



IEC62301 Standards Testing for Standby Power Measurement

Introduction

Energy consumption in low-power and standby modes is now recognized as an important issue due to the increased awareness that energy resources are becoming more limited and because the demand for energy-saving household electrical appliances continues to grow.

Background

Internationally recognized standards IEC62301 Ed2.0 (2011) and EN 50564:2011 define standby mode as the lowest energy consumption of an appliance not performing its main function, when connected to the mains. Additionally, IEC62301 Ed2.0 (2011) defines the test methods and requirements for both the mains supply and the test equipment. Appliances that typically fall under the umbrella of these standards include those that turn on almost instantly without a delay for warm-up, such as smart home devices, TVs, anything that get switched on with a remote, and even some plug-in chargers for cell phones and laptops.

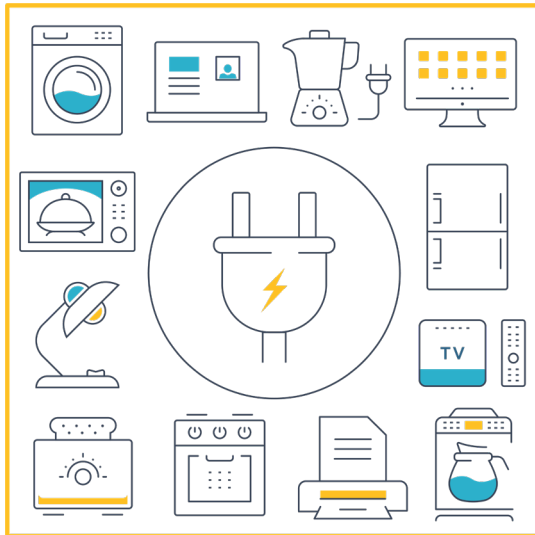


Figure 1. Examples of devices that use standby power.

Manufacturers of domestic electrical appliances and related equipment that seek to develop and market products that are certified as operating with high efficiency and minimum standby power consumption must perform strict standby power testing as determined by government-backed programs such as ENERGY STAR and the EU Eco Directive.

As these energy efficiency and environmental protection programs continue to expand, their requirements become more stringent, resulting in a drop in the standby power level necessary to confirm compliance. It is crucial that design and test engineers choose highly accurate power measurement tools to confirm that their devices meet these requirements.

The Challenge

The IEC62301 Ed2.0 (2011) standard defines the relevant test conditions for accurate measurement of standby power. Requirements for the measuring device include the ability to measure low current and power factor, crest factor, harmonic content, and energy consumption over time if the power consumption fluctuates. For this reason, a power analyzer is typically used to measure standby power.

The Solution

For easy and accurate measurements, Yokogawa Test&Measurement's Power Consumption Measuring Software connects with WT series power analyzers and satisfies the requirements of IEC62301 Ed2.0 (2011), for household electrical appliance standby power measurement, and EN 50564:2011, for electrical and electronic household and office equipment low power consumption measurement.

Connection method

A power analyzer can be connected to the software using GPIB, Ethernet, USB, or RS-232 by selecting the appropriate power analyzer and connection method shown

on the *Connection* screen. Click *Device Search*, select the proper instrument, and then click *Connect* to establish the connection.

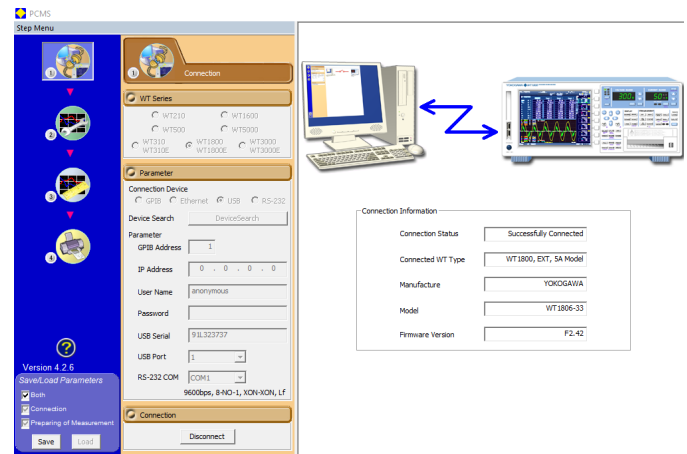


Figure 2. Connection screen showing a successfully connected power analyzer.

