

/ Ansys DDR Eye Analyzer

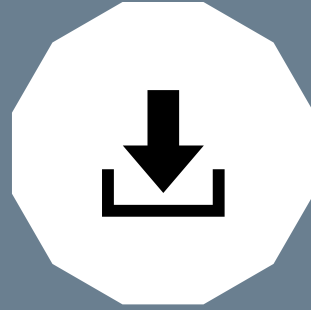


About ADEA

New DDR Solution for
Easy! Simple! and Customizable!

[See more details about ADEA!](#)

01

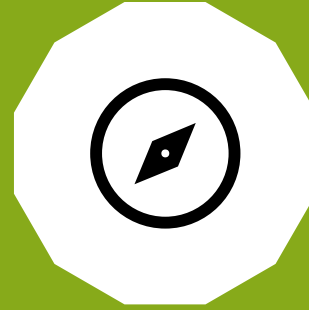


GitHub

All ADEA source codes are
published on the GitHub.

[Download and Enjoy ADEA!](#)

02



How to Use

User guide is included in ADEA .

Go to `./Resources/help`
[Check the guide video!](#)

03



Questions

Any questions & problems,
Send an e-mail to developer

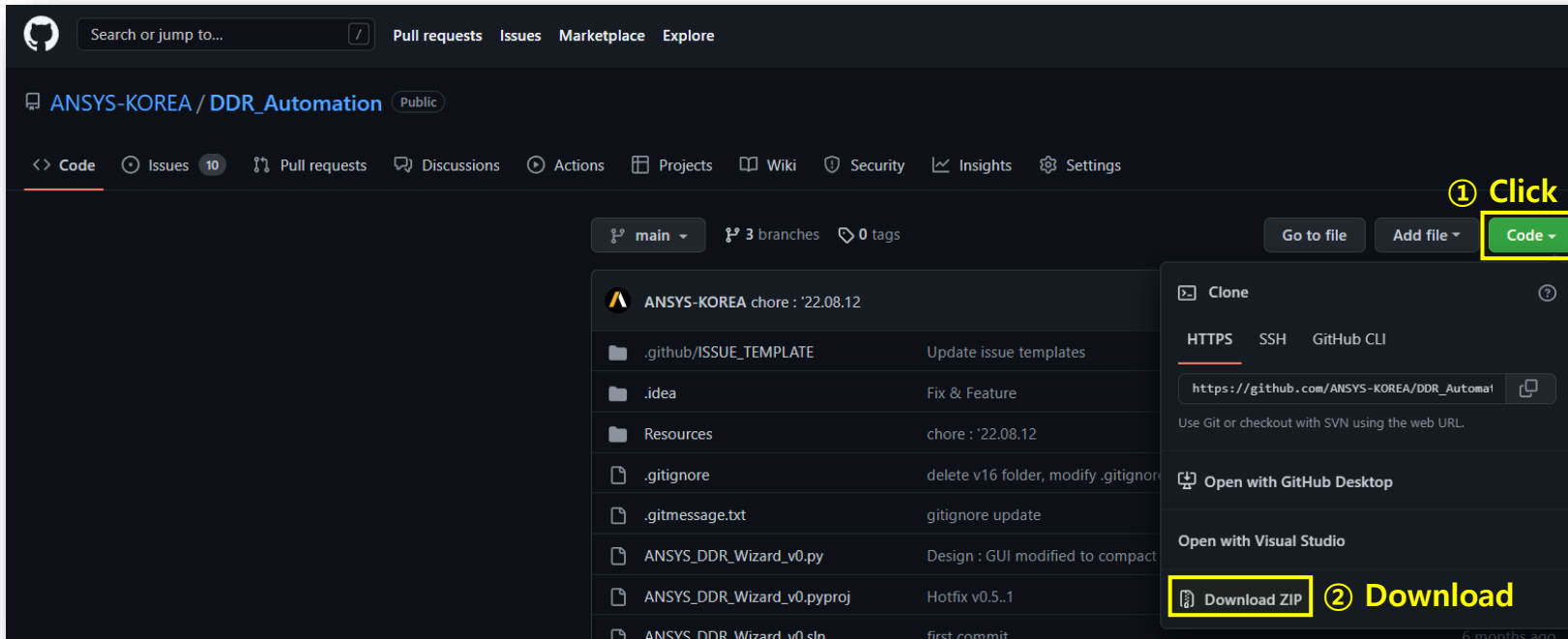
04

/ Getting Start with ADEA

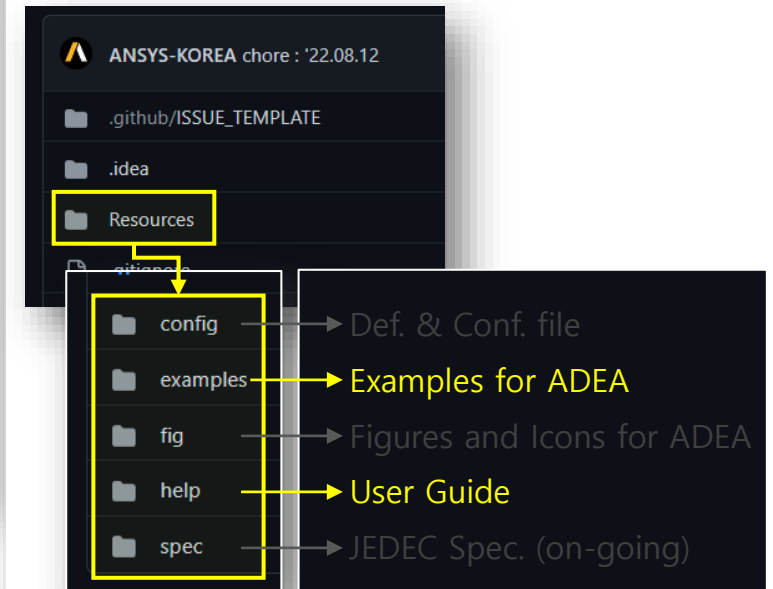


❏ Source code, example, and user guides of ADEA are available for download from GitHub.

- Download ADEA from the [Ansys-Korea GitHub Homepage](https://github.com/ANSYS-KOREA/DDR_Automation).



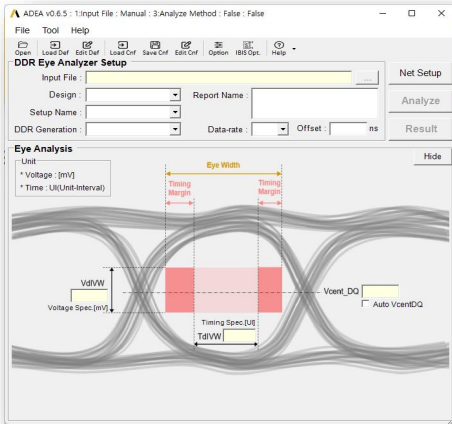
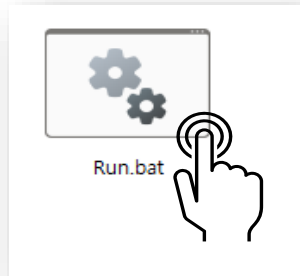
Check the **Examples** and **User Guide**
in the **Resources** folder 😊



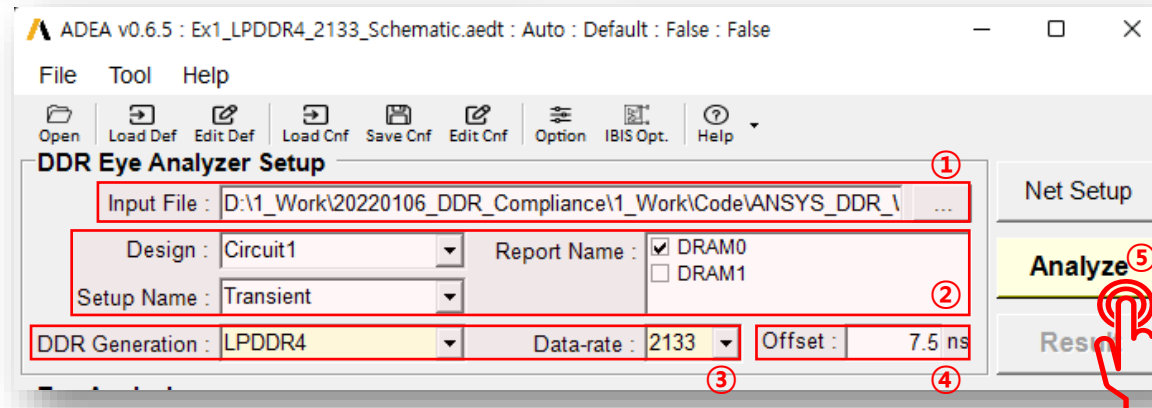
User Guide – Ansys DDR Eye Analyzer : Eye Analyze



1. Launch ADEA



2. ADEA Setup

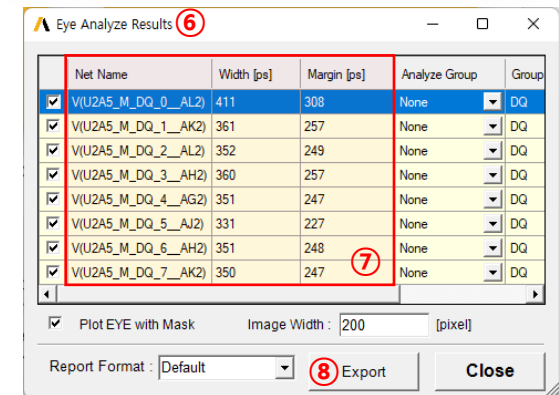


- ① Load **Input File** (*.aedt).
- ② Select **Design**, **Setup**, and **Report**.
- ③ Select **DDR Type** and **Data-rate**.
- ④ Enter **Offset** for eye analyze.

3. Analyze

- ⑤ Click '**Analyze**'

4. Result



- ⑥ Result Window Pops up.
- ⑦ Check Analysis Results
- ⑧ Export Report (Optional)

User Guide – Ansys DDR Eye Analyzer : IBIS Opt.

