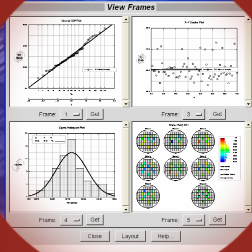
metawafer technologies®

ïRDA 3.0

Reliability Device Analyzer



Effortlessly calculate device lifetime.

Visualize parametic and reliability relationships.

Library of standard JEDEC and enhanced analysis techniques.

Minutes, not hours or days, to understand test data.

Turning Data into Information

Data to Information

ïRDA (E4100A) is a PC-based parametric and reliability data analysis environment tailored for rapid and intuitive transformation of data into information.

Considering that modern devices contain hundreds of millions of transistors, meters of metal lines and square centimeters of gate dielectrics, it is not the typical device that is of interest but the statistically lowest performance device in the chain that defines full product reliability.

Ever increasing device complexity results in more subtle fail mechanisms. Coupled with rapid scaling in nanometer technology reduces the time to ensure the quality of the device and process.

It takes more than amassing an ocean of statistically meaningful test data to control your process or ensure the reliability of your products. The next step is understanding the data; turning it into information.

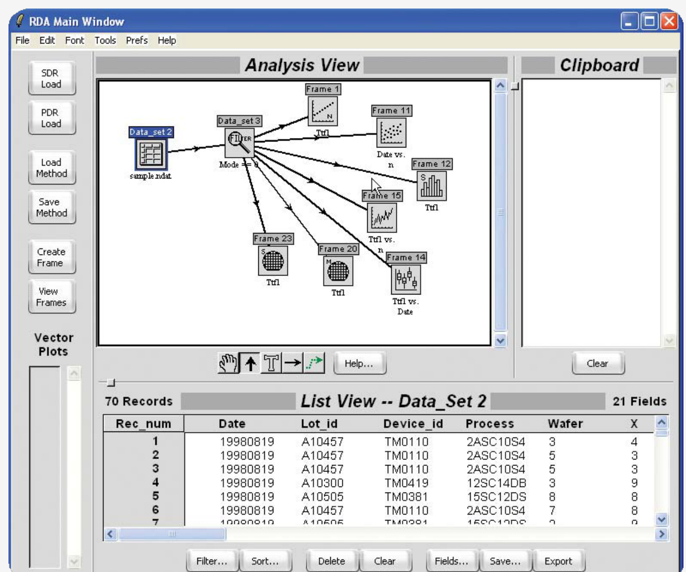
Instantly explore the effect of different failure criteria. Effortlessly deduce lifetimes. information that can uncover new phenomena and explain today's device reliability.

Visualize information

ïRDA provides visualization and analysis of data sets. These can range from simple scatter plots and statistical distributions to interactive wafer maps to full lifetime extractions and statistical process control charts.

All plots provide visual data censoring to suppress outliers without deletion and provide data tunneling to trace any specific data point back to its physical and parametric source including wafer die location. Outliers in statistical plots can be traced to specific die locations or test conditions.

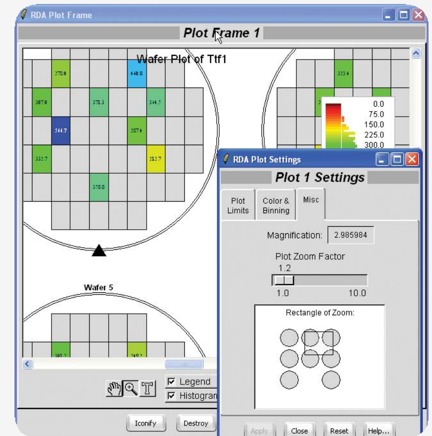
Users can access the standard built-in library procedures through the menu or use the macro calculator to produce custom analysis sequences which can be recorded and played back graphically for other data sets.



