

STDF Statistical Analyzer User Manual

TrueWalkers
Test Data Matters

STDF Statistical Analyzer (SSA) User Manual

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Introduction

- What is STDF Statistical Analyzer (SSA).
- User interface.

What is STDF Statistical Analyzer?

STDF Statistical Analyzer (SSA) is a instant STDF statistical analysis tool on Windows platform, you can easily get SSA from Microsoft Store.

STDF (Standard test data format) is a binary data format frequently used in semiconductor industry.

SSA can open STDF files directly with a fast extracting speed, and it can calculate statistical parameters (like mean, stdev, CPK etc.) by different groups for each test. SSA has statistical charts built in; it has Histogram, Box plot, Scatter plot and Cumulative Frequency chart to display your test parameters' distribution in different dimension.

SSA has a flexible grouping feature; you could create statistical summary report and charts by different group factors and compare between them.

Also, you can export data to Excel file and charts to Word file.

If you have any question or suggestion, please feel free to contact us at support@truelwalkers.com.

User Interface

SSA UI color style follows your Windows theme. SSA Window is divided into 2 major views: statistical summary view in the center and chart view on the right. Of course we have tool bar on the left and menu bar and search box on the top.

The screenshot shows the STDF Statistical Analyzer interface. At the top, there is a menu bar with 'View', 'Groups', 'Help', and 'Charts'. A search box contains the number '83'. Below the menu bar is a toolbar with icons for home, save, print, and settings. The main area is split into two views: a 'Statistical Summary View' on the left and a 'Chart View' on the right. The summary view shows a table of test results, with the selected test '83 Leakage_VCORE VDD_CORE 0' highlighted. The chart view displays a histogram and a box plot for the same test, showing the distribution of values across different wafer groups.


T#	TestName	LSL	USL	Unit	Mean	Stdev	Cpk	Mean
69	O_S_N_3001 M_BPI2_IO 112	-900	-200	mV	-459.114	2.24899	38.4045	-460.689
70	O_S_N_3001 CLK_MODE_IO 383	-900	-200	mV	-459.458	2.12541	40.6913	-461.419
71	O_S_N_3001 DPA_DISABLE_IO 20	-900	-200	mV	-464.138	2.69512	32.6686	-465.81
72	O_S_N_3001 AVDD12_LDO 354	-900	-200	mV	-554.797	20.7966	5.53302	-562.799
73	O_S_N_3001 AVDD25_LDO 255	-900	-200	mV	-482.025	18.7941	5.00201	-486.126
74	O_S_N_3001 AVDD28_LDO 371	-900	-200	mV	-558.231	21.1382	5.38943	-567.68
75	power_short VDD_CORE 0	-100	100	uA	6.70639	22.3142	1.39363	5.13017
76	power_short VDD_IO 1	-100	100	uA	0.0522526	0.19752	168.671	0.046941
77	power_short DVDD18 2	-100	100	uA	-0.0313782	0.108054	308.391	0.090146
78	power_short AVDD43 3	-100	100	uA	0.288631	2.24283	14.8193	0.288404
83	Leakage_VCORE VDD_CORE 0	-1	350	uA	111.324	30.3074	1.23539	103.597
84	Leakage_VCORE DVDD18 1	-1	10	uA	0.0563726	0.035544	9.90671	0.171449
85	Leakage_VCORE VDD_IO 1	-1	10	uA	-0.0860569	0.0470353	6.47701	-0.058958
122	Leakage_AVDD43 AVDD43 3	-1	80	uA	28.2315	1.28702	7.57081	27.4267
150	Leakage_AVDD43 AVDD43 7	-1	80	uA	28.0793	1.24682	7.77425	26.9893
136	Leakage_AVDD43 AVDD43 3	-1	80	uA	29.2761	0.443454	22.7578	28.0622
123	Leakage_AVDD43 AVDD43 3	-1	80	uA	29.2143			26.6172
137	Leakage_AVDD43 AVDD43 7	-1	80	uA				27.2025

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Extraction

- Load STDF files
- Add STDF files
- View menu
- Test key types *
- Record types

Load STDF files

Click  button on toolbar to open file browser, you can select multiple STDF files by pressing Ctrl key. The STDF files will be automatically extracted after you select them, then all data will be retained in memory for analysis in particular data structure. If there is data loaded already in SSA, it will be abandoned after you load new STDF files.

