Pre-Compliance Harmonics & Flicker Test System PCTS

- **Affordable Pre-Compliance Test**
  Test products for compliance to IEC Harmonics and Flicker standards using standard 230 Vac - 50 Hz line power.

- **AC Line Distortion Compensation**
  PCTS Software compensates for AC Line distortion.

- **PC Based Operation**
  Simple to use Windows GUI automates and documents test procedures and easily accommodates future IEC standard changes.

- **Upgradable to Full Compliance Level**
  PCTS can be field upgraded to full compliance by adding a California Instruments AC Power Source.

- **EN 61000-3-2 Harmonics**
  Supports new Amendment 14 harmonics test requirements.

- **EN 61000-3-3 Flicker**
  Eliminates the need for IEC 725 reference impedance using direct voltage and current measurement method.

INCLUDES AMENDMENT 14 SUPPORT !!!

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Introduction

The PCTS pre-compliance harmonics and flicker test system provides a cost effective solution for testing products to EN61000-3-2 harmonics, and EN61000-3-3 Flicker standards during internal product qualification and development stages. Using line AC power from 100 - 240 Vac 50 Hz, the PCTS uses proprietary software algorithms to compensate for line distortion. Hence, test results will be virtually identical to those that will be obtained with a full compliance test system. This ensures that results are consistent and repeatable, regardless of prevailing line conditions.

For flicker analysis, the use of a sophisticated dual channel measurement technique compensates for the lack of the IEC 725 impedance and dynamically calculates the correct flicker results. Therefore, test results of the PCTS are within a few percent of those that will be obtained by a certified full compliance test system. Thus the

PCTS can be used to check EUT's before submitting them to a test lab or for periodic verification of product compliance in a production environment.

Modular Architecture

The PCTS system utilizes an easily upgradeable modular approach. The signal conditioning unit converts voltage and current into low level signals that are routed to the AC power analyzer card that is installed in the user's PC. This approach is extremely cost effective, and only requires the user to plug the signal conditioning unit into a wall outlet. The EUT is then plugged into the signal conditioning unit, which can be placed under a printer or a desktop style PC.

50 Hz AC Line Operation

Typical harmonics and Flicker compliance test systems such as the California Instruments CTS series utilize a programmable AC power source. The PCTS however relies on the available

50 Hz AC line power. Note that 60 Hz line power with different voltage levels may cause harmonics spectra to differ substantially. Moreover, 60 Hz power distribution systems also have a lower impedance, affecting Flicker calculations. Thus, it is advised to use a fully IEC compliant CTS Series system under these conditions.

The included PACS signal conditioning unit (Power Analysis and Conditioning System) provides the required signal isolation and scaling for the PC based acquisition system. A high speed sampling system records and processes all relevant data and produces a real-time display of voltage, current and harmonic content.

The elimination of the AC power source and the use of a PC based measurement system greatly reduces the acquisition cost of the PCTS compared to traditional harmonics and flicker test systems.

California Instruments

PCTS Series - IEC 61000-3-2 Harmonics Test

Simple buttons start and stop automated test.

Key EUT electrical parameters are updated continuously.

User selectable test limit margin.

Test start time and test progress are clearly indicated.

