

Available Features:

Windows 10 GUI Software Support covers four IEC61000-4 Immunity Test Standards:

- **IEC61000-4-14**, Voltage fluctuation immunity test for equipment with input current not exceeding 16 A per phase
- **IEC61000-4-17**, AC Ripple on DC input power port immunity test
- **IEC61000-4-27p**, Unbalance, immunity test for equipment with input current not exceeding 16 A per phase
- **IEC61000-4-28**, Variation of power frequency, immunity test for equipment with input current not exceeding 16 A per phase

Common Features for all IEC 61000-4 Test Sequences Provided:

- Includes test levels for all EUT classes 1, 2, 3 and X. *Accommodates changing IEC standards if needed. Covers all EUT classes and test levels.*
- Pre-set test sequences and test levels conform to **relevant** IEC 61000-4 test standards. *Ready to test out of the box. No need for any programming by the end-user saves time.*
- Individual test levels or EUT class tests can be selected and run by the operator to allow close observation of EUT performance. *Enables detailed review of EUT behavior to help implement needed design changes.*
- Simple selection of test parameters guides the operator through entire test procedure. *No detailed IEC Standards knowledge required on the part of the operator, less chance of mistakes.*
- Reports are generated in Rich Text Format for compatibility with most word processors, allowing customization of test reports. *Makes it easy to meet documentation requirements and augment technical construction files with test reports.*
- Included with all ECTS2 Series EMC Test Systems.
- Software also available as an Option for AFX Series, AZX Series and LMX Series Power Source Models.



International
Electrotechnical
Commission



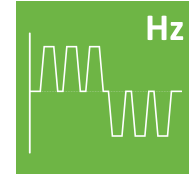
VOLTAGE FLUCTUATIONS



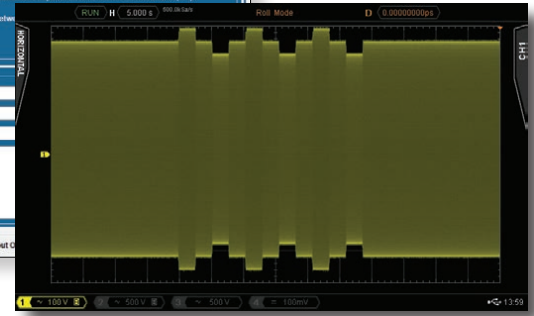
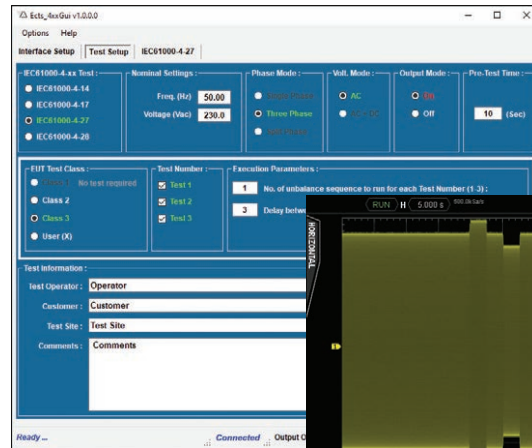
AC RIPPLE ON DC



VOLTAGE UNBALANCE



FREQUENCY VARIATIONS

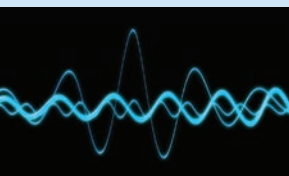


IEC 61000-4-xx Immunity Testing

The EMC Directive is one of the 'New Approach' Directives and applies across all 27 member states of the European Union (EU). The Directive applies to all electronic or electrical products liable to cause or be disturbed by electromagnetic interference (EMI). As a result, a large number of manufacturers in the electronics or electrical industries need to ensure that their products are compliant with the requirements of the Directive and be able to demonstrate that this is the case in order to affix the CE Mark.

