



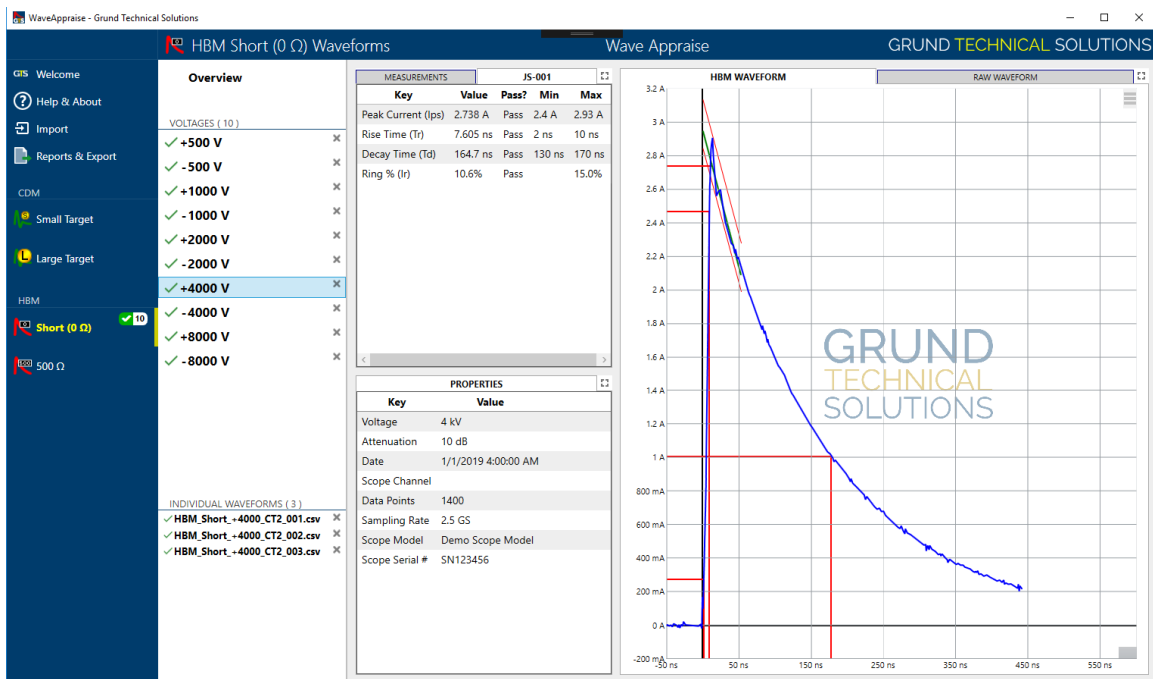
## Wave Appraise – Quick Start Guide

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### What is Wave Appraise?

Wave Appraise is a modern, efficient tool for analyzing HBM and CDM waveforms from virtually any source. It will tell you if your HBM or CDM waveforms pass JS-001/JS-002 using open-source verifiable calculations. You can import multiple waveforms together as a batch, and generate reports as pictures, CSV, or PDF.

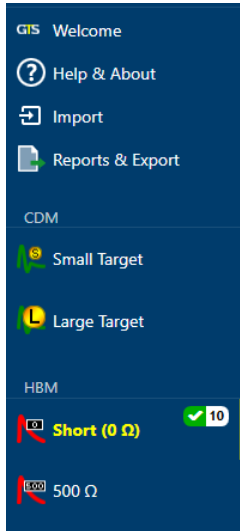




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### Navigation



Navigate around Wave Appraise by clicking a section on the blue navigation bar.

- **Welcome** – Shown when launched. Has the latest news from GTS
- **Help & About** – Read documentation and manage your license
- **Import** – Helps you import your raw waveform files for analysis
- **Reports & Export** – Shows different ways to export your analyzed waveforms
- **Waveforms (CDM, HBM)** –

Shows the analysis for waveforms you've imported. Notification bubbles next to each indicate how many are passing or failing.

### Getting Started

Wave Appraise requires a license key, which is free with registration. You will be prompted for your activation code (dashes required) the first time you run Wave Appraise. Internet access is required for activation.

#### Register Wave Appraise

Wave Appraise is currently in Closed-Beta. Please enter your Closed-Beta access code to begin using it.