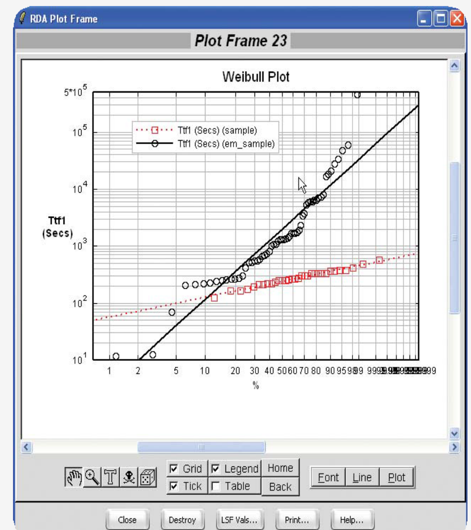
ïRDA main analysis window

Key Features

Function	Feature
Data Access	• ïRDA seamlessly accesses ïSDR data formats • ÏRDA can access data remotely; via LAN; does not need to be on same controller as data source, • All data can be output into flat ASCII files or directly exported to excel; export or import from other databases.
Data Selection	• Select and filter data and data sets based on wafer location, device parameter, date, lot id, test. conditions and/or results. Find exactly the data needed across many tested devices and wafer lots. • Create derived data using transformations on scalar or vector data. Understand complex analysis. • Defined transforms with calculator interface. • Visualize data flow and save for re-use.
Data Presentation	• Map single wafer and lots of wafer. • Reliability and process control specific charts. Use standard semiconductor charting. • Drill into data point's original source on wafer, etc. • Compare and contrast results easily. • Cleanly and correctly censor outliers. • Overlay multiple analysis charts. • Customize and annotate plots and wafer maps.
Graphs	• Wafer map. • Statistical distribution plots (Normal CDF, Log Normal CDF, Weibull, Extreme Value). • Scatter plot. • Vector data plot. • Process control plot. • Histogram. • Box and Whisker plots. • Reliability Lifetime Plots (EM, HCI, Oxide).



ïRDA wafer map

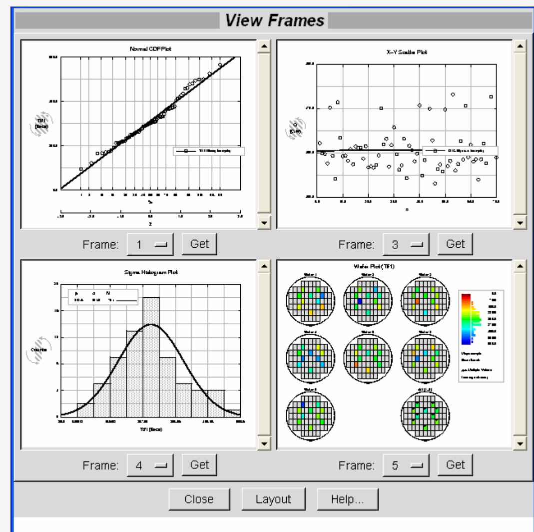


EM Weibull plot comparing split data

Key Features

Function	Feature
Failure Mechanisms	ïRDA provides built-in physical reliability capability based on the most widely accepted failure mechanism physics with regards to stress or long- term acceleration. • Oxide lifetime extraction using the E and 1/E models. • BTI lifetime extraction using the Vg model. • Hot-carrier degradation lifetime extraction: I_b, $1/V_d$ and I_g models. • Electromigration activation energy and lifetime extraction • Lifetime extraction uses the chosen acceleration model to combine the entire data set at different stress conditions to make the best statistical estimate of low probability failures.
Misc	• Plots are intelligent, not just pictures. Every data point is hyperlinked to data set. • Macro calculator. Creates equations and transformation. • Automatic parameter extraction (APEX) operates on vectors of vectors; rapid data reduction to quantifiable parameters from multi-dimensional data. – JEDEC sample G_m calculation, and other examples, included and user editable. • Designed for seamless integration with ïSDR *and ïPDQ-WLR* tester data. • Superset of and supersedes PDQ-AT. • Does not require Oracle server. • Comprehensive context sensitive help throughout the environment. • Uses standard security key so ïRDA can be shared on multiple PCs. • Can handle very large data files.

