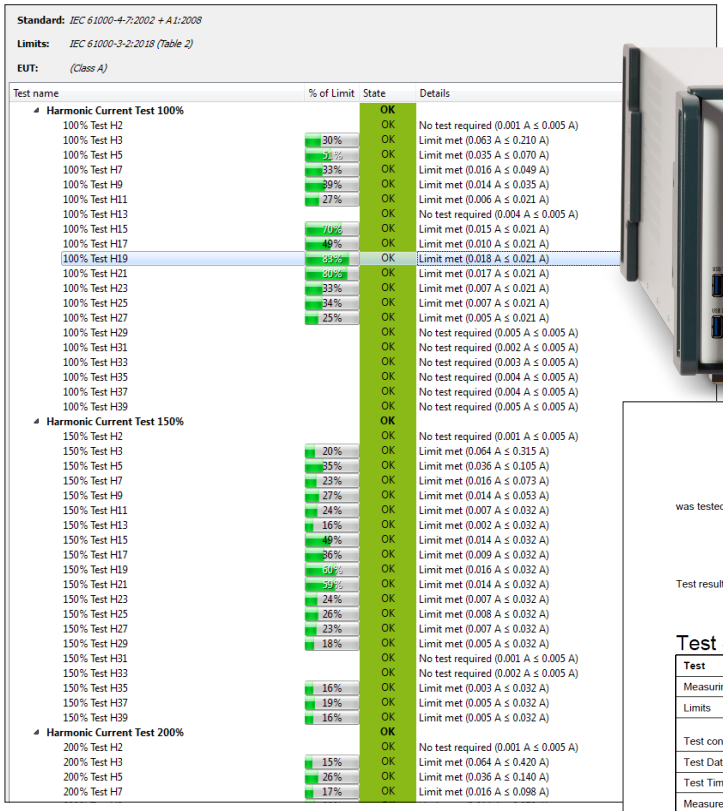
LMG Test Suite

Compliance test system by ZES ZIMMER



Standard: *IEC 61000-4-7:2002 + A1:2008*
Limits: *IEC 61000-3-2:2018 (Table 2)*
EUT: *(Class A)*

Test name	% of Limit	State	Details
Harmonic Current Test 100%		**OK**	
100% Test H2		OK	No test required (0.001 A ≤ 0.005 A)
100% Test H3	30%	OK	Limit met (0.063 A ≤ 0.210 A)
100% Test H5	21 %	OK	Limit met (0.035 A ≤ 0.070 A)
100% Test H7	33%	OK	Limit met (0.016 A ≤ 0.049 A)
100% Test H9	39%	OK	Limit met (0.014 A ≤ 0.035 A)
100% Test H11	27%	OK	Limit met (0.006 A ≤ 0.021 A)
100% Test H13		OK	No test required (0.004 A ≤ 0.005 A)
100% Test H15	70%	OK	Limit met (0.015 A ≤ 0.021 A)
100% Test H17	48%	OK	Limit met (0.010 A ≤ 0.021 A)
100% Test H19	83%	OK	Limit met (0.018 A ≤ 0.021 A)
100% Test H21	80%	OK	Limit met (0.017 A ≤ 0.021 A)
100% Test H23	33%	OK	Limit met (0.007 A ≤ 0.021 A)
100% Test H25	34%	OK	Limit met (0.007 A ≤ 0.021 A)
100% Test H27	25%	OK	Limit met (0.005 A ≤ 0.021 A)
100% Test H29		OK	No test required (0.005 A ≤ 0.005 A)
100% Test H31		OK	No test required (0.002 A ≤ 0.005 A)
100% Test H33		OK	No test required (0.003 A ≤ 0.005 A)
100% Test H35		OK	No test required (0.004 A ≤ 0.005 A)
100% Test H37		OK	No test required (0.004 A ≤ 0.005 A)
100% Test H39		OK	No test required (0.005 A ≤ 0.005 A)
Harmonic Current Test 150%		**OK**	
150% Test H2		OK	No test required (0.001 A ≤ 0.005 A)
150% Test H3	20%	OK	Limit met (0.064 A ≤ 0.315 A)
150% Test H5	35%	OK	Limit met (0.036 A ≤ 0.105 A)
150% Test H7	23%	OK	Limit met (0.016 A ≤ 0.073 A)
150% Test H9	27%	OK	Limit met (0.014 A ≤ 0.053 A)
150% Test H11	24%	OK	Limit met (0.007 A ≤ 0.032 A)
150% Test H13	16%	OK	Limit met (0.002 A ≤ 0.032 A)
150% Test H15	49%	OK	Limit met (0.014 A ≤ 0.032 A)
150% Test H17	36%	OK	Limit met (0.009 A ≤ 0.032 A)
150% Test H19	50%	OK	Limit met (0.016 A ≤ 0.032 A)
150% Test H21	59%	OK	Limit met (0.014 A ≤ 0.032 A)
150% Test H23	24%	OK	Limit met (0.007 A ≤ 0.032 A)
150% Test H25	26%	OK	Limit met (0.008 A ≤ 0.032 A)
150% Test H27	23%	OK	Limit met (0.007 A ≤ 0.032 A)
150% Test H29	18%	OK	Limit met (0.005 A ≤ 0.032 A)
150% Test H31		OK	No test required (0.001 A ≤ 0.005 A)
150% Test H33		OK	No test required (0.002 A ≤ 0.005 A)
150% Test H35	16%	OK	Limit met (0.003 A ≤ 0.032 A)
150% Test H37	19%	OK	Limit met (0.005 A ≤ 0.032 A)
150% Test H39	16%	OK	Limit met (0.005 A ≤ 0.032 A)
Harmonic Current Test 200%		**OK**	
200% Test H2		OK	No test required (0.001 A ≤ 0.005 A)
200% Test H3	15%	OK	Limit met (0.064 A ≤ 0.420 A)
200% Test H5	26%	OK	Limit met (0.036 A ≤ 0.140 A)
200% Test H7	17%	OK	Limit met (0.016 A ≤ 0.098 A)