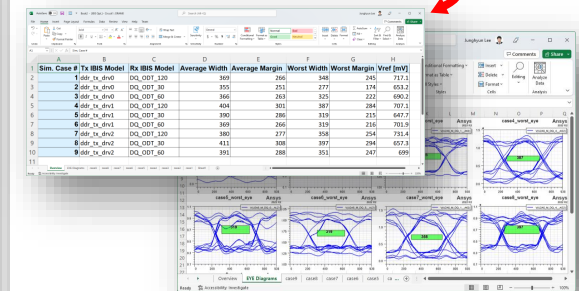
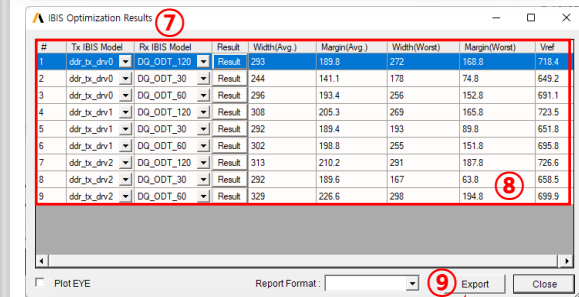
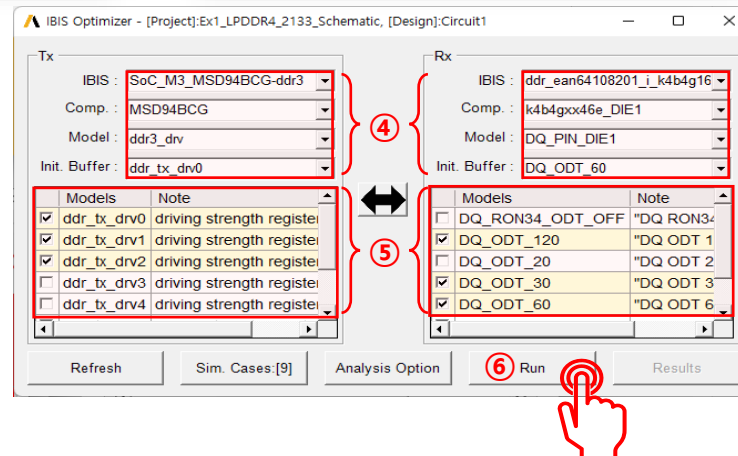
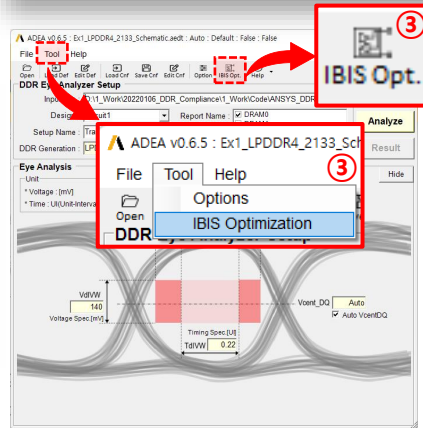
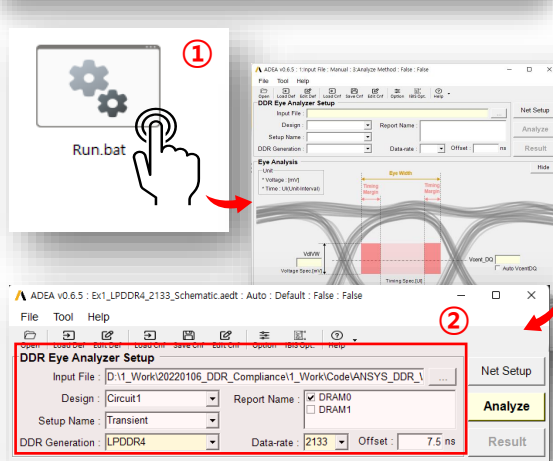


1. IBIS Opt. Setup

2. Sim. Case Setup

3. Analyze

4. Result



Same way as Eye Analyze

① Launch AEDA

② ADEA Setup

③ Click 'IBIS Opt.' Icon

or Tool → IBIS Opt.

④ Check Tx & Rx IBIS Info.

✓ IBIS file, Comp., Model, Initial Buffer

⑤ Select IBIS Models for Tx/Rx.

⑥ Click 'Run'

⑦ Result Window Pops Up.

⑧ Check Analysis Results.

⑨ Export Report

Eye Analyze

1. Launch ADEA

2. ADEA Setup

3. Analyze

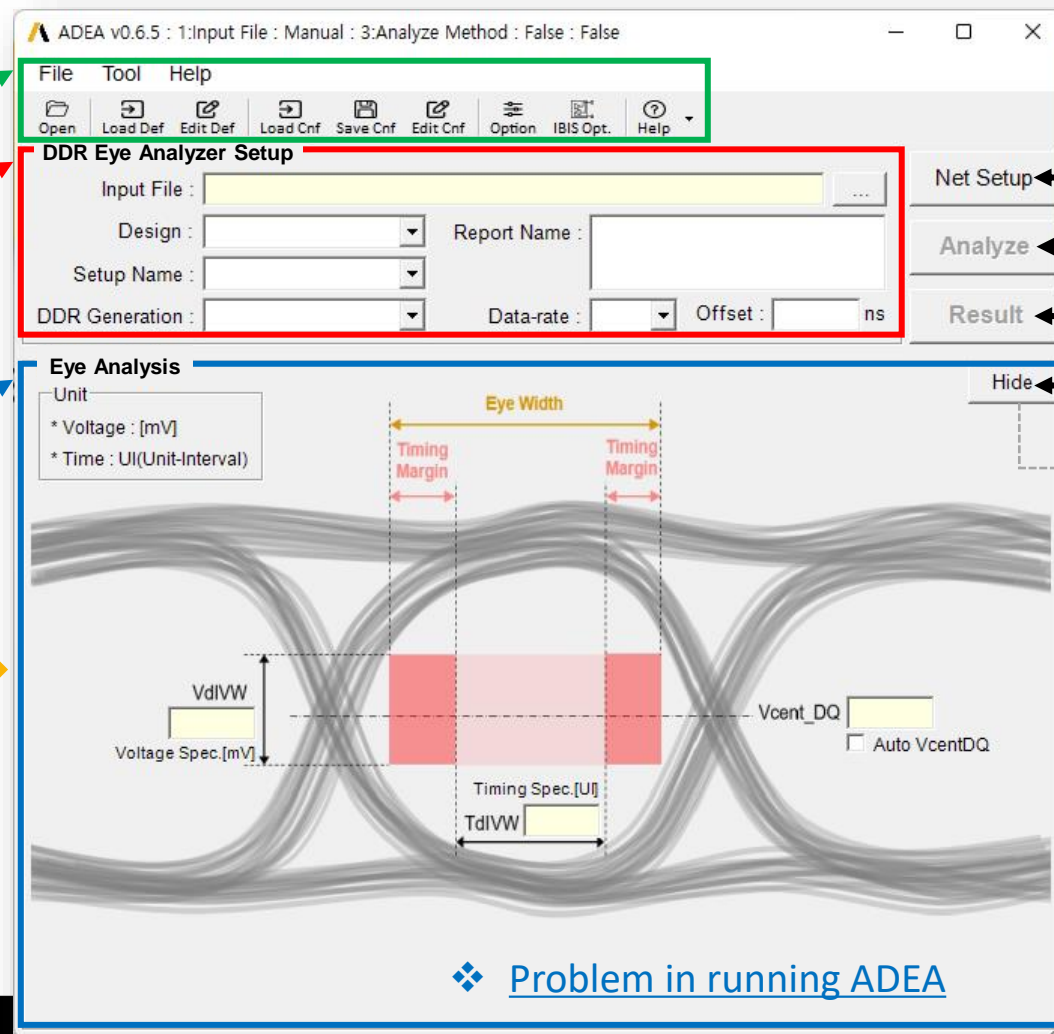
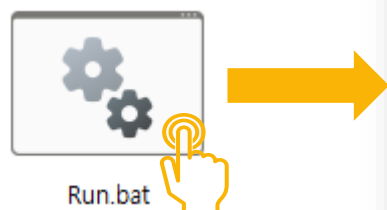
4. Result

- Launch ADEA using Run.bat file among the files provided.