Add STDF files

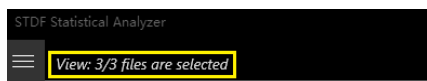
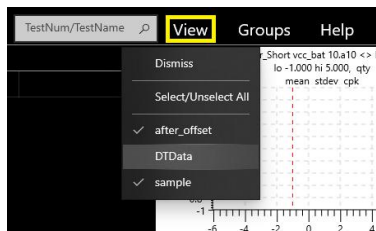
Button  on toolbar is used to load new STDF files into SSA while keep previous loaded data, and they could be analyzed together. This feature is designed to load data files from different folder.

View Menu to select active files

“View” menu is used to check what files are extracted in memory and you can select different files for analysis. That means you can select subset of files in memory for analysis. You can take below snapshot as a example, there are 3 files extracted in memory (after_offset.stdf, DTData.stdf and sample.stdf), while we only make 2 files active and left “DTData.stdf” aside.

After you changes active files selection via “view” menu, the statistical summary will be automatically re-calculated.


It will display how may files are active now once you move your mouse on “View” menu.



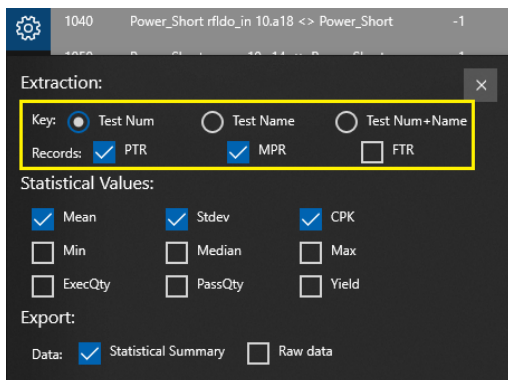
Test key type

This section is very important. Please go through it carefully before you start with SSA. SSA extracts and analyzes STDF data by TEST; each TEST has TEST_NUM, TEST_NAME, LO_LIMIT, HI_LIMIT and UNIT. How to distinguish different TESTs? Test Key is a keyword that we distinguish tests by? We can use TEST_NUM, TEST_NAME or TEST_NUM + TEST NAME as test key.

According to STDF V4 spec, different test should have different test number, so normally we could distinguish tests from their test number. But sometimes STDF data has duplicated test number (but different test name), this will cause exceptions if we extract these data use test number as Test Key. In this case we could use test name as test key.

You can click  icon on toolbar, and change Test Key Type at “Extraction” section on popped up screen. It will only take effect on next extraction.

Test Info					
T#	TestName	LSL	USL	Unit	
1000	Power_Short vcc_bat 10.a10 <> Power_Short	-1	5	mA	
1020	Power_Short coreldo_in 10.a18 <> Power_Short	-1	5	mA	
1030	Power_Short vdd_core 35.a10 <> Power_Short	-1	5	mA	



Extraction:

Key: Test Num Test Name Test Num+Name

Records: PTR MPR FTR

Statistical Values:

Mean Stdev CPK

Min Median Max

ExecQty PassQty Yield

Export:

Data: Statistical Summary Raw data

Record types

There are 3 types of data record that related to test data, you can choose what record you want to extract and analyze. Normally we only focus on PTR and MPR, FTR only contains pass/fail flag.

Statistical summary

- Test Info & Groups
- Statistical parameters
- Select test to display chart
- Search test

Statistical summary

Statistical summary is the default data view of SSA, after any STDF file loaded, it will automatically calculate statistical summary based on Group factor you selected.

Test Info & Groups

Statistical summary contains 2 sections: Test Info & Group data (statistical parameters), Group data is calculated base on what group factors and active files you selected.

Group: MIR.LOT_ID [Correlation_20pcs_10x] Q007F022.001_RT										TestNum/TestName	View
Test Info					Correlation_20pcs_10x			HQQ007F022.001_RT			
T#	TestName	LSL	USL	Unit	Mean	Stdev	Cpk	Mean	Stdev	Cpk	
101	VDD_Con/VDD	-650	-250	mV	-438.62	36.8165	1.70775	-438.728	49.9132	1.26037	
102	VIO_Con/VIO	-600	-200	mV	-407.471	37.6728	1.70352	-412.447	8.30878	7.52429	
103	SDATA_Con/SDATA	-650	-350	mV	-514.148	6.07472	7.45452	-510.057	5.49628	8.48713	

Test info
Group 1 Data
Group2 Data

Statistical parameters

You can pick up statistical parameters at Statistical Values section on setting screen. There are 9 statistical parameters built in: Mean, Stdev, CPK, Min, Median, Max, ExecQty, PassQty and Yield.