Test Report

was tested according to

IEC 61000-4-7:2002 + A1:2008

IEC 61000-3-2:2018 (Table 2)

Test result was

OK

Test Settings

Test	
Measuring Standard	IEC 61000-4-7:2002 + A1:2008
Limits	IEC 61000-3-2:2018 (Table 2)
Test conditions	IEC 61000-3-2:2018, App. B.10 Information technology equipment (ITE)
Test Date	18.07.2018
Test Time	10:23:03
Measurement Duration	00:02:30
EUT Classification	Class A
EUT / Measurement Setup	
Input current at fundamental frequency [L1]	2A
Power Factor [L1]	1
Power Supply	
Nominal Voltage	230V
Nominal Frequency	50Hz

EUT Details

A complete software and hardware solution

Compliance tests according to IEC EN 61000-3 harmonics and flicker standards

Standby power measurement

CE marking

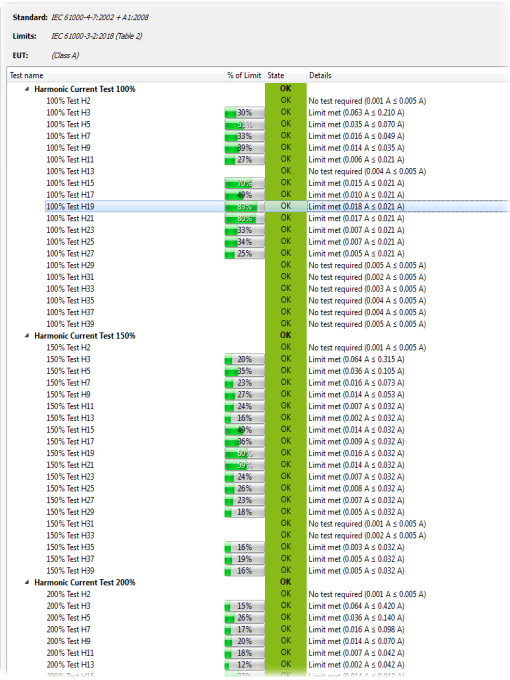
Standards-compliant and meaningful

In modern power grids, the electromagnetic compatibility between all connected devices is ensured, when phenomena such as harmonic current emissions and flicker disturbance are strictly regulated. This is the scope of part of the IEC 61000 EMC standard family. The European Union is particularly demanding when it comes to electromagnetic compatibility, requiring from products that are intended for sale and distribution in its territory to bear the “CE” marking. The European Committee for Electrotechnical Standardization (Cenelec) commonly reviews the IEC international standards before they become European (EN) standards.

The LMG Test Suite is a ZES ZIMMER developed software, used together with the LMG Power Analyzers to perform EMC compliance tests in accordance with the currently valid versions of the IEC/EN 61000-3-2/-12 standards for harmonic emissions and the IEC/EN 61000-3-3/-11 standards for flicker disturbance. The software further supports measurements of standby power according to IEC 62301 & EN 50564. The LMG600 itself performs the harmonic analysis and flicker measurement according to the IEC/EN 61000-4-7 and IEC/EN 61000-4-15 standards.