Tool Strip Menu & Icons

Analyzer Setup

Specifications by DDR Type & Speed

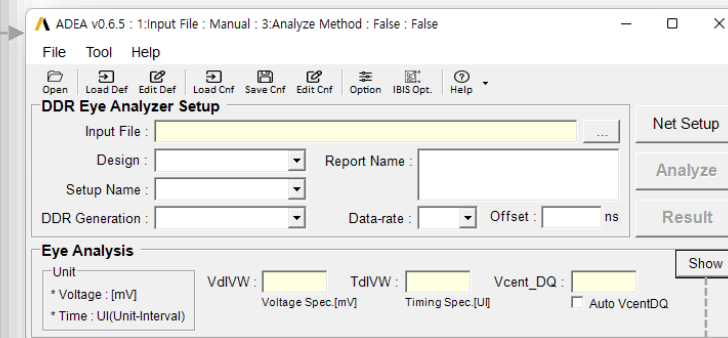


Target Net Setup

Analyze

View Analyze Result

GUI Size Control Button





Eye Analyze

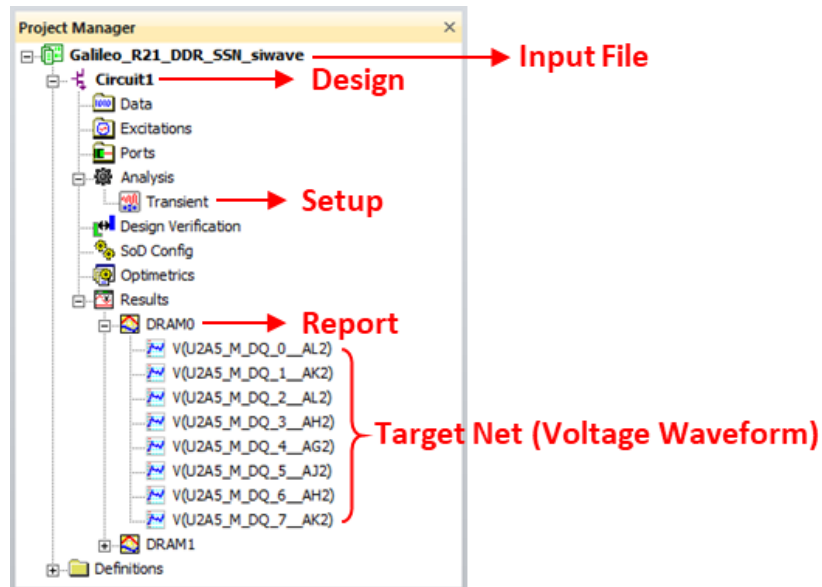
1. Launch ADEA

2. ADEA Setup

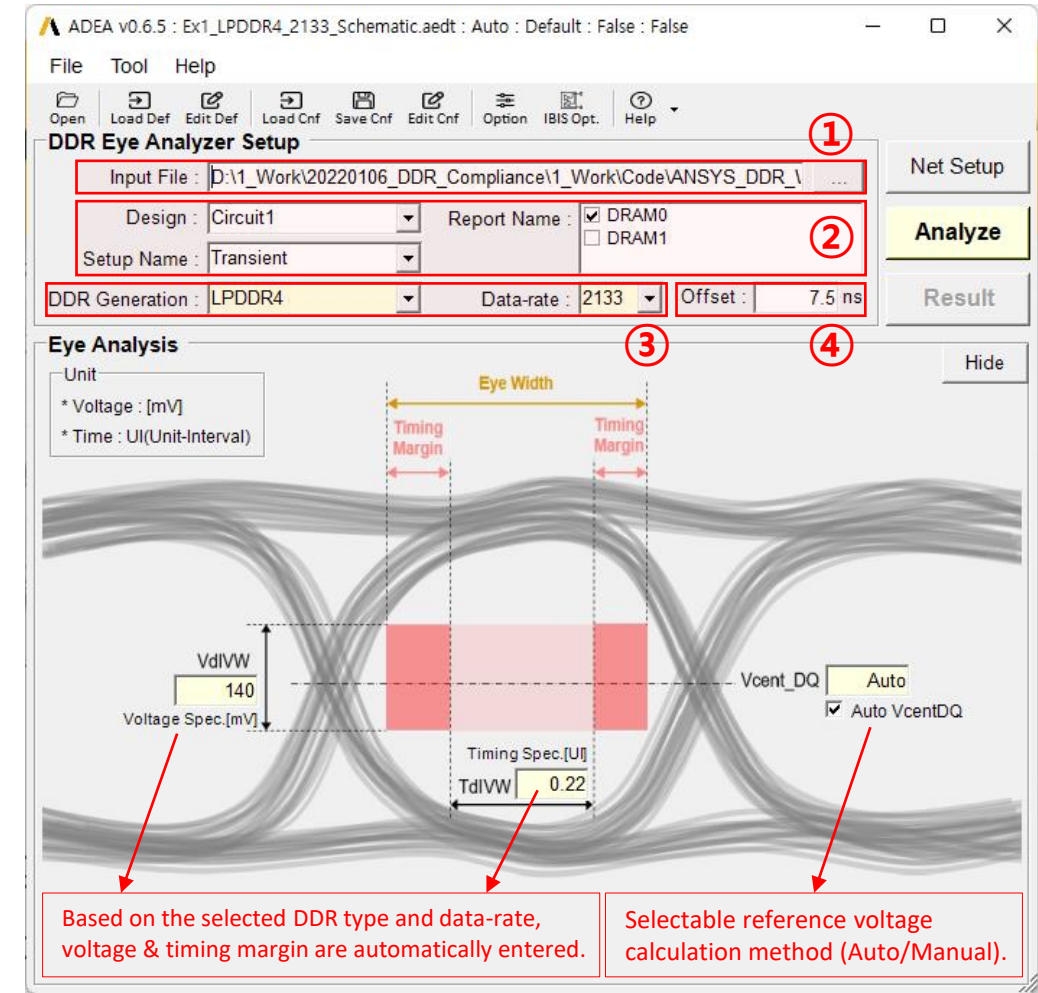
3. Analyze

4. Result

- ① Click  button or  Icon → Select Input File.
- ② Select Design, Setup, and Report to analyze.



- ③ Select DDR Type and Data-rate.
- ④ Enter Offset.



Eye Analyze

1. Launch ADEA

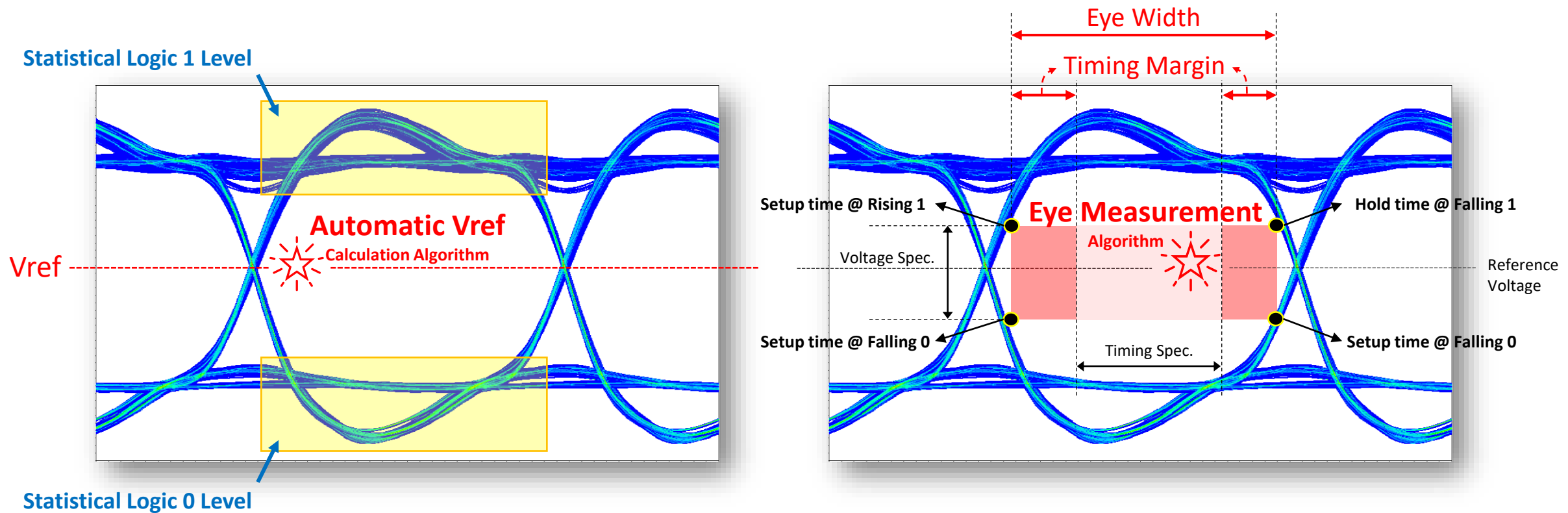
2. ADEA Setup

3. Analyze

4. Result

- Click the Analyze button to proceed with the analysis

- ✓ Reference voltage level calculation and eye measurement algorithms are built in.
- ✓ Customized reference voltage level calculation and/or eye measurement method can be added.



Eye Analyze

1. Launch ADEA

2. ADEA Setup

3. Analyze

4. Result

- View the analysis result in the Result Window

- ✓ Possible to export built-in Excel report.
- ✓ HTML report is also available (TBD), and customization is possible easily in the format desired by the user.

The screenshot displays the ADEA v0.6.5 software interface. The 'DDR Eye Analyzer Setup' window is open, showing the 'Input File' as 'D:\1_Work\20220106_DDR_Compliance\1_WorkCode\ANSYS_DDR_1...'. The 'Design' is set to 'Circuit1' and the 'Report Name' is 'DRAM0'. The 'Setup Name' is 'Transient' and the 'DDR Generation' is 'LPDDR4'. The 'Data-rate' is '2133' and the 'Offset' is '7.5 ns'. The 'Eye Analysis' window is also open, showing the 'Unit' as 'Voltage: [mV]' and 'Time: UI(Unit/Interval)'. The 'Eye Analyze Results' window is open, displaying a table of analysis results. The 'Result window' is also open, showing a table of analysis results. The 'Eye Diagrams' window is open, showing multiple eye diagrams for different signals.

Eye Analyze Results

Net Name	Width [ps]	Margin [ps]	Analyze Group	Group
<input checked="" type="checkbox"/> V(U2A5_M_DQ_0_AL2)	339	236	None	DQ
<input checked="" type="checkbox"/> V(U2A5_M_DQ_1_AK2)	332	229	None	DQ
<input checked="" type="checkbox"/> V(U2A5_M_DQ_2_AL2)	319	216	None	DQ
<input checked="" type="checkbox"/> V(U2A5_M_DQ_3_AH2)	350	247	None	DQ
<input checked="" type="checkbox"/> V(U2A5_M_DQ_4_AG2)	320	217	None	DQ
<input checked="" type="checkbox"/> V(U2A5_M_DQ_5_AJ2)	323	220	None	DQ
<input checked="" type="checkbox"/> V(U2A5_M_DQ_6_AH2)	321	218	None	DQ
<input checked="" type="checkbox"/> V(U2A5_M_DQ_7_AK2)	335	232	None	DQ

☐ Plot EYE with Mask

Report Format: Default

Export Close

Result window

	Analyze Group	Width [ps]	Jitter_RMS [ps]	Jitter [ps]	Timin Margin [ps]	Vcent_DQ [mV]
1 V(M_DQ_0_B3_G83568-001_U1B5)	None	417	N/A	0	314	823.6
3 V(M_DQ_1_C7_G83568-001_U1B5)	None	417	N/A	0	314	
G83568-001_U1B5	None	420	N/A	0	317	
G83568-001_U1B5	None	418	N/A	0	315	
G83568-001_U1B5	None	417	N/A	0	314	
G83568-001_U1B5	None	416	N/A	0	313	
G83568-001_U1B5	None	417	N/A	0	314	
G83568-001_U1B5	None	417	N/A	0	314	

Eye Diagrams

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

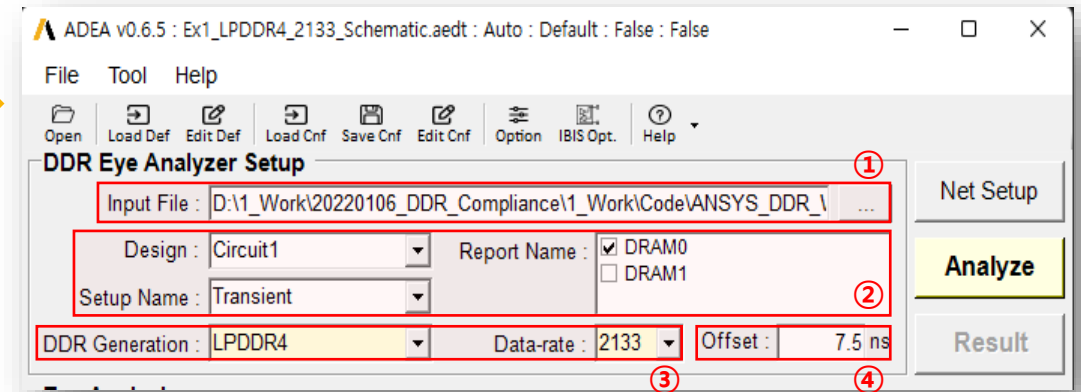
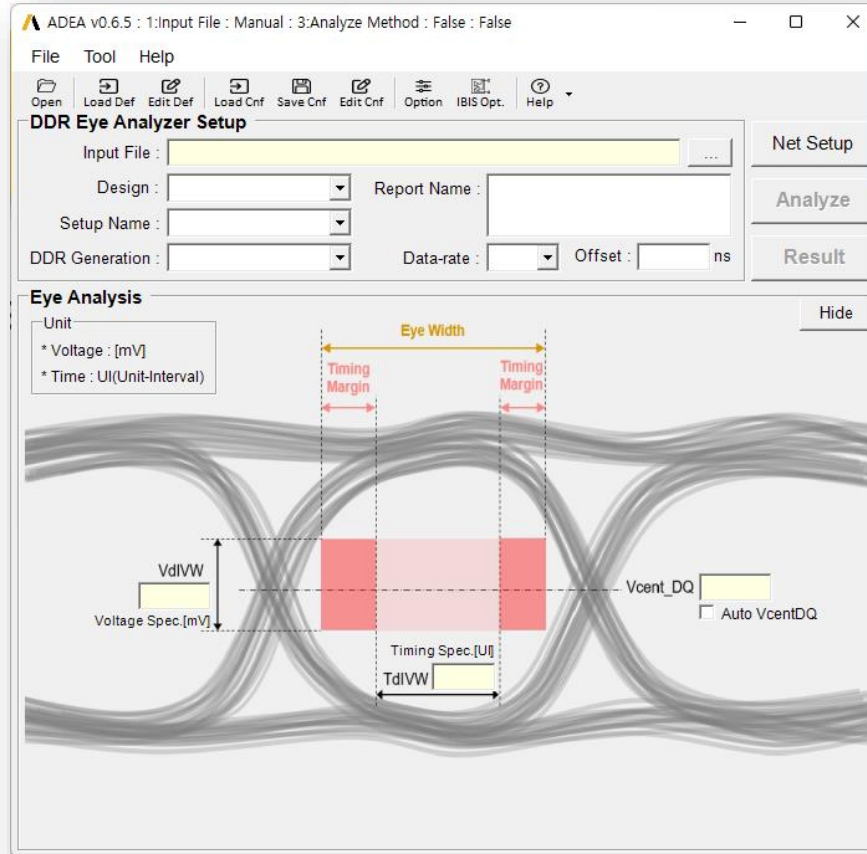
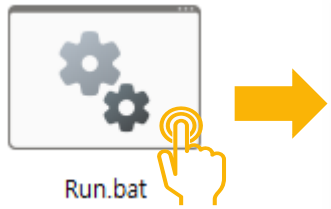
DQ_0 DQ_1 DQ_2 DQ_3 DQ_4 DQ_5 DQ_6 DQ_7