The Ects_4xxGui Test Software supports these four Immunity Test Standards:

- IEC61000-4-14
- IEC61000-4-17
- IEC61000-4-27p
- IEC61000-4-28



FREQUENCY CONVERSION

AEROSPACE

R & D

MILITARY

MANUFACTURING

CUSTOM

IEC61000-4-14 Immunity Test Screens

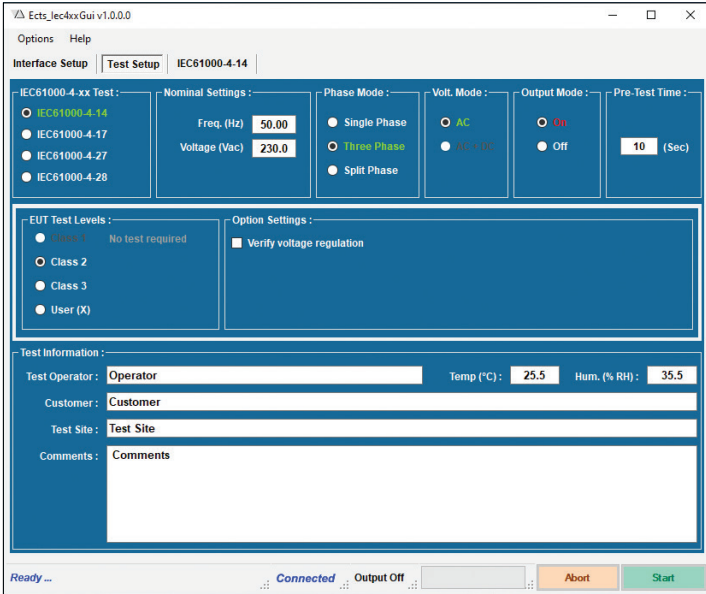


Figure 1: IEC61000-4-14 Test Setup GUI Screen

IEC 61000-4-14 Voltage Fluctuations

The IEC 61000-4-14 AC immunity test standard is aimed at testing a product for immunity against voltage fluctuations that can occur on the public utility power grid.

The nature of these voltage fluctuations involve typical high and low voltage line conditions. As such, the AC voltage is changed either up or down by a certain percentage of the nominal line voltage. This pattern is repeated several times while observing the EUT for any unusual behavior.

The Ects_4xxGui software supports full compliance to the IEC 61000-4-14 standard. All test EUT test classes are supported, including the user class X which allows the user to set custom test levels and durations.

Test Setup Tab

The Test Setup tab allows nominal test values for Voltage and Frequency as well as AC source phase mode - single, split or three phase - to be selected. The EUT Class selection determines the test levels applies. Relevant EUT classes for IEC61000-4-14 testing are 2, 3 and X. No test is required for Class 1 EUTs.

IEC61000-4-14 Test Levels Tab

The Test Levels tab displays the test levels, durations and delays between successive application of the test levels as well as the number of times they are repeated. These values are determined by the Class selected except for Class X (User Class) for which the operator can edit the values in the test screen table and save/recall to disk as needed.



VOLTAGE FLUCTUATIONS

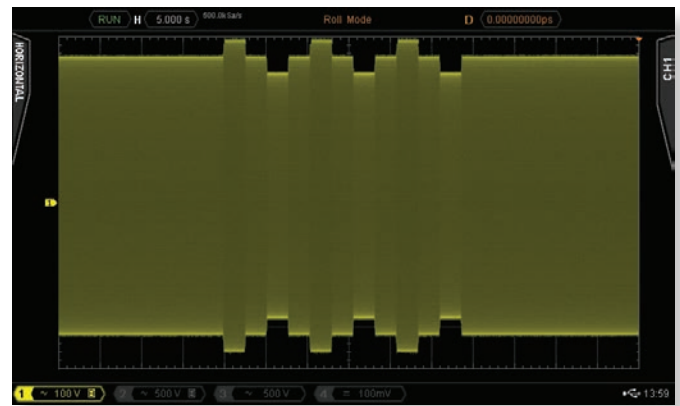


Figure 2: IEC61000-4-14 Voltage Fluctuation on one phase

Test Reports

Detailed test reports can be generated at the end of each test run. Reports include test levels applied and any operator observations of the EUT behavior during the test. A Rich Text Format is used that is easily transferred to MS Word or PDF.

AC Source Compliance

Required AC Source compliance to this IEC test standard is summarized in the Table below for the model series that support this option.