Clearly marked Pass (Green) or Fail (Red) indication is active during the entire test run. AC Line distortion is monitored and compensated for in software.
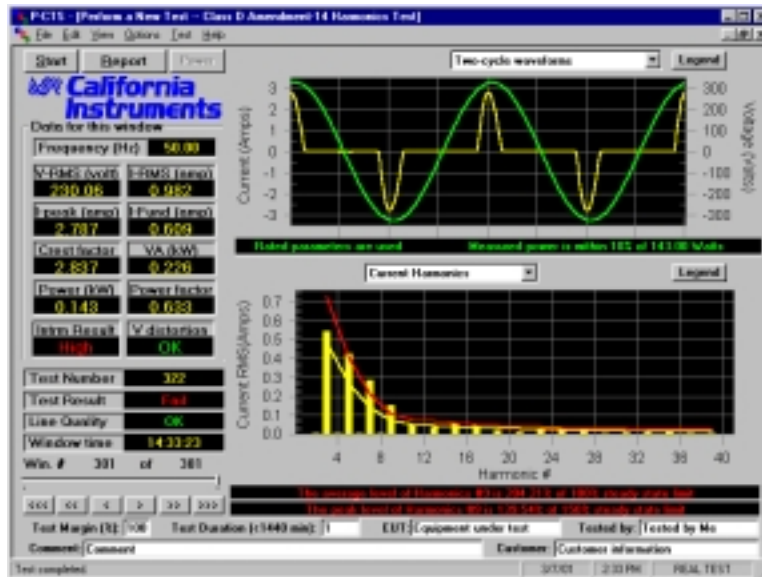
Both Voltage and Current waveforms are shown in real-time. For class A and D test, the special waveshape template (red) is shown.

Bottom graphs show current harmonics against IEC class limits. The user can also view the AC Line voltage harmonics in real-time.

Equipment Under Test description and operator ID are added to all test reports.

The Windows based graphical user interface (GUI) greatly facilitates the use of the system by the operator. EUT class selection and test time are the only required user inputs. If desired, additional information on the EUT can be entered for incorporation in the test report. The result of each test run is clearly shown using color highlights.

Actual EUT current harmonics versus IEC test limits are displayed in graphical form with a clear indication of which harmonics surpass the IEC limits.

AC Line voltage is monitored in real-time and the PCTS harmonic analysis software automatically compensates for the effect of line distortion on the EUT harmonic currents. This produces

test results which are comparable to those obtained with a fully EN61000-3-2 compliant test system.

Both IEC 61000-3-2.1998 and the IEC 61000-3-2.2001 Amendment 14 standards are supported by the PCTS software.
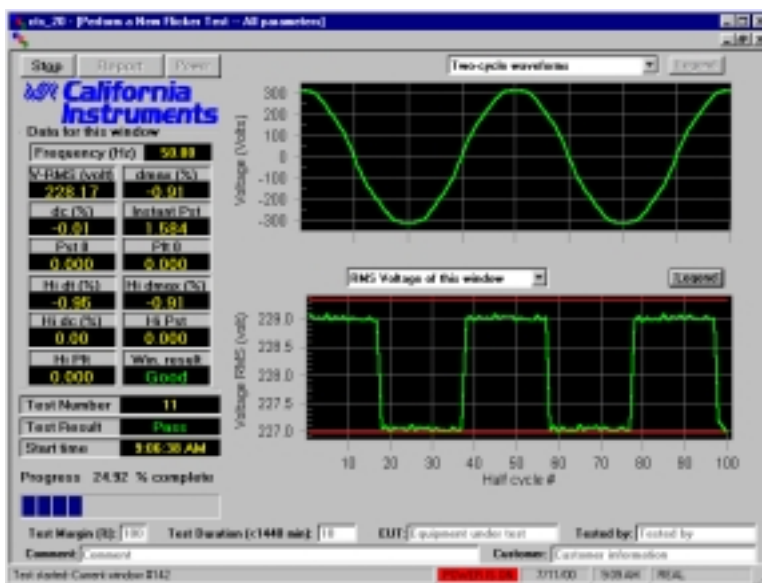
PCTS Series - IEC 61000-3-3 Flicker Test

Start and Stop Flicker tests with the click of a button.

Start time, current time and stop time monitoring.

Highest values found during test are continuously shown and updated.

Clear Pass (Green) or Fail (Red) indication leaves no doubt about the test result.

User selectable test time.

Select test parameters and data display options.

IEC Test limits can be changed for pre-compliance applications.

Real time display of d_t, d_c and V_{rms}.

Continuous readouts of V_{rms}, d_{max}, d_c, Plt and Pst provide test progress feedback.

Equipment Under Test description and operator ID are added to all test reports.

