in descending order.

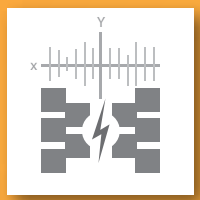
Show Not Operated: Select Show Not Operated. It will show the non-operated channels.

Protection Suite

PSCT | *Protection Analytic tool*



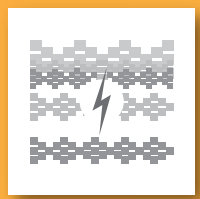
Power System Network Editor



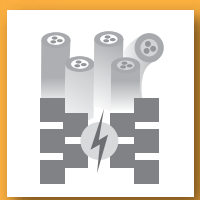
Graph Utility

Free Programmable Block

Database Manager



COMTRADE Viewer



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