Statistical summary will be re-calculated if you selected different statistical parameters.

Extraction: ✕

Key: Test Num Test Name Test Num+Name

Records: PTR MPR FTR

Statistical Values:

Mean Stdev CPK

Min Median Max

ExecQty PassQty Yield

Export:

Data: Statistical Summary Raw data

Highlight test to display chart

You can click on any test item in statistical summary table to display its charts; you also could use “Up” and “Down” key to highlight different test and charts will also be updated.

Search test

If there are many TESTs in statistical summary table, it will be difficult to find your interested test by scroll bar. Now you need the search box, you can type TEST_NUM or TEST_NAME in search box, it will automatically highlight on 1st test that matches your keyword while you are typing, and it could move to next matched test if you continue hit “Enter” key.



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Charts

- Enable chart view and select charts
- Interactive operation
- Histogram
- Box plot
- Scatter plot
- Cumulative Frequency
- Combined Histo-Box plot

Enable chart view and select charts

You can enable/disable chart view by click toggle switch at right of menu bar. Click “Chart” menu to pop up chart setting screen, check/uncheck the chart types as you wish, adjust chart view width by moving Slider bar.

Note: Chart will not load data to make it smoother when you adjust chart view with.

The screenshot shows the STDF Statistical Analyzer interface. The 'Charts' menu is open, displaying a 'Width' slider and several chart type options: Histogram (checked), Blox Plot (checked), Scatter Plot (unchecked), Cummulative Frequency (unchecked), and Combined Histo-Box Plot (unchecked). A context menu is also visible over the histogram chart, with options for Copy, Save, Refresh, Legend (checked), and Properties. A callout box points to the context menu with the text: 'Invoke context menu by right-click on chart'.

Stdev	Cpk
37.6728	1.70352
6.07472	7.45452
1.94747	49.3512
1.80958	25.933
16.95	1.91007
12.0573	3.4274
13.1091	2.27636

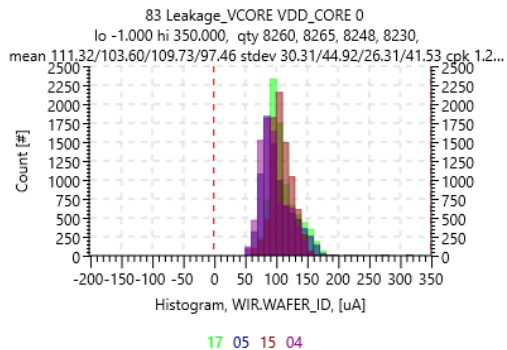
Interactive operation

1. **Zoom:** you can zoom in & zoom out chart by mouse wheel with Ctrl key pressed. The zoom feature is to change view range on data result dimension (X axis of histogram and cumulative frequency, Y axis of scatter plot and box plot). You current mouse position on chart will be next view range centre.
2. **Highlight Group:** you can click legend item to highlight corresponding GROUP data on chart. This will help you to have clear view when different group data overlapped on each other, especially on histogram.
3. **Show full text:** if any content is too long to display, it will be trimmed and display "...". You can move your mouse over it to show full text.
4. **Context menu:** right click on chart to display context menu, and there are several useful tools on it. “Copy”, “Save”, “Refresh” buttons and **Show/Hide legend** button.

Histogram

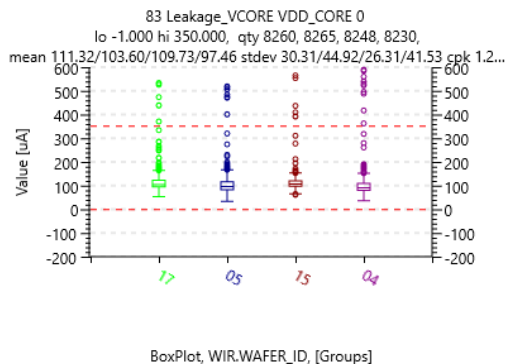
Histogram is a widely used statistical chart, it is easily to interpret and it is also the fastest chart to render when there are huge data samples.