Parameter	IEC 61000-4-14 Requirement	LMX Series	AFX Series	AZX Series
Output voltage capability	Un ± 15%	Up to 600Vac	300Vac	460Vac
Voltage accuracy	± 1%	± 0.5%	± 0.02%	± 0.02%
Zero crossing accuracy	250 µsec at zero voltage crossover	< 20 µsec		
Output current capability	Able to supply enough current to EUT at test voltage	Model dependent. See LMX/AFX/AZX Data sheet for Current/Voltage rating chart by model.		
Voltage overshoot/undershoot	Less than 5% of the change in voltage	Meets requirement		
Voltage rise/ fall time during switching	< 1 msec	< 100 µsec		
Maximum interphase error (Three Phase)	2.5°	0.3°		
Frequency accuracy	2.5% of fn (50 Hz or 60 Hz)	0.01% of fn		

IEC61000-4-17 Immunity Test Screens

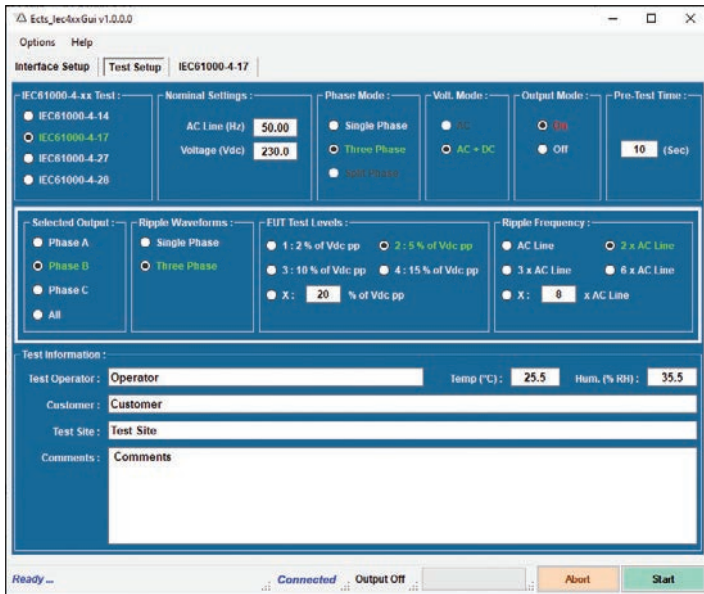
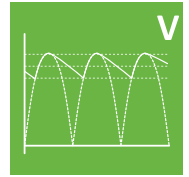


Figure 3: IEC61000-4-17 DC Ripple Test Setup GUI Screen



AC RIPPLE ON DC

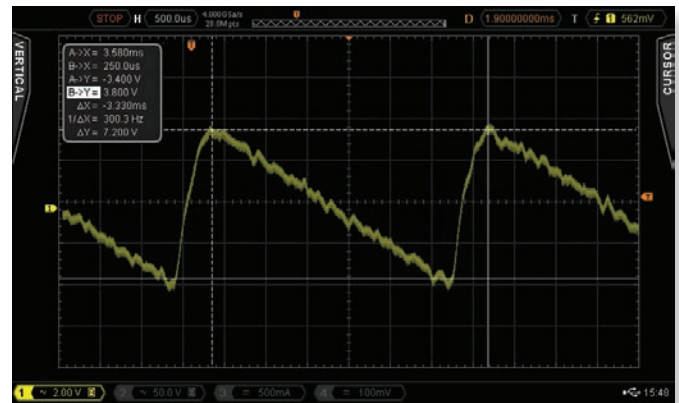


Figure 4: IEC61000-4-17 Single Phase Rectifier DC Ripple

IEC 61000-4-17

The IEC 61000-4-17 standard covers DC powered products. DC output mode is available on AFX and AZX Series power sources. Test voltages up to 425Vdc are available on AFX Series and up to 650Vdc on AZX Series.

Test Setup Tab

The test standard covers Test Levels 1 through 4 as well as user test level X. The DC ripple frequency is a multiplier of the mains frequency by x1, x2, x3, x6 of a level X user multiplier. Two ripple waveforms are available, one for a typical single phase AC rectified DC output and one for a typical three phase AC rectified output.

The user sets the nominal DC voltage of the EUT and ripple parameters. These tests generally use only one output but on three phase power sources in DC mode, all three outputs can be used at the same time if needed.

Power Group	Nominal Voltage	Ripple Frequency	Ripple Amplitude
DC	User Set	50Hz	2%, 5%, 10% or 15%
		100Hz	
		150Hz	
		300Hz	
DC	Level X:	User set	User Set

Test Reports

Detailed test reports can be generated at the end of each test run. Reports include test levels applied and any operator observations of the EUT behavior during the test.

A Rich Text Format is used that is easily transferred to MS Word or PDF.

DC Source Compliance

Required DC Source compliance to this IEC test standard is summarized in the Table below for the model series that support this option.