Access Code:

**SAMPLE DATA** - Navigate to the **Welcome** section and click a Sample Data button for HBM or CDM.

**IMPORT YOUR DATA** - Refer to the **Import** section of this document.



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### Import

Wave Appraise can import data from a variety of sources including text and CSV files from oscilloscopes.

1. Navigate to the **Import** section, then click the button **Open Waveforms From Files...**
2. Select the waveform(s) you wish to import. You can select more than one.
  - a. *Multiple waveforms of the same voltage will automatically be averaged together.*
3. Valid waveform files will be listed. Type in the Voltage for each waveform
  - a. *Don't worry about polarity, Wave Appraise automatically determines positive/negative*

Volts (Abs)	Filename and Directory
✓ 1 kV	1KV.csv C:\GTS\WaveAppraise Sample Data\Titan\
✓ -1 kV	-1KV.csv C:\GTS\WaveAppraise Sample Data\Titan\
✓ 2 kV	2KV.csv C:\GTS\WaveAppraise Sample Data\Titan\
✓ -2 kV	-2KV.csv C:\GTS\WaveAppraise Sample Data\Titan\
⚠ 0 V	4KV.csv C:\GTS\WaveAppraise Sample Data\Titan\
⚠ 0 V	-4KV.csv C:\GTS\WaveAppraise Sample Data\Titan\



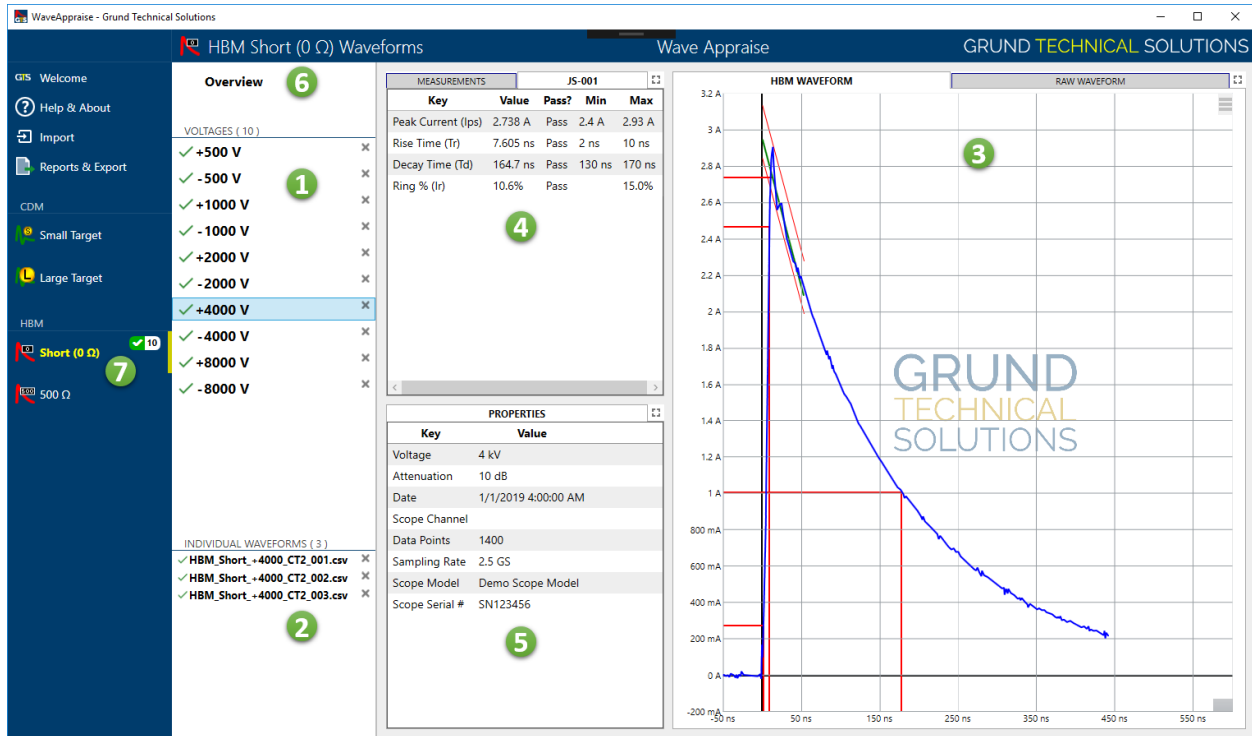
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4. Provide required details about the waveforms being imported:

Waveform Type:	✓	HBM
DUT:	✓	Short (0 Ω)
Attenuation (dB):	✓	20
Current Probe:	✓	CT-2
Test Date:		1/22/2019 2:45:45 PM
Tester Model:		
Tester Serial Number:		
Oscilloscope Channel:		Unknown
Oscilloscope Model:		
Oscilloscope Serial Number:		

- a. **Waveform Type** – Choose **CDM** or **HBM**
  - b. **DUT** – For **CDM** choose **Large/Small**, for **HBM** choose **0Ω/500Ω**
  - c. **Attenuation (dB)** – Enter the attenuator value (dB) that was placed on front of the oscilloscope, or 0 if none used.
  - d. **Current Probe (HBM only)** – Choose the current probe that was used to record data:
    - i. **CT-1** – Tektronix CT-1 current probe or equivalent (5 mV/mA)
    - ii. **CT-2** – Tektronix CT-2 current probe or equivalent (1 mV/mA)
    - iii. **Ground-Current** – Current signal terminated in the oscilloscope (applies to GTS PurePulse equipment)
  - e. **Sampling Rate (Gigasamples)** – (Only visible if required) If the raw waveform data does not contain time (X) values, you will need to provide the sampling rate in Gigasamples per second.
    - i. Sampling Rate = #DataPoints / ΔTime
    - ii. Example: 800 DataPoints per division, 80ns per division = 10 GS
5. (Optional) Provide extra details about the waveforms:
- a. **Test Date**
  - b. **Tester Model**
  - c. **Tester Serial Number**
  - d. **Oscilloscope Channel**
  - e. **Oscilloscope Model**
  - f. **Oscilloscope Serial Number**
6. Click **Finish Importing** to begin analyzing the waveforms.

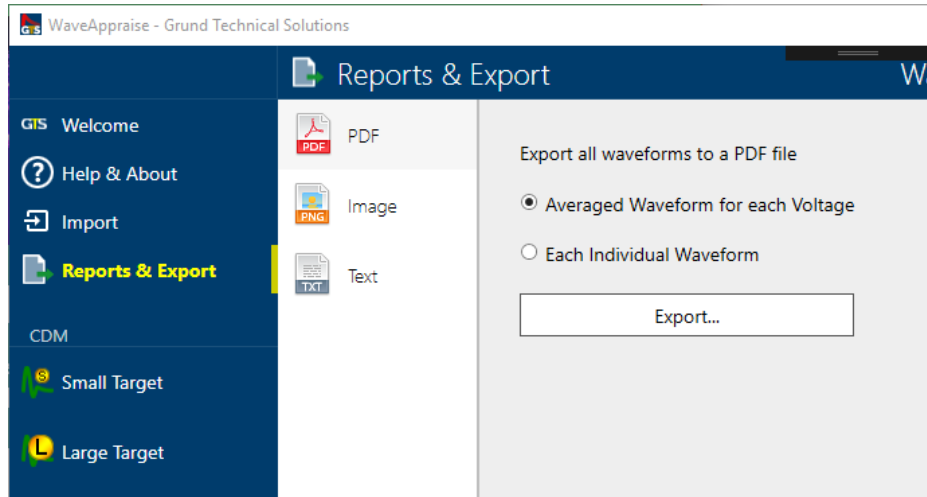
### Analyzing Waveforms



When you finish importing waveforms, you'll automatically be shown the analysis.

1. Voltages are listed here. When a **voltage** is selected, the analysis represents the **average** of all waveforms with matching voltage.
2. Individual waveforms that make up the average for a given voltage are shown here. When an **individual waveform** is selected, the analysis represents just that single waveform.
3. Waveform with analysis markup is shown here. You can click the **Raw Waveform** tab to see the original waveform as received from the oscilloscope.
4. Measurements and pass/fail outcome are shown here. Click the standard tab (JS-001/JS-002) to see the min/max criteria for passing.
5. Properties about the waveform are shown here.
6. Click **Overview** to see the waveforms of all the voltages overlaid together.
7. The selected section is highlighted with yellow, and a pass/fail bubble shows you how many voltages passed or failed at a glance.

### Reports & Export



You can export your data as pictures, CSV, or PDF.

1. Navigate to the **Reports & Export** section
2. Select an export format
3. Choose to export the averaged or individual waveforms
4. Click Export..., then choose a save location
5. It may take a few minutes to export a large number of waveforms.