But different group data will easily to overlap on each other; in this case you can click different legend items to view different group data.



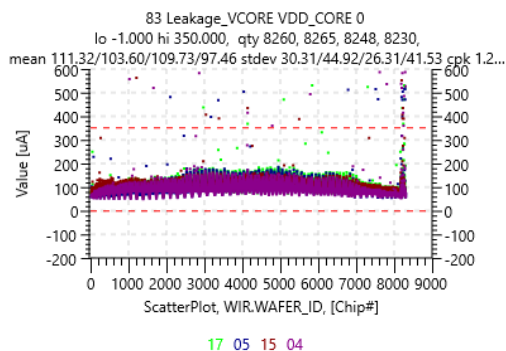
Box plot

Box plot can display distribution in different dimension. When you have many group of data, box plot could display them clearly on one chart (without overlap), and easily compare between groups. Box plot is also very fast to render, but a little slower than histogram.



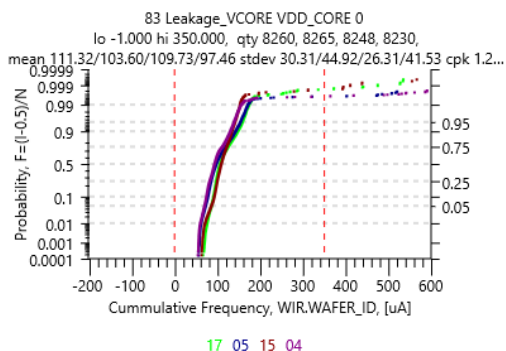
Scatter plot

Scatter plot is also called Trend chart, it display each data point on chart by time, so we could know whether TEST result is drifting during testing. But when you have huge data, it will easily to overlap between different groups. Because scatter plot display each data point on chart, it takes longest time to render.



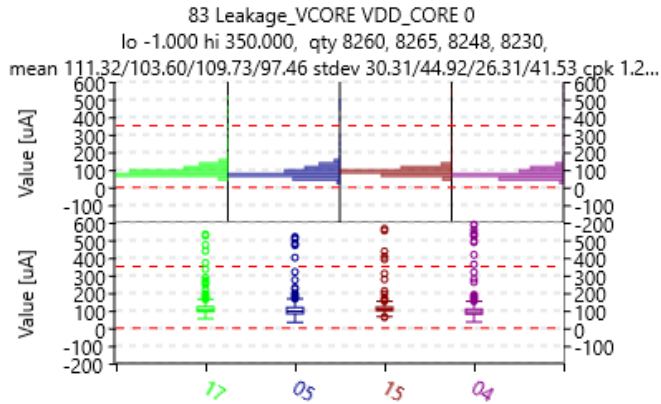
Cumulative frequency

Cumulative frequency is also very good chart, it could display different groups of data on one chart clearly and it is easily to know distribution percentage according to Y axis. It is slower to render than histogram & box plot, but faster than scatter plot.



Combined Histo-Box plot

This is a hybrid chart combined histogram together with box plot. It is useful when you want to compare distribution with many groups of data on one chart.



Histo-Box Plot, WIR.WAFER_ID, [Groups]

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Grouping

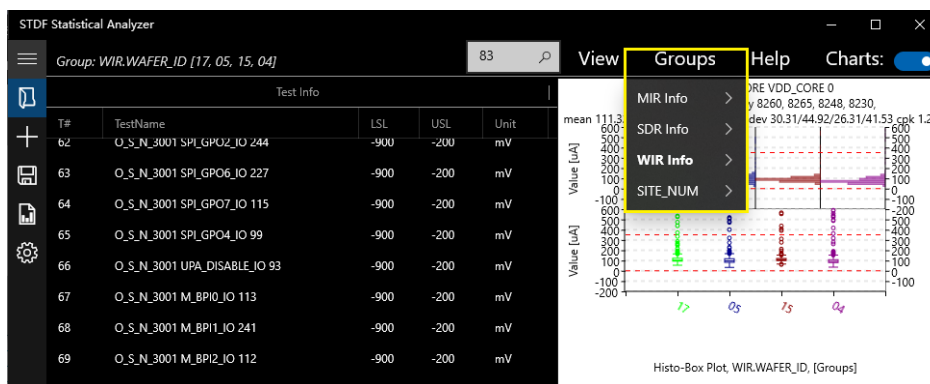
- Group menu
- MIR items
- SDR items
- Wafer ID and SITE_NUM

Group menu

Grouping feature is very useful. It could separate data and calculate by different factors you selected and compare between each other. In semiconductor industry, we will always compare data by different factors to find out the cause of the issue that you are looking at like LOT_ID, Tester ID, Load board ID, Handler ID, Wafer ID, SITE_NUM and so on.