Parameter	IEC 61000-4-14 Requirement	AFX Series	AZX Series
Output voltage capability	up to 360Vdc	425Vdc	650Vdc
Voltage Load Regulation	< 5%	± 0.02%	± 0.02%
Output Voltage Waveform	Sinusoid-linear AC waveform	Full Arbitrary Waveform capability. Sinusoidal-linear waveforms downloaded to DC Source by GUI	
Output Voltage tolerance	± 10%	± 0.25%	
Output Current (steady state)	up to 25Adc	Model dependent. See AFX/AZX Data sheet for Current/Voltage rating chart by model.	
Peak output current capability < 5 msec	+2.5/- 0.5 steady state current		
Ripple Frequency Tolerance	± 1%	Exceeds	

IEC61000-4-27p Immunity Test Screens

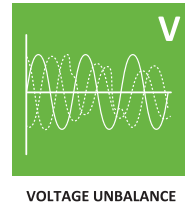
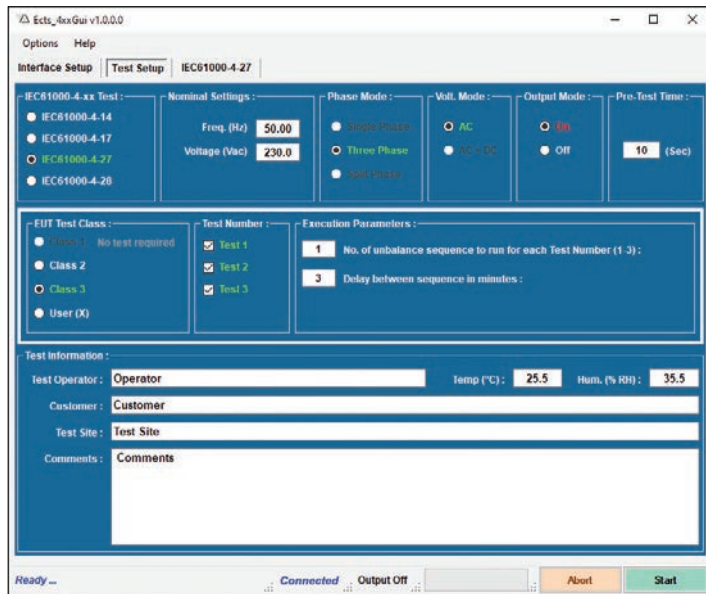


Figure 5: IEC61000-4-27p Three Phase Voltage Unbalance Test Screen

Figure 6: IEC61000-4-27p Three Phase Voltage Unbalance Sequence

IEC 61000-4-27p

The IEC 61000-4-27p standard applies only to 50Hz or 60Hz three-phase powered electrical and/or electronic equipment with rated line current up to 16Arms per phase. It establishes a reference for evaluating the immunity of such equipment when subjected to an unbalanced power supply voltage. This test can only be performed using a three phase AC Power Source.

Test Setup Tab

The IEC 61000-4-27p test sequences cover class 2 and 3 for nominal voltage and frequency permutations in three phase mode only. The user class X is supported as well. For each test level, the user can select Test Number 1 through 3 and the number of test sequences to run for each (1 ~3). Once selected, the corresponding test screen is displayed allowing a test to be started. A typical IEC 61000-4-27p test sequence is shown in Figure 6.

Test Reports

Detailed test reports can be generated at the end of each test run. Reports include test levels applied and any operator observations of the EUT behavior during the test. A Rich Text Format is used that is easily transferred to MS Word or PDF.

AC Source Compliance

Required AC Source compliance to this IEC test standard is summarized in the Table below for the model series that support this option. Using the Ects_4xxGui, this test is pre-compliance only due to the voltage rise/fall requirement time of the generator. However, the EPTS Hardware option is available for full compliance IEC61000-4-27 testing. See the PPS_EPTS_Datasheet for details.

Parameter	IEC 61000-4-27 Requirement	LMX Series	AFX Series	AFX Series
Output Voltage Capability	Un +15%, -40%	Model dependent. See LMX series datasheet	300Vac	440Vac
Output Voltage Accuracy	± 2% of Un		± 0.5%	
Output Current Capability	Sufficient to supply the EUT under all test conditions	Model dependent. See LMX/ASX/AFX Data sheet for Current/Voltage rating chart by model.		
Voltage overshoot / undershoot, generator loaded with 100 Ohm resistive load	Less than 5% of the change in voltage		Meets requirement	
Voltage rise (and fall time) during voltage changes, generator loaded with 100 Ω resistive load	1 μs to 5 μs		Full Compliance is available with the EPTS Hardware Option Pre-compliance only without the EPTS Option	
Total harmonic distortion of the output voltage	Less than 3%	< 0.1% @ 50Hz / 60Hz	< 0.25% @ 50Hz / 60Hz	
Phase Shifting	0°, 120°, 240° ± 30°		0°, 120°, 240° ± 360°	
Phase Accuracy	1° between any two phases		< 0.35° between any two phases	
Frequency Accuracy	0.5% of f1 (50 Hz or 60 Hz)		±0.005%	