### Integration with Maestro

Maestro is the software that powers GTS' Scorpion CDM and PurePulse TLP/HBM tools. With Maestro you can automatically push the validation data to Wave Appraise, saving you time and eliminating errors during data import.



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### Revision History – Quick Start Guide

#### **2019-09-10**

- Updated for release with Wave Appraise v1.1

#### **2019-01-22**

- Initial version – created for release with Wave Appraise v0.4

### Revision History – Wave Appraise

#### **V1.4 February 14, 2020**

- Exporting to non-existent directory fixed for PDF export

#### **v1.3 February 7, 2020**

- Exporting to non-existent directory no longer causes crash
- Invalid HBM 0-Ohm data handling improved
- Exporting individual waveforms name collision fixed

#### **v1.2 September 26, 2019**

- Importing data points with identical time values (due to rounding) is now handled better
- HBM 0-Ohm now handles truncated waveforms better when calculating decay time
- PDF report now contains filenames and paths of each waveform
- Registering WaveAppraise automatically starts the 90-day premium trial now

#### **v1.1 September 10, 2019**

- Voltage parsing tuning
- XML export now saves as “.wavex” but is actually a zip file
- XML export tuning

#### **v1.0 (Public Release) August 20, 2019**

- Voltage is parsed from filename automatically (Premium feature)
- Rigol oscilloscope CSV files with multiple channels now imports
- Properties of imported waveforms can now be edited
- Error log zip archive can now be generated
- Non-english CSV parsing now handles culture better
- PDF export tuning

### v0.10 (Closed-Beta) June 4, 2019

- HBM 0-Ohm Peak-Current derivation offset time is now adjustable
- HBM 0-Ohm find second peak options added
- Importing waveform speed improvements
- XML export tuning
- Premium Trial and Premium Subscription license types added

### v0.9 (Closed-Beta) April 3, 2019

- Settings section added (at bottom left)
- Averaged waveforms that are skewed are now corrected so data points average correctly
- Removing an individual waveform now causes pass/fail to be re-evaluated
- Export to PDF includes a summary page at the beginning
- Export to PDF or Text now has an option to automatically open the exported file (default: yes)
- Export to PDF individual wfms now shows correct wfm (it repeated the averaged wfm before)
- The default HBM noise cutoff time changed to -15ns

### v0.8 (Closed-Beta) March 18, 2019

- All standard-specific calculations have been released as open source in ESDWaveformVerifier.dll
- Calculating HBM decay time uses an Exponential Fit to reduce noise
- Export to PDF values can be formatted with custom numeric formats. Default is two decimal places
- Export to PDF formatting and placeholders fixed

### v0.7.3 (Closed-Beta) February 21, 2019

- Importing Maestro waveform captured with Ground-Terminated waveforms now imports correctly
- Importing Rigol Oscilloscope CSV format implemented
- CDM import parameters are now un-hidden correctly while importing waveforms
- Current Probe type added to HBM properties
- HBM 500-Ohm no longer incorrectly uses HBM 0-Ohm measurements
- CDM capacitance and total charge added (Preliminary version, may not be accurate)
- Export to XML implemented
- Import from WaveAppraise-formatted XML implemented (extension .wavex)
- Logging filename scheme changed to a unique timestamp to accommodate multiple instances
- Mismatched current probe type when calculating average waveform is now scaled before averaging
- Export to PDF filename now has "Average" or "Individual" inserted by default
- Exporting now remembers the last save location
- Tester Model and Serial Number added to the properties UI
- Oscilloscope Cal Due Date, Operator properties added to the UI and input fields
- When importing data that is "complete from source" such as Maestro, it no longer populates empty default values incorrectly
- Import section now keyboard focuses on the import button, then moves to the first voltage textbox
- Version number added to the titlebar
- Export to PDF now contains rudimentary measurements and properties





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- Range-shifting waveform math bug fixed
- [Experimental] HBM 0-Ohm noise reduction for Ring % calculation

### **v0.6 (Closed-Beta) (2019-01-24)**

- Opening CSV data from additional Tektronix models added
- Opening waveforms shows a comment about success/fail when opening
- Current Probe choice has more detail about them

### **v0.5 (Closed-Beta) (2019-01-22)**

- Initial Closed-Beta release