You could change Group factor by “Group” menu, and when you move your mouse over “Group” menu, it will display current selected group factor and group values of current extracted data files.

When you changed group factor, statistical summary will be re-calculated automatically.



MIR items

MIR items are LOT level items, it including factors like: LOT_ID, NODE_NAME, JOB_NAME, OPERATOR NAME and so on. We list some frequently used items of MIR. Your data may use different items to store the information you are interested in, like Fab name, test house name, Test Insertion name, test flow, retest flow and so on.

1. LOT_ID: lot number of the data
2. JOB_NAM: test program name
3. NODE_NAM: tester id
4. OPER_NAM: operator name
5. TST_TEMP: temperature

SDR items

SDR items are mostly related to HW like Hander ID, Load board ID, Prober card ID, Cable ID etc.

WIR items

Most useful WIR item is Wafer_ID, if you are analyzing wafer test data, you could also select it to compare between different wafers.

SITE_NUM

Sometimes we want to check site to site distribution difference; you could select SITE_NUM as group factor.

***Note:**


If your data have duplicated test (Same test number and same test name), this will cause exception when we group by SITE_NUM (will not affect other group factors).

6

Exportation

- Data exportation
- Chart exporation

Export data to Excel

You could export statistical summary and test result data into Excel by clicking  icon on toolbar. Please check “Export” section on Setting screen and check “Raw data” if you need to export test result to Excel too.

Statistical summary will be in 1st sheet in saved Excel file, and test result data will be saved in following sheet by STDF files.

Note: if you loaded huge size STDF files, it will take a few minutes to export test result data.

Extraction: ✕

Key: Test Num Test Name Test Num+Name

Records: PTR MPR FTR

Statistical Values:

Mean Stdev CPK

Min Median Max


ExecQty PassQty Yield

Export:

Data: Statistical Summary Raw data

A	B	C			E	F			H	I		K
		Lo Limit	Hi Limit	Unit		Mean	Stdev	Cpk		Mean	Stdev	
Test Num	Test Name	Test Info				QKAQQ-1_FTRT4				Datalet xLot		
1000	e_bat 10.a10	-1.00	5.00	mA	0.04	0.01	38.19					
1020	hdo_in 10.a18	-1.00	5.00	mA	-0.02	0.07	4.68					
1030	d_core 35.a10	-1.00	5.00	mA	1.05	0.13	5.06					
1040	do_in 10.a18	-1.00	5.00	mA	0.04	0.01	47.21					
1050	cc_sx 10.a14	-1.00	5.00	mA	-0.11	0.02	16.75					
1060	d_iq1 10.a18	-1.00	5.00	mA	0.91	0.24	2.71					
1080	cdup 11.d2	-1.00	5.00	mA	0.03	0.18	1.87					
3900	Dut -1 <> XT	-20.00	0.00	ppm	-73.63	236.18	-0.08					
4000	ent -1 <> VC	0.00	18.74	mA	15.96	0.41	2.28					
4010	ent -1 <> VC	11.54	18.74	mA	15.96	0.41	2.28					
4020	MX -1 <> VC	4.70	8.00	mA	6.36	0.21	2.59					
4030	NA -1 <> VC	2.00	3.50	mA	2.92	0.12	1.57					
4040	CO -1 <> RF	3.00	6.00	mA	4.72	0.12	3.43					
4050	DIV -1 <> VC	2.04	4.84	mA	3.03	0.12	2.77					
4500	1 <> VCO T	8.00	23.00	mA	11.40	0.55	2.13					

Export Charts to Word

You could export all TESTs' charts Word by clicking  icon on toolbar. When you enabled multiple charts at char view, there will be multiple charts saved in Word for each TEST. While SSA is save charts to Word file, you will noticed that charts at chart view are flashing, you'd better wait at this moment, and do NOT open the target Word file until exporting complete. It may take a few minutes if you loaded large size STDF files.