In Flicker mode, the PCTS software automatically incorporates the effect of the required IEC 725 reference impedance. This software synthesized impedance method eliminates the need to add a costly impedance to the system and produces comparable test re-

sults. A real-time display of flicker parameters such as Pst, dc, dmax and dt is provided during the test run so EUT's that fail are immediately apparent to the operator. This eliminates the need to wait for the end of an up to two hour test run to know the outcome of a test.

A concise Flicker test report can be printed at the end of each test run. Required operator interaction is minimal making the PCTS one of the easiest systems to use.

Report Generation
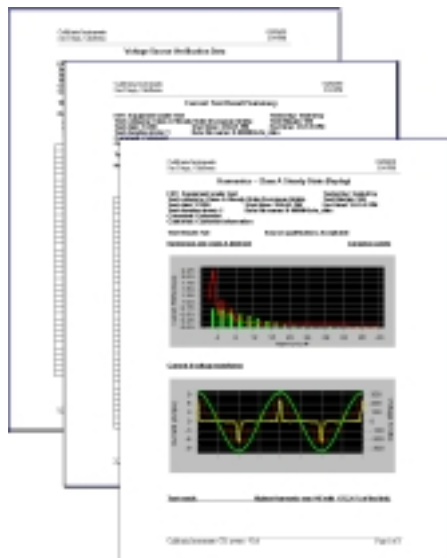
MS Word Test Reports

Test reports for harmonics, flicker and immunity tests are generated using MS Word format. This widely used format report can be integrated into more elaborate reports covering all aspects of compliance testing if needed.

Test reports contain data on the EUT, the test lab and operator, all measurement results and a clear pass or fail indication. Harmonics test reports include current harmonics and voltage harmonics data in both bar charts and tabular formats.

Note: A copy of MS Word must be installed on the PC to generate test reports.

Measurement Specifications

Measurement	Specification	Unit
Bandwidth		
Anti Aliasing	> 60 dB at 5 kHz	
Bandpass ripple	< 2 % up to 2.5 kHz	%
Volts		
Range	0.001 - 312.00	V_{rms}
Max. input	1000	V_{peak}
Max. crest factor	5:1	
Accuracy	±0.1 % ± 0.05 % FS ± 3 mV	
Resolution	10	mV
Voltage CMRR	80	dB
RMS Current		
Current ranges (Auto ranging)	4, 16, 40	A_{rms}
Highest range	40.00	A_{rms}
Max. input [permanent, no damage if < 200 A_{peak}]	40.00	A_{rms}
Max. Crest Factor [High Range]	5:1	
Max. Crest Factor [Low Range]	20:1	
Accuracy	±0.1 % ± 0.05 % FS ± 3 mA	mA
Resolution	1	mA
Power		
Range	0.1 - 12,500	W
Accuracy	±0.25 % ± 0.25 % FS ± 20 mW	mW
Resolution	0.1	W
Apparent Power		
Range	0.1 12,500	VA
Accuracy	±0.15% ± 0.15% FS±20mVA	mVA
Resolution	0.1	VA
Power Factor		
Range	0.000 - ± 1.000	
Accuracy	± 0.005	
Resolution	0.001	
Crest Factor		
Range	20:1	
Accuracy	± 0.005	
Resolution	0.001	
Frequency		
Range	50.0 ± 0.5	Hz
Accuracy	0.01 % of reading	Hz
Resolution	0.1	Hz
Harmonic Analysis		
Range	Fundamental to 40th	
Accuracy Fundamental	±0.05% FS±0.05%/kHz	
Accuracy Harmonics	±0.1 %±0.1%/kHz	
Measurement window	16 periods	
Smoothing filter	1.5	sec
Errors due to Line voltage distortion	For 230 V, 50 Hz line voltage distortion with individual voltage harmonics < 3% for H2-H15 and < 2% for H16-H40, the harmonic current analysis results will be within ±2 % of those obtained with a fully compliant AC power source.	