EYE Measure Results EYE Diagrams

Ready Accessibility Investigate

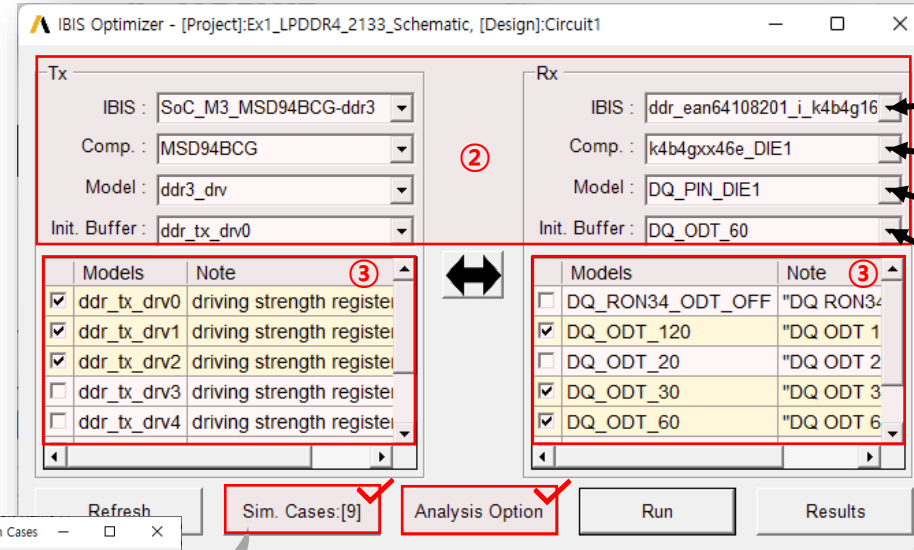
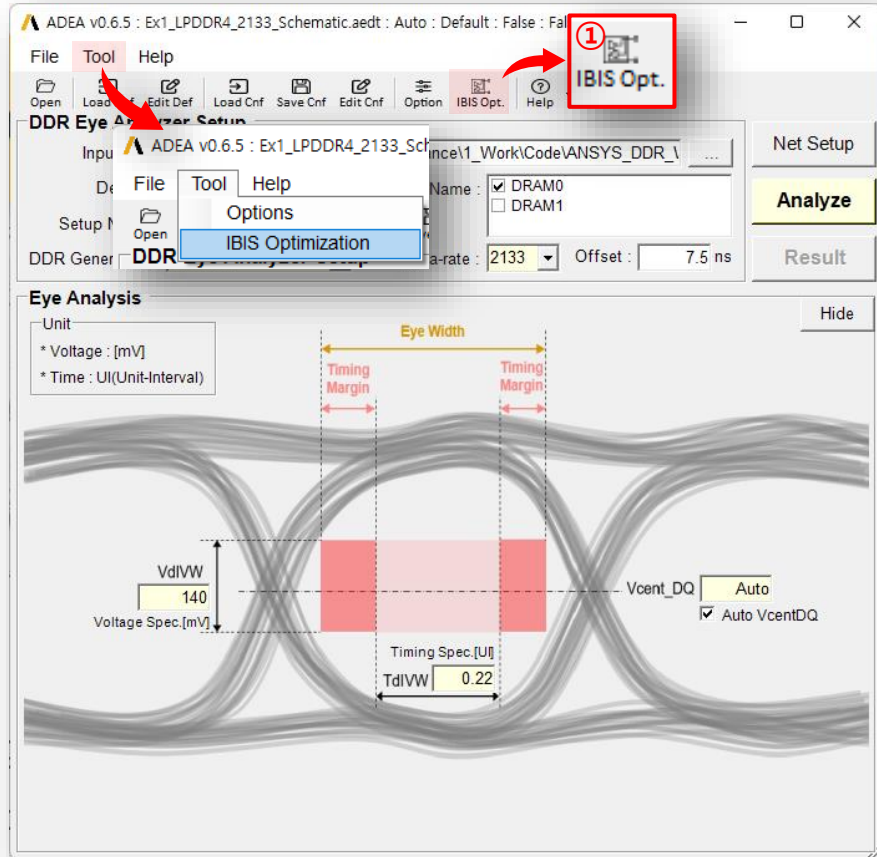
- Automatically pop-up the result window when the analysis is complete.
- Check the result of the timing analysis in the result window.
- Export eye and Excel report as required.

- Run ADEA and complete the ADEA setup in the same way as the Eye Analyze



- ① Select Input File (*.aedt).
- ② Select Design, Setup Name, and Report.
- ③ Select DDR Type and Data-rate.
- ④ Enter Eye Offset.

- Run IBIS Optimizer and select IBIS and simulation case.



- IBIS File (*.ibs)
- IBIS Component
- IBIS Model
- Initial Buffer model for input schematic

#	Tx IBIS Model	Rx IBIS Model
1	ddr_tx_drv0	DQ_ODT_120
2	ddr_tx_drv0	DQ_ODT_30
3	ddr_tx_drv0	DQ_ODT_60
4	ddr_tx_drv1	DQ_ODT_120
5	ddr_tx_drv1	DQ_ODT_30
6	ddr_tx_drv1	DQ_ODT_60
7	ddr_tx_drv2	DQ_ODT_120
8	ddr_tx_drv2	DQ_ODT_30
9	ddr_tx_drv2	DQ_ODT_60

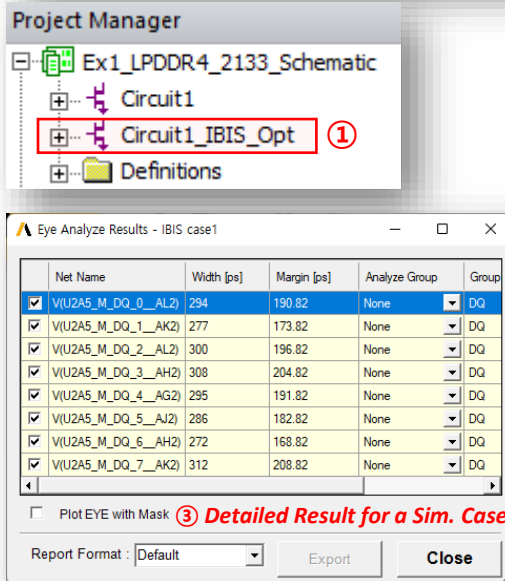
Simulation Cases

- Run IBIS Optimizer.
- Select and/or check
 - IBIS file, component, model, and initial buffer model.
- Select the Tx/Rx buffer models to be analyzed.
 - Check the Simulation cases.
 - Check Analysis option.

- Check the combination of Tx/Rx IBIS models

- Click the Run button to proceed with the analysis and check the results.

- Schematic for IBIS opt. is automatically created.
- Automatically pop-up the result window.
- Check the detailed result for each simulation case.
- Export Excel report as required.



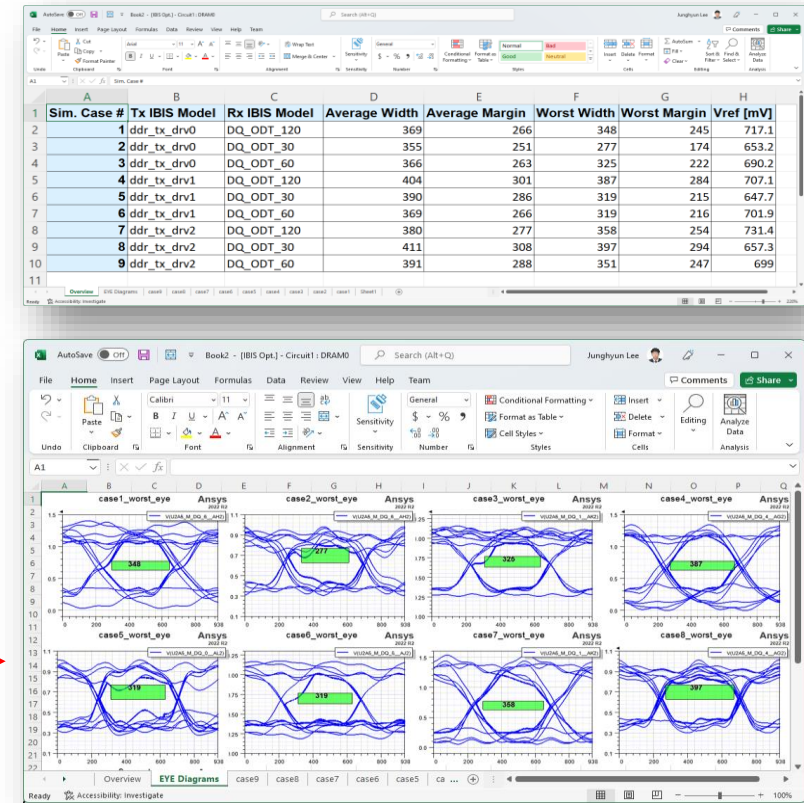
IBIS Optimization Results

#	Tx IBIS Model	Rx IBIS Model	Result	Width(Avg.)	Margin(Avg.)	Width(Worst)	Margin(Worst)	Vref
1	ddr_tx_drv0	DQ_ODT_120	Result	369	266	348	245	717.1
2	ddr_tx_drv0	DQ_ODT_30	Result	355	251	277	174	653.2
3	ddr_tx_drv0	DQ_ODT_60	Result	366	263	325	222	690.2
4	ddr_tx_drv1	DQ_ODT_120	Result	404	301	387	284	707.1
5	ddr_tx_drv1	DQ_ODT_30	Result	390	286	319	215	647.7
6	ddr_tx_drv1	DQ_ODT_60	Result	369	266	319	216	701.9
7	ddr_tx_drv2	DQ_ODT_120	Result	380	277	358	254	731.4
8	ddr_tx_drv2	DQ_ODT_30	Result	411	308	397	294	657.3
9	ddr_tx_drv2	DQ_ODT_60	Result	391	288	351	247	699

Plot EYE Image Width: 200 [pixel] Report Format: Default

Export Close

④ Export Excel report



Appendix A.1 – Launching ADEA



❑ Launch Ansys DDR Eye Analyzer using Run.bat file.