View frame showing multiple graphs simultaneously



Automatic Parameter Extraction

APEX allows mathematical processing vectors-of-vector to reduce and extract usable results.

For example, APEX can be used to extract V_t from every device measurement of Id-vs.-Vg made across a set of wafers in a single step. The V_t becomes a vector of scalars that can be plotted, wafer-mapped or used for other calculations, as if it was part of the original measurement data set.

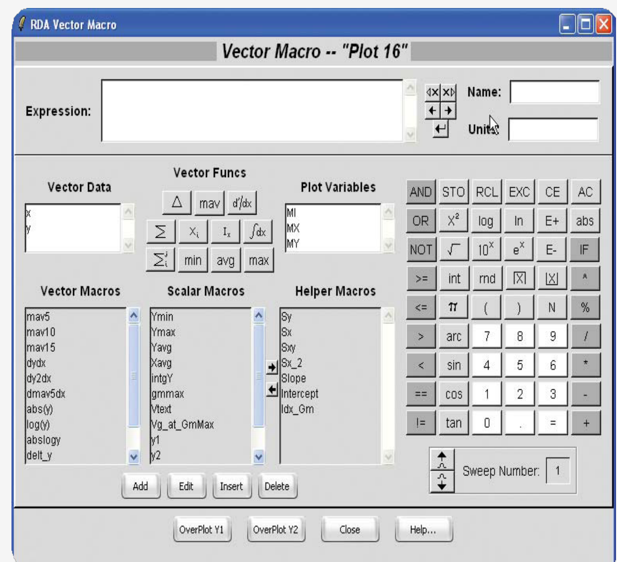
Strong features such as a unique and easy to-use graphical macro calculator provides advanced users with the capability to perform mathematical operations on any set of data variables. Frequently used functions can be stored and accessed as macros in the calculator window. This gives the user significant freedom in defining new acceleration models and extracting the parameters. Direct extraction to and import of spreadsheet data further enhances the customization.

ïRDA also supports trend charts for Statistical Process Control (SPC) in a production environment. ïRDA provides complete data manipulation capability including data merge (from different lots, tests, processes, etc.); data filter for filtering of useful or defective or bad data from the group; data sorting and data extraction with simple graphical operation.

Data Manipulation

Process, merge and filter data sets; multi-lot, multi-split, multi-condition analysis for casual to power users. Graphical representation of the data analysis flow makes clear the filtering and display frames used for analysis. Analysis methods, can be saved and re-used. Any test variable can be used to specify a filter.

Data can be filtered using wafer map selections to censor by die location. Any data set can be transformed into new, derivative, data sets using the macro transform calculator. Scalar data such as Id measured over time, or vector data such as full ID vs. VG curves measured over time, may be transformed into a new set of scalar or vector data.



ïRDA macro editor

Data Manipulation

Vector data can be transformed into scalar data; for example, extract extrapolated VT from ID vs. VG curves for every time point in a reliability time-series data set, using the powerful APEX features.

APEX automatically creates a new column in the data file associated with every device tested. If the test algorithm does not extract a parameter during test, either by design or through oversight, APEX can easily extract the missing derivative parameter.

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ïRDA PC Controller Requirements

Processor	i5
Operating System:	Windows 7/8 Professional
Required Memory:	2 GB
Required Disk Space:	100 GB
Monitor:	SVGA

USB (2/3) Port for security key
CD Drive to load software

METAWAFER TECHNOLOGIES sells advanced parallel, characterization, reliability, lifetime and quality estimating solutions for magnetic, semiconductor and nanotechnology devices.

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2520-9000 PDQ-WLR (C) for SPECS (HP-UX)
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Product specification and description in this document subject to change without notice.

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