



# Power Supply System Simulation Software





There is a contradiction between the power supply system and electrical equipment: equipment requires uninterrupted, pure sine wave AC or smooth DC power, while the power supply expects a constant load without voltage distortion. In reality, both sides cannot meet these ideal requirements, so compromises must be made within the entire electrical system. Power supply standards define the permissible output limits and require equipment to meet design specifications within the acceptable disturbance limits.

## Industry Regulations and Standards

The power supply characteristics standards define the power supply requirements for electrical equipment. For example, the STD-704 series specifies how the equipment should operate under various supply conditions. Common power supply scenarios include normal operating conditions, abnormal operating conditions, overvoltage and undervoltage, frequency modulation, etc.

Other power supply standards, such as RTCA DO-160 "Environmental Conditions and Test Methods for Electrical Equipment," cover various power disturbances, including voltage dips, short interruptions, harmonic distortion, and more. Additionally, leading manufacturers often have their own standards, such as Airbus's ABD and AMD standards, and Boeing's B787 standard. These standards are highly valuable for the design of large electrical systems and set higher requirements for the equipment's ability to withstand disturbances.

## AC/DC power system

The power supply system has evolved through low-voltage DC, AC, and high-voltage DC. Among them, the AC power supply has undergone the development of constant-speed constant-frequency (400Hz), variable-speed constant-frequency, and variable-speed variable-frequency (360Hz-800Hz). For example, the Boeing 787 power distribution system uses four power supply systems: 230VAC, 115VAC, 28VDC, and 270VDC, to power the onboard electrical loads.

## Test challenges for electric equipment

Performing power supply adaptability tests for electrical equipment is a complex and time-consuming task. Even experienced engineers need several weeks to study the regulatory test conditions and ensure that these waveforms can be successfully output on a powerful programmable AC/DC power supply. During this process, engineers must repeatedly work on editing custom waveforms and even understand secondary development instructions to achieve automated testing and generate comprehensive test reports. On the other hand, selecting a high-speed AC/DC power supply with strong waveform simulation capabilities is also a key factor for successful testing.

## APS4000 Series Regulatory Software

To accelerate the power supply adaptability verification process for electrical equipment, ITECH has launched the APS4000 series regulatory software, which, when paired with the high-performance programmable DC power supplies from the IT7800/IT7800E/IT7900P/IT7900EP series, can generate various DC and AC output waveforms as specified by power supply standards. This includes waveforms such as harmonic distortion and abnormal voltage transients. The software interface is simple and user-friendly, with built-in test item numbers corresponding to each regulation. Users only need to select the applicable regulation standard and test number to begin the test, saving engineers a significant amount of time on test editing and configuration.

# Overview of APS4000 Series Regulatory Software

The APS4000 Series Regulatory Software can be paired with ITECH IT7800/IT7800E/IT7900P/IT7900EP series high-performance programmable AC/DC power supplies to provide power output ranging from 5kVA to 960kVA and frequencies from 16Hz to 2400Hz. The software includes mainstream power supply characteristic standards such as STD-704, DO160, A350, A380, GJB181B, HB20326, and STD-1399, realistically simulating various AC and DC power supply systems. These include DC 270Vdc, 28Vdc, single-phase AC 115V/400Hz, three-phase AC 115V/400Hz, and a wide frequency range of 360Hz-800Hz. The APS4000 Series software includes four models to meet different testing scenarios: APS4000-ASTD, APS4000-B787&AMD, APS4000-AVALL, and APS4000-1399. The software provides a user-friendly interface to help engineers quickly select test conditions and complete testing.