- If ADEA does not run using the Run.bat file, apply the following sequentially.

```
1 : Launch Option 1 - Specific version of ANSYS EM
2 :   step1. Create an environment variable [ANSYS_EYE_Analyzer]
3 :   step2. Set its value to the Specific version
4 :   ex) C:\Program Files\AnsysEM\AnsysEM20
5
6 : Launch Option 2 - Latest version of ANSYS EM Suite
7 :   You don't have to do anything because SerDes
8
9 ① set PATH=%SIWAVE_INSTALL_DIR%\common\IronPython"
10
11 ② ipyw64 ".\ANSYS_EYE_Analyzer_v0.py"
```

❖ [Setup the Version for Ansys Electronics Desktop](#)

A. Modify the path of ① to the absolute path where AEDT is installed.

ex) Before : `set PATH=%SIWAVE_INSTALL_DIR%\common\IronPython"`

After : `set PATH="C:\Program Files\AnsysEM\AnsysEM21.2\Win64\common\IronPython"`

B. Modify ② to the absolute path of the file “ANSYS_EYE_Analyzer.py”.

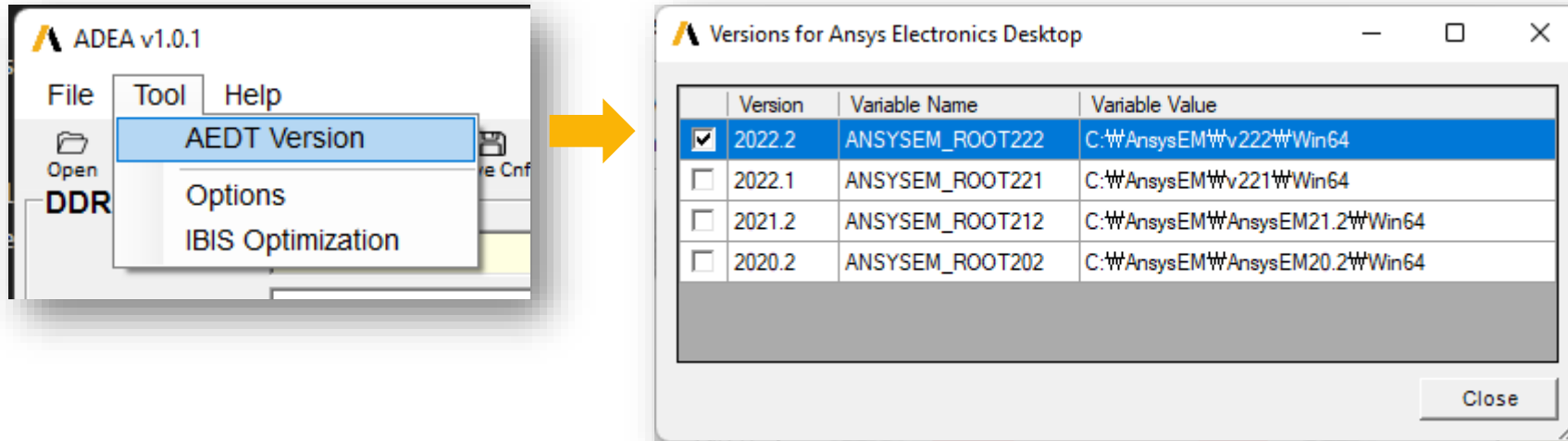
- ✓ When using relative paths, the Run.bat file and “ANSYS_EYE_Analyzer.py” file must be in the same path.

Appendix A.2 – AEDT Version Selection



❑ Version Selection for Ansys Electronics Desktop(AEDT)

- Select **Tool** → **AEDT Version** to display the AEDT version selection window.



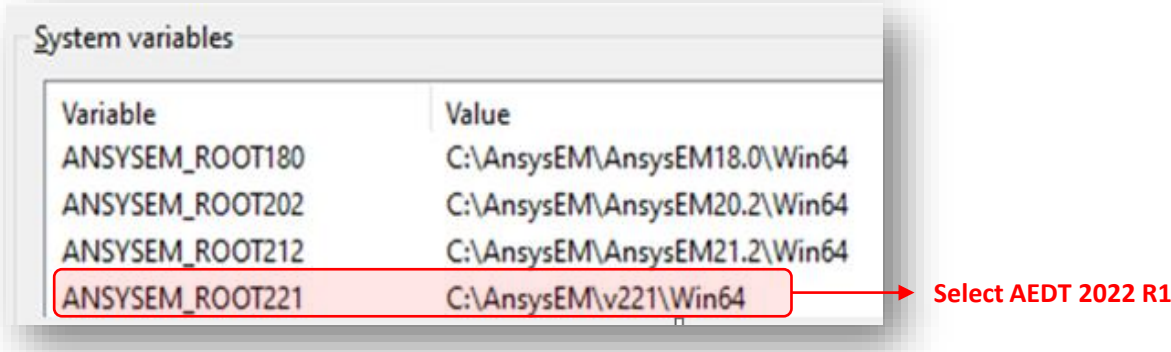
- AEDA is available in AEDT 2020 R1 and later versions.
- The AEDT version selection window lists up only the AEDT 2020 R1 or later version.
- The user can select and use the desired AEDT version.
- It is defaulted to use the latest version of AEDT installed on user's PC.

Appendix A.2 – AEDT Version Selection

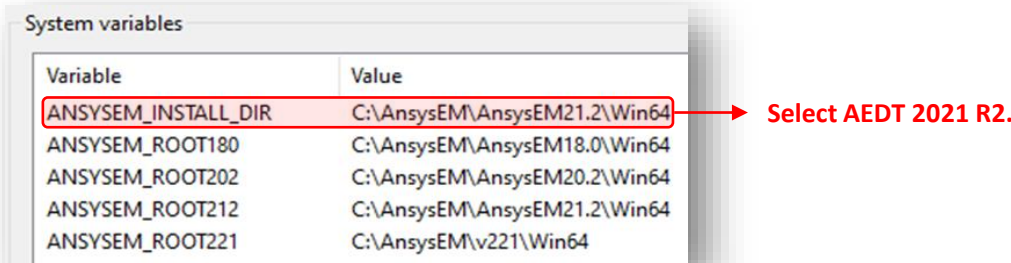
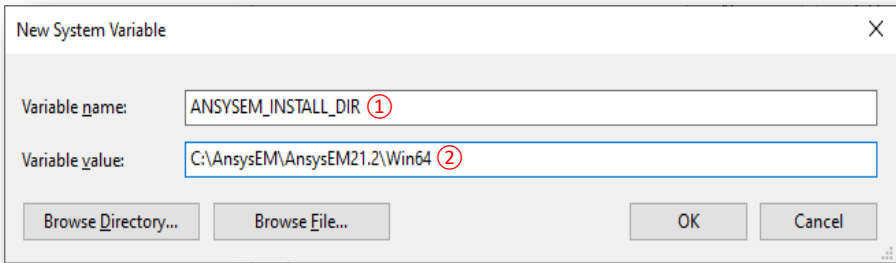


❑ Version Selection for Ansys Electronics Desktop(AEDT)

- By default, search for the system variable (ANSYSEM_ROOTxxx) to automatically select the most recent AEDT version.



- If you want to use AEDT for a specific version,
 - ① Create the [ANSYSEM_INSTALL_DIR] system variable.
 - ② Set the AEDT installation path for the desired version to the value of the above system variable.

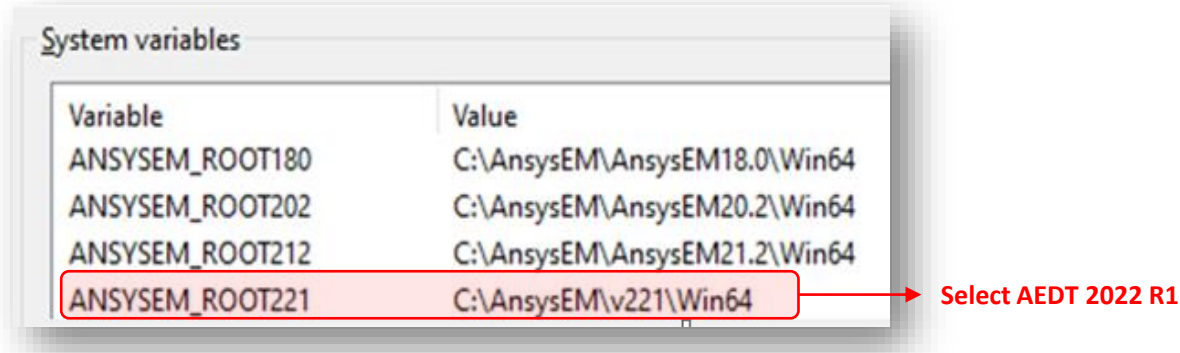


Appendix A.2 – AEDT Version Selection

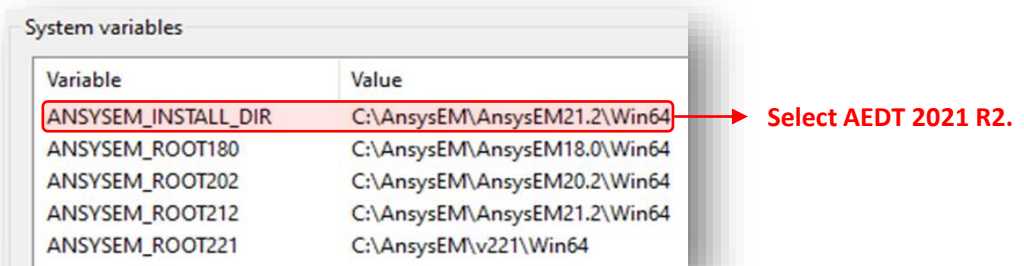
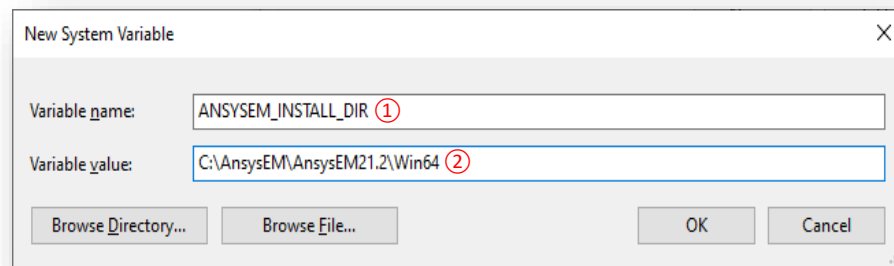


❑ Version Selection for Ansys Electronics Desktop(AEDT)

- User can select a version of AEDT



- If you want to use AEDT for a specific version,
 - ① Create the [ANSYSEM_INSTALL_DIR] system variable.
 - ② Set the AEDT installation path for the desired version to the value of the above system variable.