	Flicker		Specification	Unit
Flicker				
Pst		Range	0.1 - 10	Pst
		Accuracy	< 8	%
		Resolution	0.01	
		Integration time	10	min
Plt		Range	0.1 - 10	
		Integration time	120	min
dmax		Range	0 - 100	%
dc		Range	0.1 - 100	%
dt		Range	0.1 - 100	%
dt over 3% (4%)		Range	0 - 1000	ms

PC Requirements

Use of the PCTS requires a PC capable of running Windows 98/ME® or Win NT 4.0/2000. Recommended PC hardware specifications are as follows:

CPU > Pentium 300 (W98/ME) or 500 Mhz (NT/2000).

RAM 64 Mbytes or more.

Hard Disk 4 Gbytes or more.
     60 Mbytes required for program storage.

Display Color SVGA Monitor

Slots   Available PCI slot for A/D Power Analyzer card.

Software MS Word, Windows 98, ME, NT, 2000

California Instruments will quote a PC with pre-installed software as part of the system on request. Contact factory for details.

Mechanical Specifications

PACS-1		
Dimensions	HxWxD HxWxD	3.5" x 16.8" x 22" 89mm x 427mm x 560mm
Weight	Net Shipping	17.6 lbs / 8 Kg 28 lbs / 12.7 kg
Regulatory:		CE Mark
Power Connection		Rear panel terminal block
Line Input		115 V / 230 V selectable 0.5 A max.
EUT Connection		Front panel IEC/77 socket Rear panel terminal block

Configuration

Each PCTS system consists of the following items:

- PACS-1 Signal conditioning unit.
- PCI A/D Power Analyzer Card.
- CI68C DB-68 to DB-37 Interface Cable.
- Windows Software on CD-ROM.
- User Manual on CD-ROM.

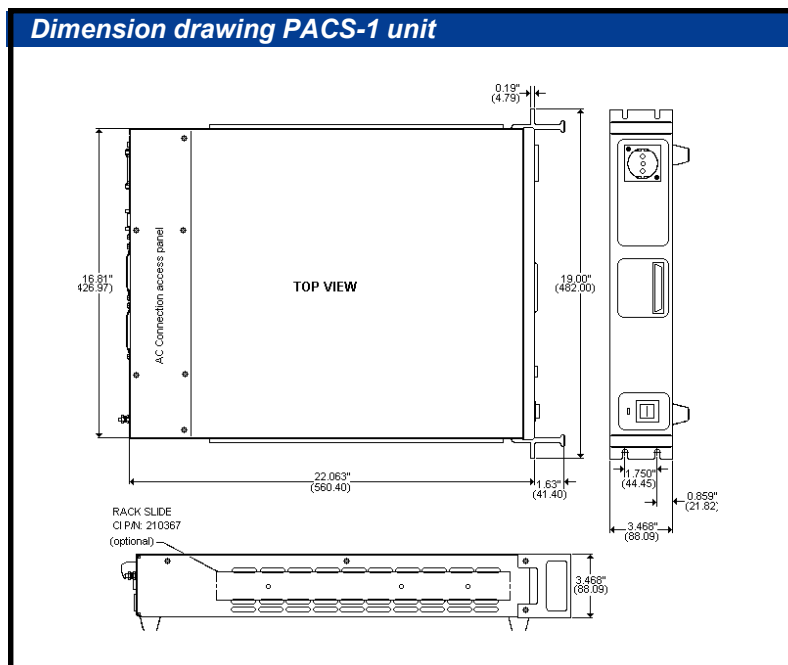## Ordering Information

Model number: PCTS

Options:

-RMS   Rack mount slides.

Accessories:

250742   Spare PCI A/D Card

CI68C   Spare signal interface cable for PCI.

Dimension drawing PACS-1 unit

Contact California Instruments:
858 677-9040
FAX: 858 677-0940
Email: sales@calinst.com
Web URL: http://www.calinst.com

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