## Advantage of AC/DC power supply:

- Adopt next generation SiC technology, high power density design
- 21kVA in 3U, master-slave parallel up to 1MVA+
- Voltage range: 0-350V L-N, reverse mode up to 700V L-N
- Up to 50th harmonic simulation and analysis function
- Four output modes: AC/DC/AC+DC/DC+AC
- Single-phase/three-phase output
- Powerful power supply waveform simulation function: LIST / user-defined waveform
- Built-in EC61000-4-11/4-13/4-14/4-28 regulation waveform
- Built-in USB/CAN/LAN/Digital IO communication interface

## Advantage of APS4000:

- User-friendly GUI, easy to operate
- Provide STD-704, DO160, A350, A380, GJB181B, HB20326, B787 and AMD regulatory standards
- Provide the STD-1399 Electrical Equipment Power Supply Adaptability Testing Standard.
- Provide single/three-phase output parameter setting and measurement interface
- Flexibility to run all test items or specified number of test items
- Automatic generation of test reports

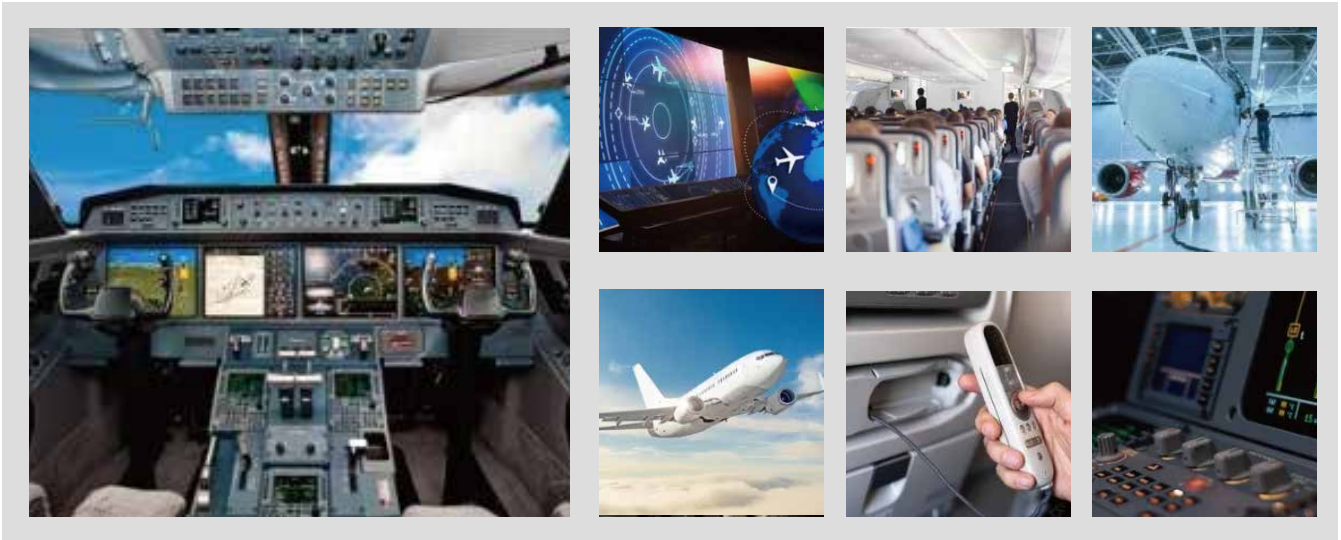


## APS4000 Models

| Model            | Regulatory Standards   | Revision                                     |
|------------------|--|--|
| APS4000-ASTD     | STD-704, DO160, ABD0100.1.8(A380), ABD0100.1.8.1 (A350), GJB181B, HB20326                      | STD-704: Rev A/B/C/D/E/F<br>DO160: Rev E/F/G |
| APS4000-B787&AMD | B787, AMD24C(A400M)  | A380: Rev D/E<br>A350: Rev C                 |
| APS4000-AVALL    | STD-704, DO160, ABD0100.1.8(A380), ABD0100.1.8.1 (A350), GJB181B, HB20326, B787, AMD24C(A400M) | GJB181B: Rev B                               |
| APS4000-1399     | STD-1399-300   | HB20326: Rev 2016                            |

## Application

- Entertainment systems
- Lighting system
- Communication and navigation Systems
- Recording system
- Cockpit display system
- Control systems



## APS4000 Software Interface

The APS4000 series features a user-friendly and straightforward software interface design, which greatly accelerates the testing process for electrical equipment. Once the software is successfully installed on your computer, you can complete the test with just a few simple steps.