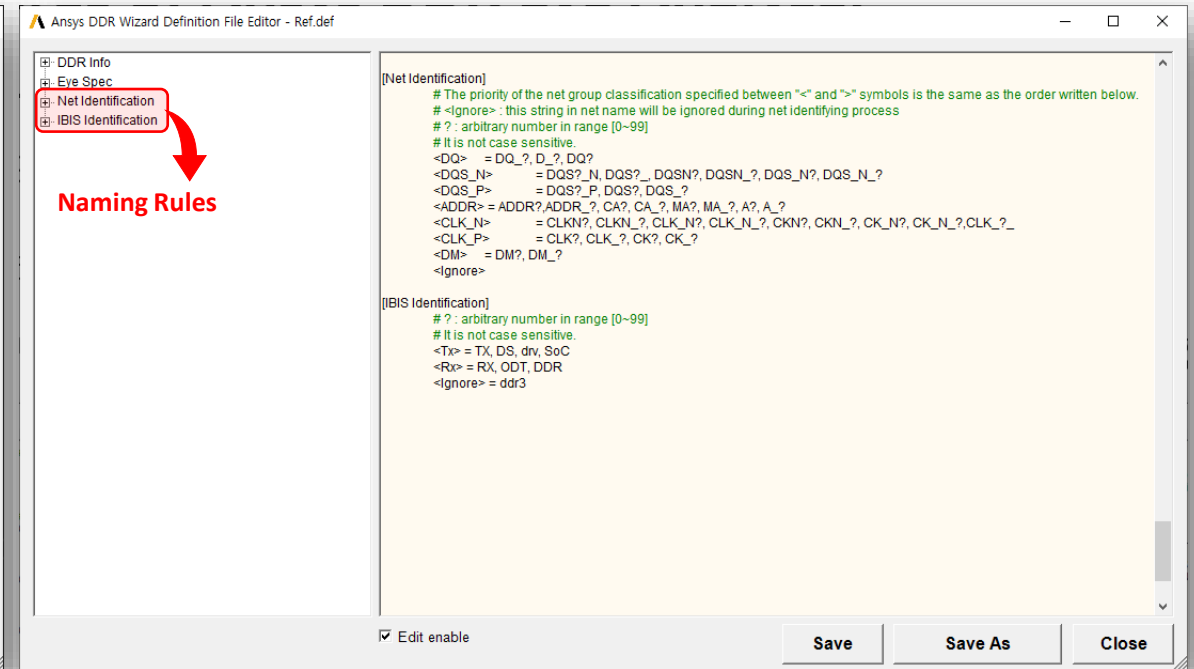
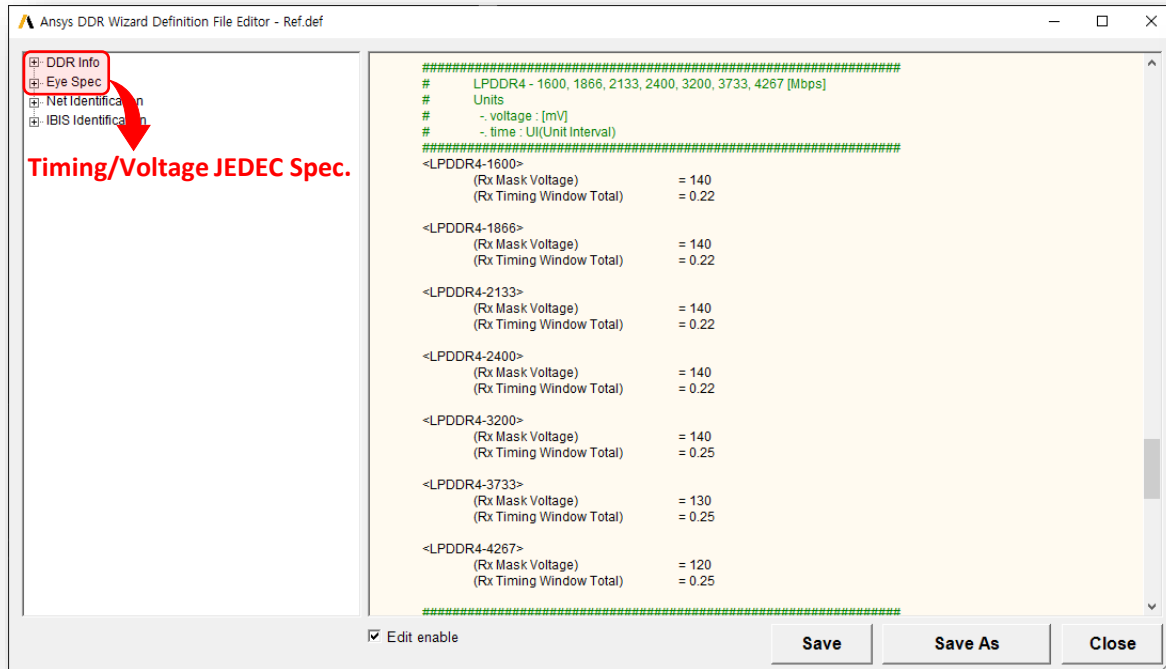
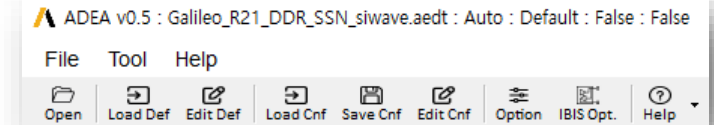
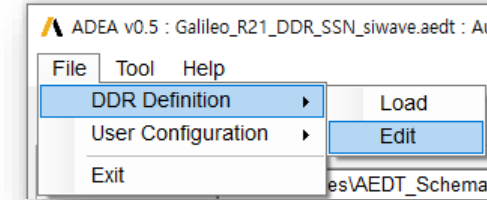


Appendix B.1 – Pre-Configurations



Definition File (*.def)

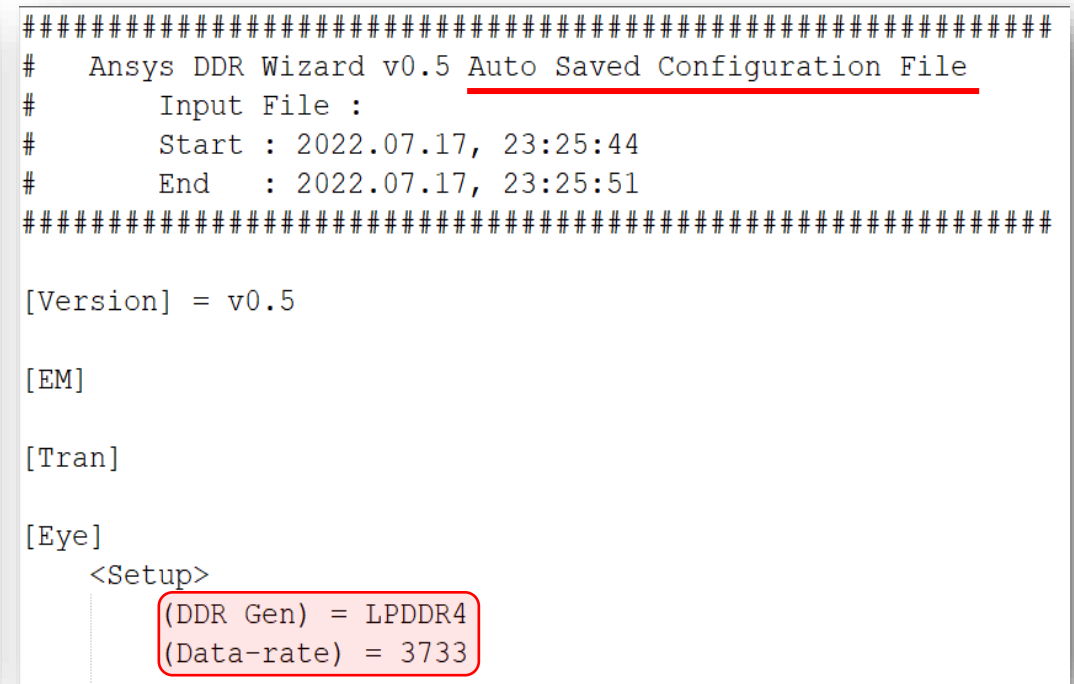
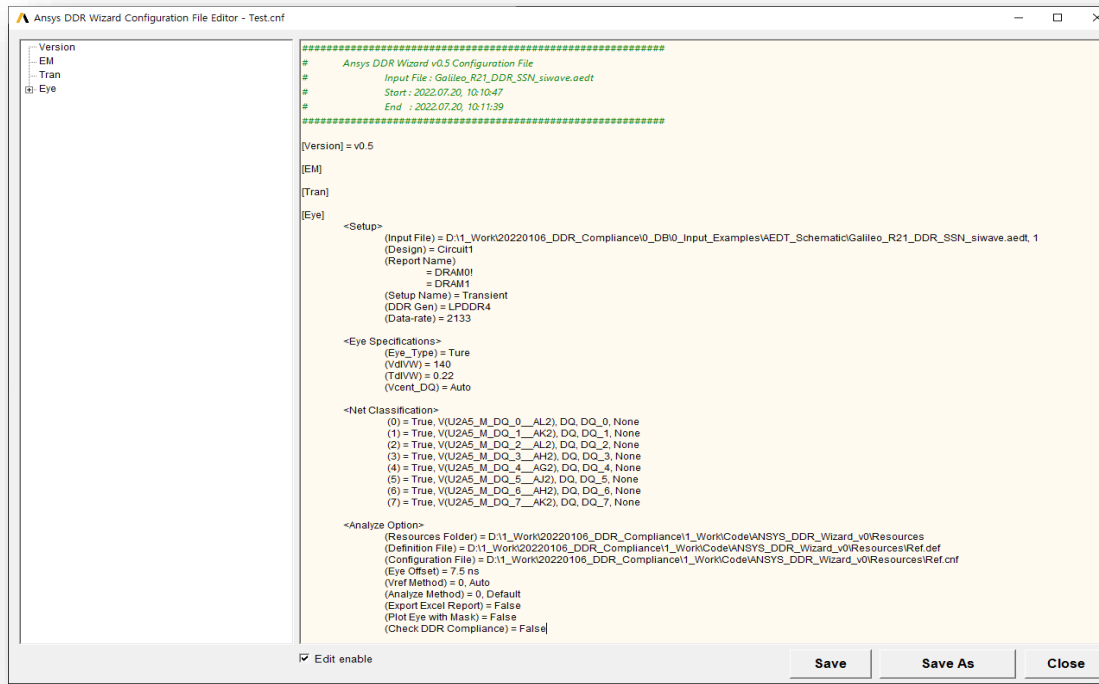
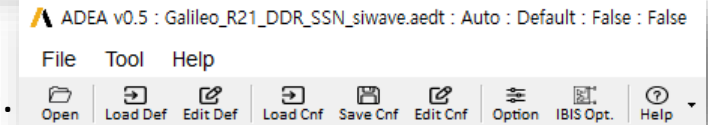
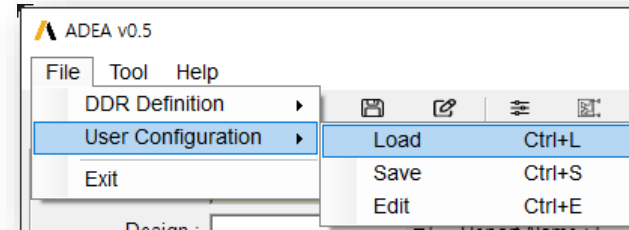
- Timing/Voltage JEDEC specifications of (LP)DDR2/3/4/5 are defined.
- User can modify and/or add customized specifications.
- Naming rules for target net and IBIS model classification are defined. The rules can be modified and/or added.