CE

IEC EN
61000-3-2/12
61000-3-3/11
EN 50564
IEC 63201

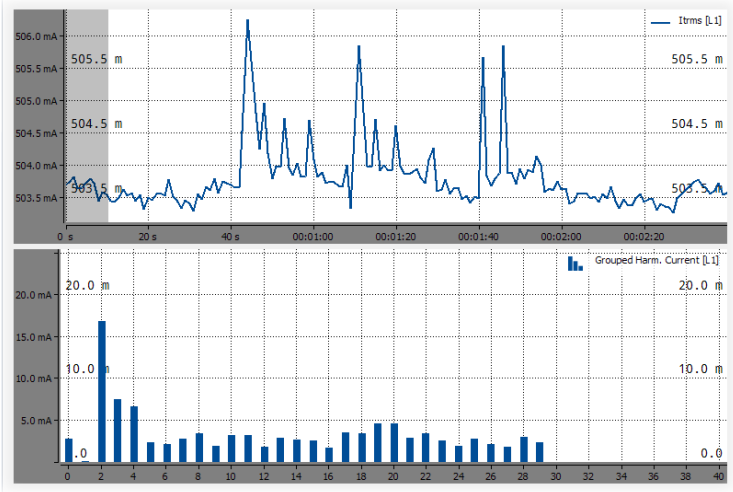


Innovative power measurement technology

The LMG Test Suite employs the LMG600’s proven excellence in precision power measurement. All ZES ZIMMER power analyzers measure with particularly great reliability and precision. The instrument itself does not only serve as compliance testing hardware but is also a powerful R&D tool. Among its various interfaces, a fast Ethernet (Gbit) port guarantees smooth communication and data transfer between the software and hardware.

Detailed analysis for rapid diagnostics and product improvement

Compliance tests with the LMG Test Suite are carried out either online through direct connection with the LMG600 or offline by using stored data records. Each measurement parameter can be displayed and evaluated in the time and/or frequency domain. This helps the user to quickly identify and address causes of non-compliance. All measured data points and test results can be exported in csv format for further analysis. At the same time the connection with the LMG600 is quick and seamless.

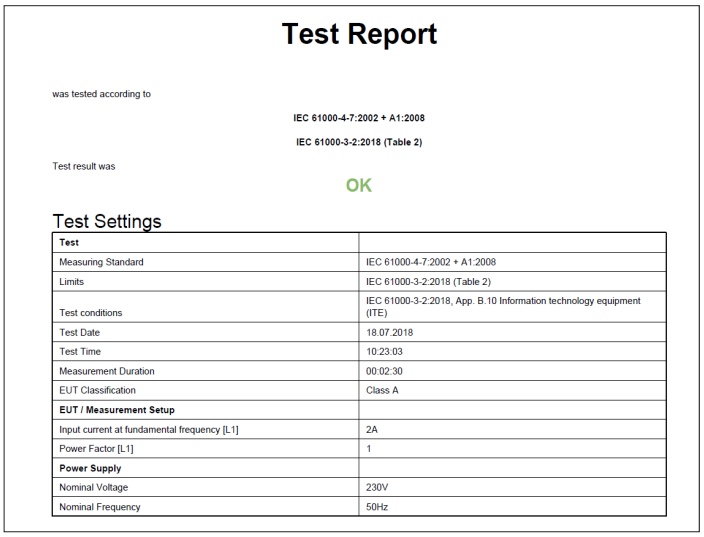


Flexible hardware use, independent of manufacturer

The LMG Test Suite supports all AC power sources available on the market that comply with the standards. This provides maximum flexibility to the user. In particular, the user can continue using an AC source that they may have already in possession and thus avoid additional investments. Standards-specific calibration of the source is not necessary as the test system monitors the compliance to the specified source parameters. For instance, the system analyzes the source's voltage harmonics and presents them graphically. Any problems from this side of the test structure are thus reliably excluded.

Comprehensive, customer-specific documentation

All results are documented in clear, comprehensive PDF/ Word/Excel test reports. According to the standard, the test report may be based on information supplied by the manufacturer to a testing facility, or be a document recording details of the manufacturer's own tests. It includes all relevant information for the test conditions, the test observation period, alongside with the appointed measurement values. All data regarding the measurement equipment, test structure and settings -such as type designations, serial numbers and information on the calibration and traceability- is also integrated into the test reports. Of course, the reports can be supplemented with additional customer-specific information and design elements, in order to avoid unnecessary post-editing outside the system.



Test Report

was tested according to

IEC 61000-4-7:2002 + A1:2008

IEC 61000-3-2:2018 (Table 2)

Test result was

OK

Test Settings

Test	
Measuring Standard	IEC 61000-4-7:2002 + A1:2008
Limits	IEC 61000-3-2:2018 (Table 2)
Test conditions	IEC 61000-3-2:2018, App. B.10 Information technology equipment (ITE)
Test Date	18.07.2018
Test Time	10:23:03
Measurement Duration	00:02:30
EUT Classification	Class A
EUT / Measurement Setup	
Input current at fundamental frequency [L1]	2A
Power Factor [L1]	1
Power Supply	
Nominal Voltage	230V
Nominal Frequency	50Hz