IEC61000-4-28 Immunity Test Screens

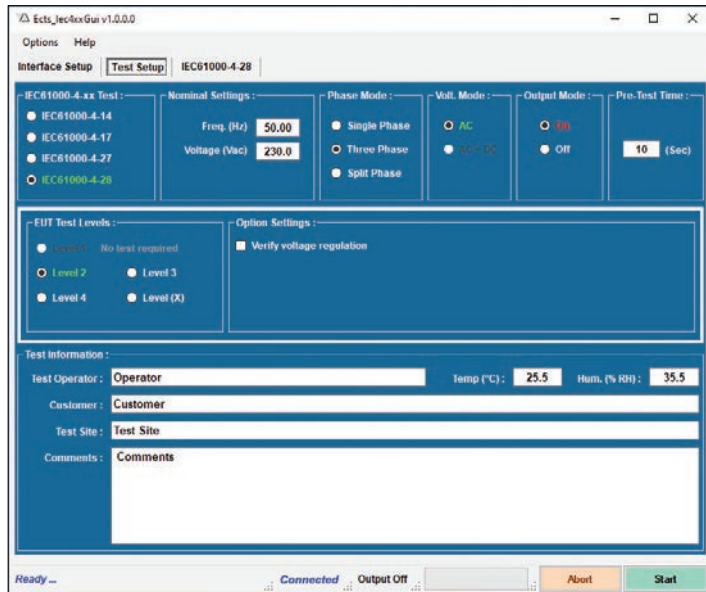


Figure 7: IEC61000-4-28 Frequency Variations Test Screen

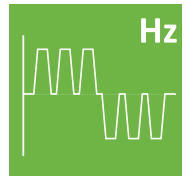
IEC 61000-4-28

The IEC 61000-4-28 standard is intended to evaluate the effect of power frequency variations on equipment which may be sensitive to such disturbances. These effects are generally instantaneous. To this end, these tests apply frequency variations using specific frequency slew rates to the EUT.

Test Setup Tab

The IEC 61000-4-28 test sequences included cover test levels 1 through 4 and a user test level X for nominal voltage and frequency permutations in single, split or three phase mode. The appropriate IEC 61000-4-28 test level can be selected from the Test Setup tab of the GUI.

Once selected, the IEC61000-4-28 Test level screen is displayed and a test can be started. A typical IEC 61000-4-28 test sequence is shown in Figure 8. Since the frequency change is very gradual, it is near impossible to see on a digital scope. A DMM or frequency counter may be required to measure the actual frequency changes.



FREQUENCY VARIATIONS

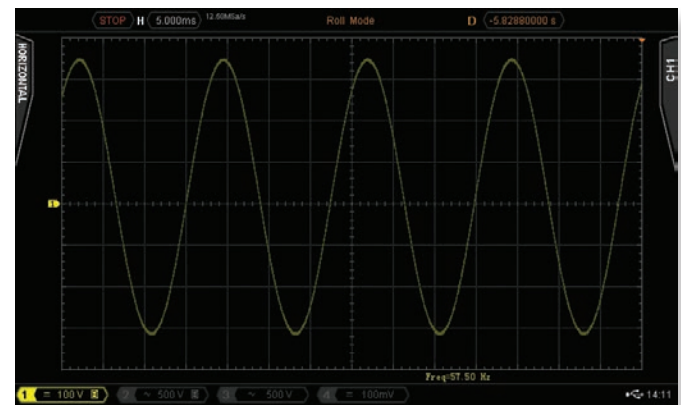


Figure 8: IEC61000-4-28 Frequency Variation for Fnom + 15% (Level 4)

Test Reports

Detailed test reports can be generated at the end of each test run. Reports include test levels applied and any operator observations of the EUT behavior during the test.

A Rich Text Format is used that is easily transferred to MS Word or PDF.

AC Source Compliance

Required AC Source compliance to this IEC test standard is summarized in the Table below for the model series that support this option.