Appendix B.2 – Pre-Configurations

❑ Configuration File (*.cnf)

- All inputs for ADEA can be saved in the configuration file.
- All inputs for ADEA can be automatically filled by importing the configuration file.
- DDR Type and Data-rate are automatically saved and loaded for convenience.



Appendix B.3 – Automatic Net Classification



Automatic Net Classification

- ADEA automatically classify the net to be analyzed into the following groups:

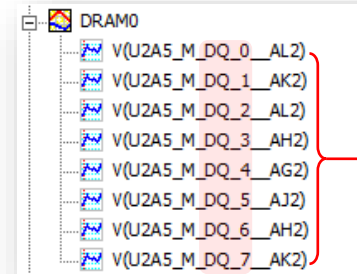
① DQ ② DQS_N ③ DQS_P ④ ADDR ⑤ CLK_N ⑥ CLK_P ⑦ DM

- It is automatically classified according to the 'Net Identification' rule defined in the definition file.

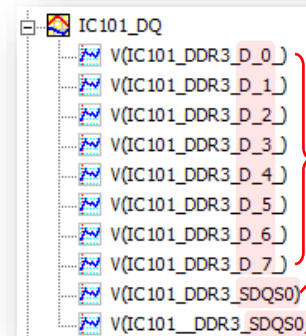
[Net Identification]

```
# The priority of the net group classification specified between "<" and ">" symbols is the same as the order written below.
# <Ignore> : this string in net name will be ignored during net identifying process
# ? : arbitrary number in range [0~99]
# It is not case sensitive.
<DQ> = DQ_?, D_?, DQ?
<DQS_N> = DQS?_N, DQS?_, DQSN?, DQSN_?, DQS_N?, DQS_N_?
<DQS_P> = DQS?_P, DQS?, DQS_?
<ADDR> = ADDR?, ADDR_?, CA?, CA_?, MA?, MA_?, A?, A_?
<CLK_N> = CLKN?, CLKN_?, CLK_N?, CLK_N_?, CKN?, CKN_?, CK_N?, CK_N_?, CLK_?
<CLK_P> = CLK?, CLK_?, CK?, CK_?
<DM> = DM?, DM_?
<Ignore>
```

- The 'Net Identification' rule can be modified and/or added.



<DQ> = DQ_?, D_?, DQ?
Classify DQ Group.




<DQ> = DQ_?, D_?, DQ?
Classify DQ Group.

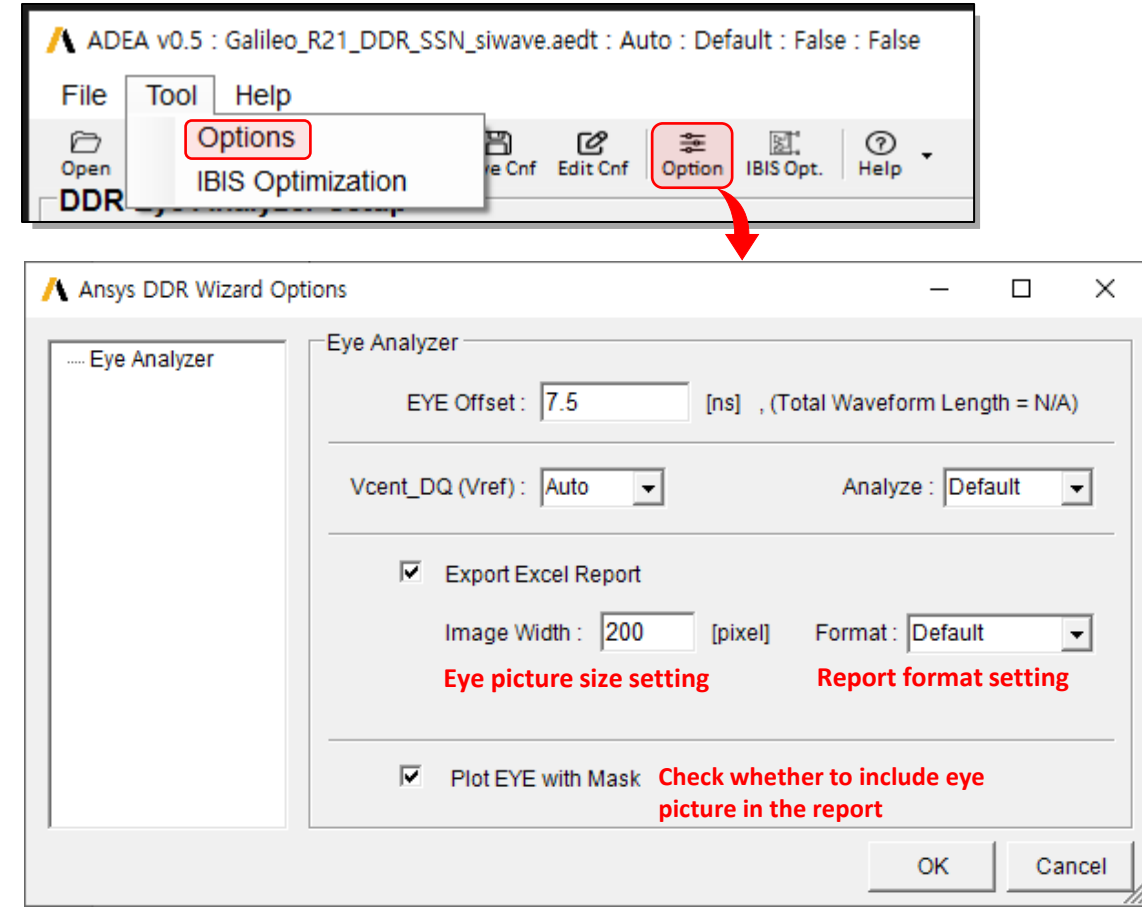
<DQS_P> = DQS?_P, DQS?, DQS_?
Classify DQS_P Group.

<DQS_N> = DQS?_N, DQS?, DQSN?, DQSN_?,
Classify DQS_N Group.

Appendix C.1 – Analysis Option Setup

❑ Ansys DDR Eye Analyzer – Option setup

- Click Tool → Option Menu or  Icon.
- In the Option Window, enter the settings for eye analysis.
 - ✓ Eye Offset : Enter the offset for voltage waveform.
 - ✓ Vcent_DQ(Vref) : Select voltage reference calculation method.
 - ✓ Analyze : Select eye measurement algorithm
 - ✓ Export Excel : Check whether to export the Excel report or not.
- The reference voltage calculation method, eye measurement method, and report format can be customized by request.



Option Setup process can be skipped when analyze with default option setup.

Appendix C.2 – Target Net Setup

Target Net Setup

- DQ groups among auto-classified groups are automatically checked as target net.
- Target nets can also be set and/or un-set by checking or unchecking the net.
- Net groups can also be manually set using the dropdown button.
- Using the Analyze Group, nets can be analyzed as a group.

Analyze Group : → Automatic grouping according to the DQ number

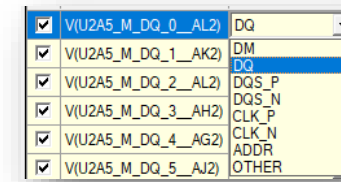
✓ If the Analyze Group is not set up, analyze it as an individual net.

Net Name	Group	Matched String	Analyze Group
<input checked="" type="checkbox"/> V(U2A5_M_DQ_0__AL2)	DQ	DQ_0	None
<input checked="" type="checkbox"/> V(U2A5_M_DQ_1__AK2)	DQ	DQ_1	None
<input checked="" type="checkbox"/> V(U2A5_M_DQ_2__AL2)	DQ	DQ_2	None
<input checked="" type="checkbox"/> V(U2A5_M_DQ_3__AH2)	DQ	DQ_3	None
<input checked="" type="checkbox"/> V(U2A5_M_DQ_4__AG2)	DQ	DQ_4	None
<input checked="" type="checkbox"/> V(U2A5_M_DQ_5__AJ2)	DQ	DQ_5	None
<input checked="" type="checkbox"/> V(U2A5_M_DQ_6__AH2)	DQ	DQ_6	None
<input checked="" type="checkbox"/> V(U2A5_M_DQ_7__AK2)	DQ	DQ_7	None
<input checked="" type="checkbox"/> V(U2A5_M_DQ_8__AT2)	DQ	DQ_8	None
<input checked="" type="checkbox"/> V(U2A5_M_DQ_9__AP2)	DQ	DQ_9	None
<input checked="" type="checkbox"/> V(U2A5_M_DQ_10__A...	DQ	DQ_10	None
<input checked="" type="checkbox"/> V(U2A5_M_DQ_11__A...	DQ	DQ_11	None
<input checked="" type="checkbox"/> V(U2A5_M_DQ_12__A...	DQ	DQ_12	None
<input checked="" type="checkbox"/> V(U2A5_M_DQ_13__A...	DQ	DQ_13	None
<input checked="" type="checkbox"/> V(U2A5_M_DQ_14__A...	DQ	DQ_14	None
<input checked="" type="checkbox"/> V(U2A5_M_DQ_15__A...	DQ	DQ_15	None