Constant support of existing and upcoming standards

The LMG Test Suite supports compliance tests according to the following standards:

- **IEC EN 61000-4-7**: Testing and measurement techniques - General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto
  - **IEC EN 61000-3-2**: Limits - Limits for harmonic current emissions (equipment input current ≤16 A per phase)
  - **IEC EN 61000-3-12:** Limits - Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current >16 A and ≤ 75 A per phase
- **IEC EN 61000-4-15**: Testing and measurement techniques - Flickermeter - Functional and design specifications
  - **IEC EN 61000-3-3**: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
  - **IEC EN 61000-3-11:** Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems - Equipment with rated current ≤ 75 A and subject to conditional connection
- **EN 50564**: Electrical and electronic household and office equipment - Measurement of low power consumption
- **IEC 62301**: Household electrical appliances - Measurement of standby power

ZES ZIMMER, as a manufacturer of precision power measurement technology, is represented in the international standards committee. As a result, all upcomincs changes in the standards are observed and immediately incorporated into the test software.

Accessories: NI2415

For flicker conformity tets according to the IEC EN 61000-3-3/-11 limits, ZES ZIMMER manufactures and supplies the NI2415 network impedance. The NI 2415 complies to the characteristics of the reference impedance described in clause 6.4 of the 61000-3-3 standard and defined in IEC/TR 60725. For seamless transition between flicker and harmonics testing the NI2415 includes a bypass switch. Via the 37-pin SUB-D connector at the back side all functions of the device are remote controlable.

Technical specifications

Accuracy

	A channel	B channel	C channel
	45 Hz ... 65 Hz		
Voltage U*	0.01+0.02	0.03+0.03	0.02+0.02
Current I* 5 mA...5 A	0.01+0.02	0.03+0.03	0.02+0.02[1)]
Current I* 10 A...32 A	0.01+0.02[1)]	0.03+0.03[1)]	
Power U*/I* 5 mA...5 A	0.015+0.01	0.05+0.02	0.03+0.01[2)]
Power U*/I* 10 A...32 A	0.015+0.01[2)]	0.05+0.02[2)]	

Accuracies valid for:	1. Sinusoidal voltages and currents 2. Ambient temperature (23±3) °C 3. Warm-up time 1 h 4. The maximum peak value for power is the product of the maximum peak value for voltage and the maximum peak value for current. 5. $0 \leq \lambda \leq 1$ (power factor) 6. Current and voltage 10 % ... 110% of nominal value 7. Adjustment carried out at 23 °C 8. Calibration interval 12 months
Other values	All other values are calculated from current, voltage and power. Accuracy resp. error limits are derived according to context (e.g. $S = I * U$, $\Delta S / S = \Delta I / I + \Delta U / U$).

[1) 2)] only valid in range 10 ... 32 A:

[1)] additional uncertainty $\pm \frac{50\,\mu A}{A^2} * I_{trms}^2$ [2)] additional uncertainty $\pm \frac{50\,\mu A}{A^2} * I_{trms}^2 * U_{trms}$

Measurement ranges

Voltage measuring ranges U*										
Nominal value (V)	3	6	12.5	25	60	130	250	400	600	1000
Max. trms value (V)	3.3	6.6	13.8	27.5	66	136	270	440	660	1000
Max. peak value (V)	6	12	25	50	100	200	400	800	1600	3200
Overload protection	1000 V + 10 % continuously, 1500 V for 1 s, 2500 V for 20 ms									
Input impedance	2.69 MΩ, 4 pF									
Earth capacitance	< 90 pF									

Current measuring ranges I*														
Nominal value (A)	0.005	0.01	0.02	0.04	0.08	0.15	0.3	0.6	1.2	2.5	5	10	20	32
Max. trms value (A)	0.0055	0.011	0.022	0.044	0.088	0.165	0.33	0.66	1.32	2.75	5.5	11	22	32
Max. peak value (A)	0.014	0.028	0.056	0.112	0.224	0.469	0.938	1.875	3.75	7.5	15	30	60	120
Input impedance	ca. 2.2 Ω		ca. 600 mΩ			ca. 80 mΩ			ca. 20 mΩ			ca. 10 mΩ		
Overload protection permanent (A)	LMG in operation 10 A								LMG in operation 32 A					
Overload protection short-time (A)	150 A for 10 ms													
Earth capacitance	< 90 pF													

ZES ZIMMER

Germany (headquarter)
ZES ZIMMER Electronic Systems GmbH
Pfeiffstraße 12 • D-61440 Oberursel
info@zes.com • +49 6171 88832-0
www.zes.com

United States (subsidiary)
ZES ZIMMER Inc.
2580 Thornhills Ave. • Suite 114
Grand Rapids. • MI 49546
usa@zes.com • +1 760 550 9371

LMG Test Suite en 01/2020