Preparing for measurement

The *Settings* screen allows users to make selections based on their specific testing requirements including the region, standard, measurement period, and more. The region selected determines the rated voltage and frequency. Users can also specify stability judgment algorithms to include linear regression, cumulative average, and three-section compare algorithms.

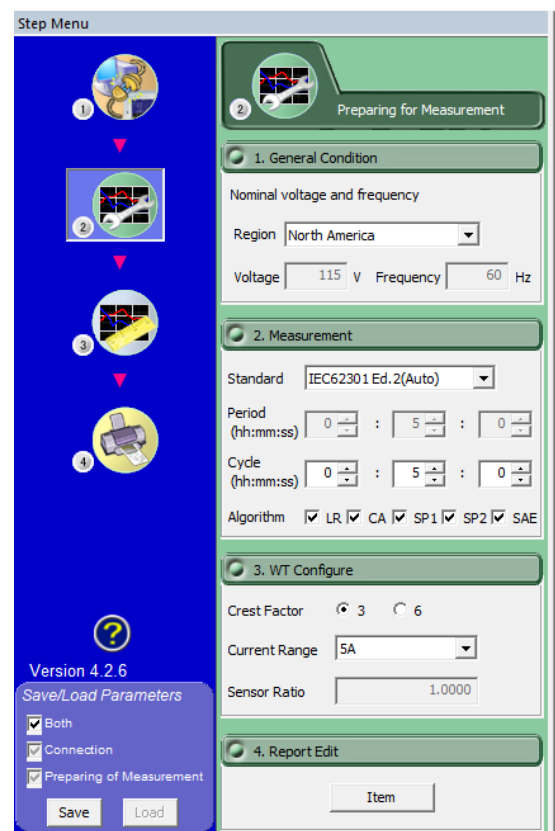


Figure 3. The Settings screen allows for test configuration based on user-specific requirements.

Test report editing

A customizable test report is generated that includes information such as test and lab details, appliance details, and test parameters. Manually-input comments are also visible on the report.

The **Report Edit** window is divided into several sections:

- Appliance details:** Includes fields for Brand, Type, Model, and Serial. There are checkboxes for "Product description, as appropriate" and "Details of manufacture marked on the product(if any)". A dropdown for "Mode category" is set to "Low power mode(Off mode)".
- Test Parameters:** Includes a field for "Ambient temperature" and checkboxes for "Other Ambient Information" and "Information and documentation on the instrumentation".
- Test and laboratory details:** Includes fields for "Test Report No./reference", "Applicant name and address", "Laboratory name and address", "Test Officer", and "Approver".
- Measure data, for each mode as applicable:** Includes checkboxes for "Detail Measured Data", "If applicable, technical justification of inappropriateness for intended use", and "Any notes regarding the operation of the appliance (equipment)".
- Remarks column:** A large text area for additional comments.

Buttons for "OK" and "Cancel" are at the bottom.

Figure 4. The *Report Edit* function allows for customizable test report details.

Making a compliant standby power measurement

On the *Condition and Measurement* screen, users can start measurements, view trends, and review measurement data. Trend settings are configurable and allow users to select the trends they want to view, change colors, turn graticule and scale values off or on, and adjust the time per division.



Figure 5. The *Condition and Measurement* screen initiates the test and updates as the test is run.

Reporting

Once testing is complete, a report is generated and ready to save on the output screen as a PDF, CSV, or both. For quicker and easier testing, the connection method and measurement settings can be saved and set to automatically load the next time the software is in use.