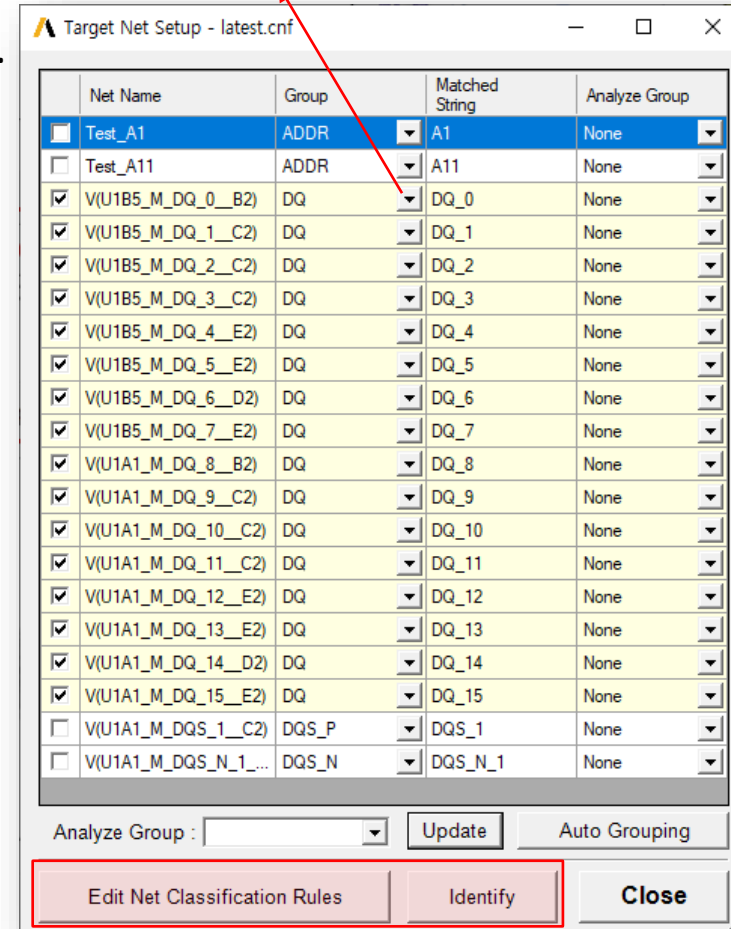
→ Analysis for each Bit line.

Net Name	Group	Matched String	Analyze Group
<input checked="" type="checkbox"/> V(U2A5_M_DQ_0__AL2)	DQ	DQ_0	Byte0
<input checked="" type="checkbox"/> V(U2A5_M_DQ_1__AK2)	DQ	DQ_1	Byte0
<input checked="" type="checkbox"/> V(U2A5_M_DQ_2__AL2)	DQ	DQ_2	Byte0
<input checked="" type="checkbox"/> V(U2A5_M_DQ_3__AH2)	DQ	DQ_3	Byte0
<input checked="" type="checkbox"/> V(U2A5_M_DQ_4__AG2)	DQ	DQ_4	Byte0
<input checked="" type="checkbox"/> V(U2A5_M_DQ_5__AJ2)	DQ	DQ_5	Byte0
<input checked="" type="checkbox"/> V(U2A5_M_DQ_6__AH2)	DQ	DQ_6	Byte0
<input checked="" type="checkbox"/> V(U2A5_M_DQ_7__AK2)	DQ	DQ_7	Byte0
<input checked="" type="checkbox"/> V(U2A5_M_DQ_8__AT2)	DQ	DQ_8	Byte1
<input checked="" type="checkbox"/> V(U2A5_M_DQ_9__AP2)	DQ	DQ_9	Byte1
<input checked="" type="checkbox"/> V(U2A5_M_DQ_10__A...	DQ	DQ_10	Byte1
<input checked="" type="checkbox"/> V(U2A5_M_DQ_11__A...	DQ	DQ_11	Byte1
<input checked="" type="checkbox"/> V(U2A5_M_DQ_12__A...	DQ	DQ_12	Byte1
<input checked="" type="checkbox"/> V(U2A5_M_DQ_13__A...	DQ	DQ_13	Byte1
<input checked="" type="checkbox"/> V(U2A5_M_DQ_14__A...	DQ	DQ_14	Byte1
<input checked="" type="checkbox"/> V(U2A5_M_DQ_15__A...	DQ	DQ_15	Byte1

→ Grouping analysis for Byte lane



Dropdown Menu for net group selection



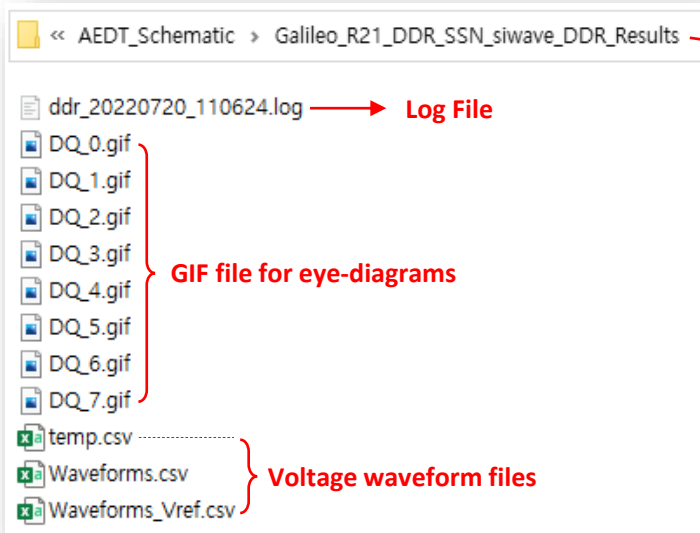
Modify and apply rule



Appendix D – Eye Measurement Results

□ Eye Measurement Results

- The Result Window is automatically pop-up, after the analysis complete.
- User can check the eye width and timing margin by bit or byte.
- After checking the results, user can export the report.
- Result files such as *.log file and eye diagram GIF file are generated.



Automatically create folder
"{Input file name}_DDR_Results"

	Net Name	Width [ps]	Margin [ps]	Analyze Group	Group
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_0__AL2)	375	272	None	DQ
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_1__AK2)	368	265	None	DQ
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_2__AL2)	360	257	None	DQ
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_3__AH2)	381	278	None	DQ
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_4__AG2)	336	233	None	DQ
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_5__AJ2)	359	256	None	DQ
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_6__AH2)	373	270	None	DQ
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_7__AK2)	355	251	None	DQ
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_8__AT2)	386	283	None	DQ
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_9__AP2)	386	283	None	DQ
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_10__A...	375	272	None	DQ
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_11__A...	374	271	None	DQ
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_12__A...	379	276	None	DQ
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_13__A...	368	265	None	DQ
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_14__A...	399	296	None	DQ
<input checked="" type="checkbox"/>	V(U2A5_M_DQ_15__A...	367	264	None	DQ

☒ Plot EYE with Mask Image Width : 200 [pixel]

Report Format : Default Export Close

Appendix E – IBIS File and Model Selection

IBIS File and Model Selection

- The IBIS file and model in Tx/Rx are automatically classified according to the IBIS identification rule in Def. file.

[IBIS Identification]

? : arbitrary number in range [0~99]
It is not case sensitive.
<Tx> = TX, DS, drv, SoC
<Rx> = RX, ODT, DDR
<Ignore> = ddr3

U23:ddr_tx_drv0_msd94bcg-ddr3 Properties: Galileo_R21_DDR_SSN_siwave

Parameter Values	Component	Symbol	Property Displays
<input checked="" type="radio"/> Value <input type="radio"/> Statistics			
Name	Value		
file	SoC_M3_MSD94BCG-ddr3.ibs		
model	ddr_tx_drv0		

U16:DQ_ODT_60_DDR_EAN64108201_i_k4b4g1646e_bcxx_june23 Prop

Parameter Values	Component	Symbol	Property Displays
<input checked="" type="radio"/> Value <input type="radio"/> Statistics			
Name	Value		
file	DDR_EAN64108201_i_k4b4g1646e_bcxx_june23.ibs		
model	DQ_ODT_60		

- IBIS identification rule can be modified and added.
- IBIS File, Comp., and Model can be selected manually.
- Select the Tx and Rx models to analyze.
- Simulation cases can be checked by Sim. Cases:[9] button.

IBIS Optimizer - [Project]:Galileo_R21_DDR_SSN_siwave, [Design]:Circuit1

Tx

IBIS : SoC_M3_MSD94BCG-ddr3 View

Comp. : MSD94BCG

Model : ddr3_drv

Models	Note
<input checked="" type="checkbox"/> ddr_tx_drv0	driving strength register
<input checked="" type="checkbox"/> ddr_tx_drv1	driving strength register
<input checked="" type="checkbox"/> ddr_tx_drv2	driving strength register
<input type="checkbox"/> ddr_tx_drv3	driving strength register
<input type="checkbox"/> ddr_tx_drv4	driving strength register

Sim. Cases:[9] Analysis Option

Rx

IBIS : DDR_EAN64108201_i_k4 View

Comp. : k4b4gxx46e_DIE1

Model : DQ_PIN_DIE1

Models	Note
<input type="checkbox"/> DQ_RON34_ODT_OFF	"DQ RON34
<input type="checkbox"/> DQ_ODT_120	"DQ ODT 1
<input checked="" type="checkbox"/> DQ_ODT_20	"DQ ODT 2
<input checked="" type="checkbox"/> DQ_ODT_30	"DQ ODT 3
<input checked="" type="checkbox"/> DQ_ODT_60	"DQ ODT 6

Run Results

Appendix F – IBIS Optimization Results

IBIS Optimization Results

- The eye analyze results for the simulation cases are automatically pop up.

The workflow involves three main components:

- IBIS Simulation Cases:** A list of simulation cases with Tx IBIS Model and Rx IBIS Model dropdowns.
- IBIS Optimization Results:** A table showing optimization results for 9 cases. The 'Result' column is highlighted in red, and the 'Export' button is also highlighted in red.
- Eye Analyze Results:** A detailed window showing eye analysis results for each net, including Net Name, Width [ps], Margin [ps], Analyze Group, and Group.

The 'IBIS Optimization Results' table data is as follows:

#	Tx IBIS Model	Rx IBIS Model	Result	Width(Avg.)	Margin(Avg.)	Width(Worst)	Margin(Worst)	Vref
1	ddr_tx_drv0	DQ_ODT_120	Result	369	266	348	245	717.1
2	ddr_tx_drv0	DQ_ODT_30	Result	355	251	277	174	653.2
3	ddr_tx_drv0	DQ_ODT_60	Result	366	263	325	222	690.2
4	ddr_tx_drv1	DQ_ODT_120	Result	404	301	387	284	707.1
5	ddr_tx_drv1	DQ_ODT_30	Result	390	286	319	215	647.7
6	ddr_tx_drv1	DQ_ODT_60	Result	369	266	319	216	701.9
7	ddr_tx_drv2	DQ_ODT_120	Result	380	277	358	254	731.4
8	ddr_tx_drv2	DQ_ODT_30	Result	411	308	397	294	657.3
9	ddr_tx_drv2	DQ_ODT_60	Result	391	288	351	247	699

The 'Eye Analyze Results' window shows a table with columns: Net Name, Width [ps], Margin [ps], Analyze Group, and Group. The 'Export' button in the 'IBIS Optimization Results' window is used to generate an Excel report, which is shown at the bottom right of the image.

- Eye width and timing margin are represented by the average and worst values.
- Click the **Result** button to see the detailed analysis results for each case.
- Click the **Export** button to create an Excel report of IBIS optimization results.