

SOLiC 200

EMC Compliance tests.

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IEC 61000-3-2 Ed. 3 2005 Harmonics Tests.

This standard assesses and sets the limit for mains connected equipment that draws input current $\leq 16\text{A}$ per phase.

Paddock View Controls (UK) Ltd.

DUT: Solar Immersion Heater Controller Model AF2.1

Test Date: 20th March 2012.

Equipment setup:

Device was set to operate at 50% duty cycle.

Test Load: 3kW domestic Immersion Heater.

Nominal 230VAC supply active filtered 50Hz mains. THD below 1%.

Differential 10Mohm probe used with 0.01Ohm shunt for current tests.

Test result: PASS.

Examiner's comments:

The DUT operates with an unconventional PWM. The switching point to proportionally vary the power to the load changes continuously from one half cycle to the next, based on a spread-spectrum rotating vector load pattern. This unusual configuration increases higher order harmonics by spreading the instantaneous impulse noise across the spectrum. The test standard specifies a 200ms minimum, 10 cycle averaged result, which this design takes advantage of. The instantaneous result is above the harmonic limit, but the average is below, giving a pass.

Harmonic 9 was the closest to the threshold, measured at 95% of the limit.

Frequency scan images:

Voltage waveform under load at 50% duty cycle.

Current waveform under load at 50% duty cycle.

Harmonics at quiescent power- in standby.

Harmonics at 50% duty cycle.

Measurements Summary

Limit readings during test (RMS):

Mains Voltage 230.2 to 226.6 VAC

Frequency 50.3 to 50.1 Hz

Total RMS current 6.73 A

Fundamental line current: 6.32 A

Total Power 1522.1 W

Power Factor: 0.94

Harmonic Number	Standard limit	Test Result
1.00	16.00	6.47
2.00	1.08	0.72
3.00	2.30	1.54
4.00	0.43	0.29
5.00	1.14	0.95
6.00	0.30	0.02
7.00	0.77	0.66
8.00	0.23	0.07
9.00	0.40	0.38
10.00	0.18	0.04
11.00	0.33	0.15
12.00	0.15	0.01
13.00	0.21	0.07
14.00	0.13	0.02
15.00	0.15	0.03
16.00	0.12	0.01
17.00	0.13	0.03
18.00	0.10	0.01
19.00	0.12	0.02
20.00	0.09	0.01