IEC 62301 Test Report

IEC62301 Second Edition compliance

Appliance(equipment) Details

<Product description>
N/A
<Details of manufacture marked on the product>
N/A

Item	Appliance	Equipment
Brand	N/A	YOKOGAWA
Model	N/A	WT1808-33
Type	N/A	Firmware Ver.F2.42
Serial Number	N/A	91L323737
Rated voltage / frequency	115 V / 60 Hz	-
Voltage Range	-	150V
Current Range	-	5A

Test Parameters

<Information and documentation on the instrumentation>
N/A

Item	Data
Name of mode	N/A
Mode category	Low power mode(Off mode)
Cycle period	00:05:00
THD	*(Upper Limit) 3.895 % (2.000 %)
Crest Factor *(Range)	1.371 - 1.382 (1.34 - 1.49)
Ambient temperature	
Other Ambient conditions	N/A
Test voltage / frequency	120.870 V / 60.011 Hz

Measured data, for each mode as applicable

<If applicable, technical justification of inappropriateness for intended use>
N/A
<Any notes regarding the operation>
N/A

Item	Data
Measurement period	00:07:41 (User Stop)
Power variation	100.000 %
Max Power Value	3.400 W
Last Power Value	0.000 W
Accumulated energy	0.005 Wh
Average Power	0.036 W

Detail Measured data

Item	Data
Apparent Power	1.900 VA
Real Power Factor	0.002

Test and laboratory details

<Applicant name and address>
N/A
<Laboratory name and address>
N/A
<Test officer(s)>
N/A
<Approver>
N/A

Item	Data
Test report No./reference	N/A
Date of test	24 / 02 / 2021 15:36

Remarks column

N/A

Figure 6. Example test report.

Recommendations

Many devices that use standby power remain plugged in even when not in active use. Though these typically have a low power draw, with multiple devices plugged in year-round, a household or business is often consuming (and paying for) considerably more power than what they expect. To save both energy and money, standby power efficient devices, as defined by IEC62301 Ed2.0 (2011) and EN 50564:2011, must be used.

For design and test engineers to make accurate measurements that meet ENERGY STAR and EU Eco Directive mandates, Yokogawa Test&Measurement Power Consumption Measuring Software, combined with a WT series power analyzer (such as a WT300E), allows for easy setup, testing, and measurement of standby, test, and measure standby power in a variety of appliances. The ability to view trend data via custom-generated reporting means that verifying a device meets requirements is easier than ever.

Learn more about the Yokogawa Test&Measurement solutions and products mentioned in this app note:

- [WT300E Precision Power Analyzer](#)
- [Power Consumption Measuring Software](#)
- [Video walk-through of the software](#)
- [Yokogawa Test&Measurement power analyzers and software](#)
- [Yokogawa Test&Measurement product technical support](#)

Yokogawa's global network of 114 companies spans 62 countries. Founded in 1915, the US \$3.7 billion company engages in cutting-edge research and innovation. Yokogawa is active in the industrial automation and control (IA), test and measurement, and aviation and other businesses segments.

Yokogawa has been developing measurement solutions for 100 years, consistently finding new ways to give R&D teams the tools they need to gain the best insights from their measurement strategies. The company has pioneered accurate power measurement throughout its history and is the market leader in digital power analyzers.

Yokogawa instruments are renowned for maintaining high levels of precision and for continuing to deliver

value for far longer than the typical shelf-life of such equipment. Yokogawa believes that precise and effective measurement lies at the heart of successful innovation - and has focused its own R&D on providing the tools that researchers and engineers need to address challenges great and small.

Yokogawa takes pride in its reputation for quality, both in the products it delivers - often adding new features in response to specific client requests - and the level of service and advice provided to clients, helping to devise measurement strategies for even the most challenging environments.

Meet the Precision Makers at
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