1. Select the applicable standard, such as STD-704.
2. Choose the version of the test standard, such as STD-704 RevF or RevE, etc.
3. Select the correct operating mode, DC or AC.
4. Select test serial number, such as HD101, HD102...
5. Select running mode: Run all steps/ Run single step/Loop single step.
6. Click and start the test.



## Test Items

Taking the STD-704 test standard as an example, the APS4000-ASTD software provides 6 test versions from RevA to RevF, and users can choose any of them and configure the corresponding power supply system voltage levels. For example, when you select the RevF version, the power supply system voltage configuration section of the software will display multiple voltage options, specifically including:

| Power supply mode | Specification  | Rated voltage | Rated frequency | Phase    |
|-------------------|--|---------------|-----------------|----------|
| SAC               | single-phase constant frequency 115Vac/400Hz                   | 115Vrms L-N   | 400Hz           | 1 $\phi$ |
| TAC               | three-phase constant frequency 115Vac/400Hz                    | 115Vrms L-N   | 400Hz           | 3 $\phi$ |
| SVF               | single-phase constant frequency 115Vac                         | 115Vrms L-N   | 360Hz~800Hz     | 1 $\phi$ |
| TVF               | three-phase constant frequency 115Vac                          | 115Vrms L-N   | 360Hz~800Hz     | 3 $\phi$ |
| SXF               | single-phase constant frequency 115Vac/60Hz                    | 115Vrms L-N   | 60Hz            | 1 $\phi$ |
| LDC               | STD-704 standard compliance test of 28V DC electric equipment  | 28Vdc         | N/A             | N/A      |
| HDC               | STD-704 standard compliance test of 270V DC electric equipment | 270Vdc        | N/A             | N/A      |

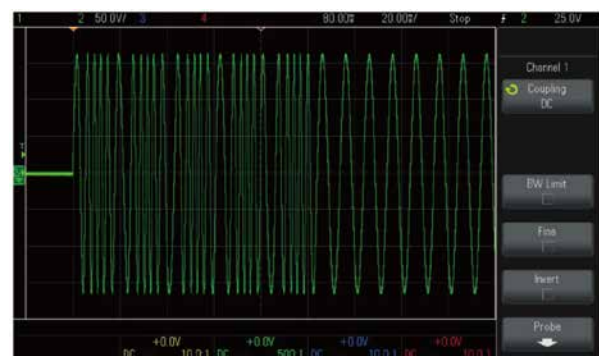
Just select the type of output, such as SAC (Single Phase Constant Frequency 115Vac), the software will automatically switch to the test item number under the SAC power supply system, containing SAS101-SAC603. The APS4000 allows you to select the test sequence to be performed and click the Run button to make the test easier and save configuration time.

Regulations Category RevF SAC Execution Mode Run all steps Run/Stop

| Method | Subject  | Test Condition                       | Comment                    |
|--------|--|--------------------------------------|----------------------------|
|        | Normal Voltage Transients (Repetitive)                 | 90V RMS to 140V RMS                  | Not less than <sup>^</sup> |
| SAC110 | Normal Frequency Transients (Overfrequency)            | High Frequency 425Hz                 | TABLE SAC1                 |
|        | Normal Frequency Transients (Underfrequency)           | Low Frequency 375Hz                  | TABLE SAC1                 |
|        | Normal Frequency Transients (Combined)                 | 375Hz to 425Hz                       | TABLE SAC1                 |
| SAC201 | Power Interrupt  | 0V RMS for 50msec                    | TABLE SAC2                 |
| SAC301 | Abnormal Steady State Limits for Voltage and Frequency | 100V RMS to 125V RMS, 380Hz to 420Hz | TABLE SAC3 <sup>v</sup>    |



LDC302 28V abnormal voltage transients (overvoltage)



SAC303 115Vac abnormal frequency transients (over frequency)



This information is subject to change without notice. For more information, please contact ITECH.

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