Parameter	IEC 61000-4-28 Requirement	LMX / AFX / AZX Series
Output voltage accuracy	± 2%	± 0.02%
Output voltage and current capability	Able to supply enough voltage and current according to the type of EUT	Model dependent. See data sheets for Current/Voltage rating chart by model.
Phase accuracy for each phase	2° (0.5% of 360°)	0.35° or better
Frequency accuracy	0.3% of f1 (50 Hz or 60 Hz)	±0.005%
Frequency capability range	f1 ±20%	Exceeds requirements
Test duration accuracy	±10%	Exceeds requirements

IEC 61000-4-xx Test Reports

Documenting product compliance is important and helps build a technical construction file to document compliance to relevant IEC61000-4 Test standards required for CE Marking of products.

The Ects_4xxGui software generates detailed test reports including IEC Standard used, EUT information, Test levels applied, nominal voltage and frequency settings, temperature¹, humidity¹ and pass or fail results as determined by the operator.

All this information is contained in a Rich Text Formatted (RTF) file generated at the end of a test. These files can easily be converted to MS Word or Adobe PDF format as needed.

Some sample reports are shown in Figure 9 for reference.

Compatible AC Power Sources



LMX Series - 500VA to 30kVA



AFX Series - 6kVA to 180kVA



AZX Series - 30kVA to 200kVA

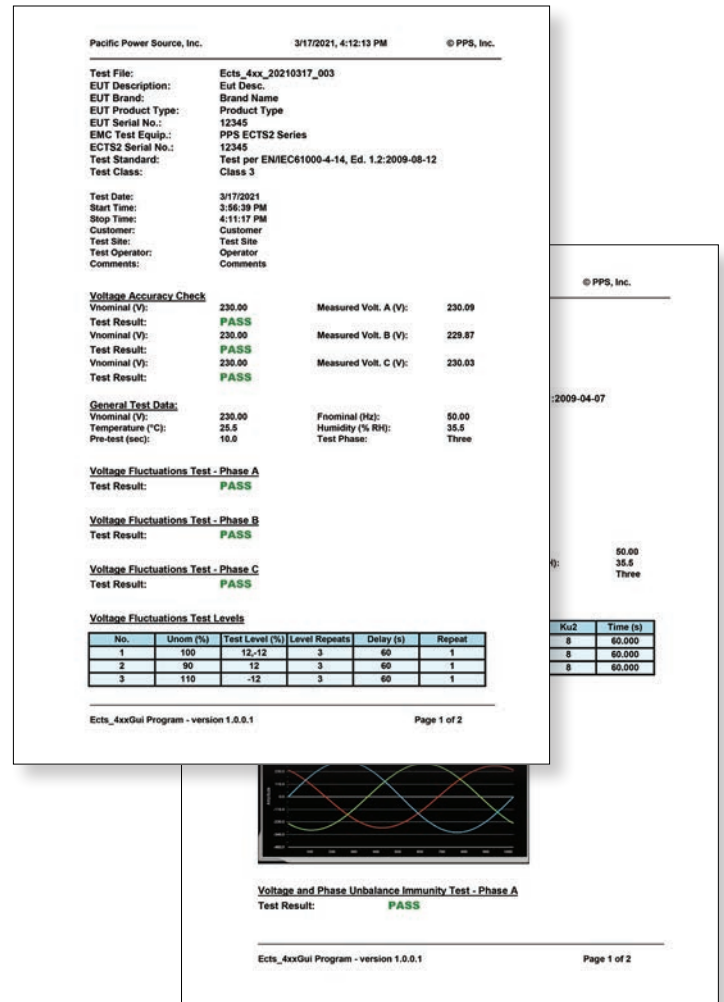


Figure 9: IEC61000-4-14 and IEC61000-4-27p Test Report Cover Pages

Test Coverage By Source Model Series

IEC 61000-4 Test	Mode	AFX Series	AZX Series	LMX Series
IEC 61000-4-14	AC	Yes	Yes	Yes
IEC 61000-4-17	DC + AC	Yes	Yes	-
IEC 61000-4-27p	AC	Yes	Yes	Three Phase Models only
IEC 61000-4-28	AC	Yes	Yes	Yes

Ordering Information

Order Example

Ects_4xxGui

- IEC 61000-4-xx Test Software Option

Included

- Ects_4xxGui for Windows 10 Software (download). Software License key provided Power Source S/N.
- Ects_4xxGui User Manual (download).



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Note 1: Requires customer provided Temperature and Humidity Measurement device