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Compliance test report ID 206550-1R2TRFEMC

Date of issue
July 16, 2012

- FCC 47 CFR Part 15, Subpart B – Certification
- ICES-003 Issue 4 February 2004

Applicant Energate Inc.
Product Foundation Smart Thermostat and Home Energy Gateway
Model Foundation FZ100 C
FCC ID WUR-FZ100C

Nemko Canada Inc., a testing laboratory, is accredited by the Standards Council of Canada. The tests included in this report are within the scope of this accreditation

SCC Accredited LAB
LAB Accrédité CCN

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Reviewed by Andrey Adelberg, Senior EMC/Wireless Specialist

July 16, 2012
Date

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

Copyright notification

Table of Contents

Section 1 Report summary

1.1 Test specifications

- FCC 47 CFR Part 15, Subpart B – Certification
- ICES-003 Issue 4 February 2004

1.2 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

1.3 Exclusions

None

1.4 Test report revision history

R1 – Report was issued to change the product description and theory of operation

R2 – FCC ID and Model name were corrected

Section 2 Summary of test results

2.1 Test results

Table 2.1-1: FCC 47 CFR Part 15, Subpart B for Digital Devices results

Test description	Verdict
Radiated disturbance	Pass
Conducted disturbance at mains port	Pass
Notes: [1] Product classification B	

Table 2.1-2: ICES-003 Issue 4 February 2004 results

Test description	Verdict
Radiated disturbance	Pass
Conducted disturbance at mains port	Pass
Notes: [1] Product classification B	

Section 3 Equipment under test (EUT) details

3.1 Applicant and manufacturer

Company name	Energate Inc.
Company address	2415 Holly Lane, Suite 210, Ottawa, ON, Canada K1V 7P1

3.2 Sample information

Receipt date	April 23, 2012
Nemko sample ID number	Item 1

3.3 EUT information

Product name	Foundation Smart Thermostat and Home Energy Gateway
Model	FZ100C
Serial number	E06AT00016
Part number	0001390251
Power requirements	The Foundation requires a power supply voltage of 24 V_{AC} nominal, with a range from 20–30 V_{AC}. The maximum power consumption is 1 W.

Product description and theory of operation

The Foundation is a Smart Thermostat and Home Energy Gateway.

As a Smart Thermostat, the Foundation is a microprocessor controlled Programmable Communicating Thermostat (PCT)

It controls the Heating, Ventilating and Air Conditioning (HVAC) equipment to modify the house room temperature to be as close as possible to the temperature programmed by the thermostat user, which is called target temperature or setpoint.

For that purpose it has an internal precision temperature sensor to measure the room temperature.

The Foundation user can program in advance different setpoint values to be applied to different times of the day and different days of the week, to suit their comfort and energy savings needs.

In order to accept user commands and provide information to the user, the Foundation has a User Interface composed of a set of buttons and a LCD (Liquid Crystal Display) screen.

The Foundation controls the HVAC equipment by switching on and off a 24 V_{AC} voltage (nominal value) to several control outputs, which are wired to the corresponding control inputs of the HVAC.

The Foundation includes a ZigBee transceiver and optionally a Consumption Data Receiver.

Through the communications interfaces the Foundation receive receives Demand Response communications from the energy provider utility and allows the user to remotely control the thermostat settings using a personal computer or other device connected to a portal through the Internet.

As a Home Energy Gateway the Foundation receives, through the communication interfaces, Energy Price and Home Energy Consumption information, which is processed and displayed to the home user.

3.3 EUT information, continued

Operational frequencies

The Foundation microprocessor uses a clock frequency of 32 MHz. It has a Real Time Clock which uses a 32.768 kHz crystal.
It includes a ZigBee Transceiver which operates in the frequency range from 2400 to 2483.5 MHz and uses a 24 MHz crystal.
It can also include optionally a Consumption Data Receiver which operates at a frequency of 433 MHz.

Software details

The Foundation operation is controlled by a microprocessor which runs a program (firmware) stored in a nonvolatile flash memory programmed at the factory.
The ZigBee transceiver uses a System on a Chip which includes another microprocessor which handles the communication protocol, running also a firmware programmed at the factory on a nonvolatile flash memory.
The firmware on both microprocessors can be remotely upgraded through the communication network.
The configuration settings of the Foundation are stored in a nonvolatile memory so they are preserved in case of a power outage.

3.4 EUT exercise and monitoring details

The verification that the thermostat is powered and operating normally is that the Liquid Crystal Display screen is active showing the home screen, which displays, among other parameters, the current room temperature expressed in degrees Celsius or Fahrenheit.

3.5 EUT setup details

Table 3.5-1: EUT sub assemblies

Description	Brand name	Model/Part number	Serial number	Rev.
Foundation Smart Thermostat and Home Energy Gateway	Energate	FZ100 / 0001390251	E06AT00016	N/A
Class 2 power supply transformer (120 VAC/24 VAC, 60 Hz)	Triad	WAU24-450	N/A	N/A

Table 3.5-2: EUT interface ports

Description	Qty.
AC input from power supply transformer	1

Table 3.5-3: Inter-connection cables

Cable description	From	To	Length (m)
Power cable	Power Supply Transformer	Foundation Thermostat and Home Energy Gateway	1.8

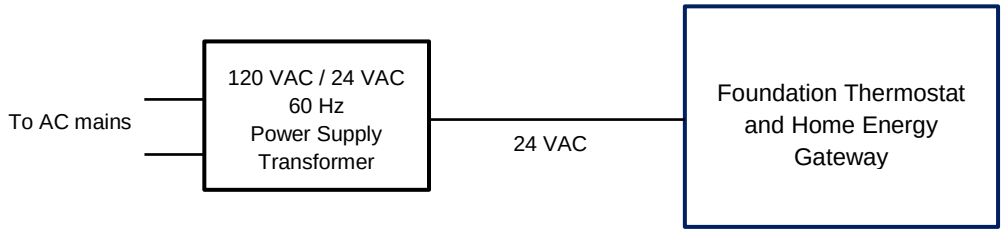


Diagram 3.5-1: Setup diagram

Section 4 Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5 Test conditions

5.1 Atmospheric conditions

Temperature: 15–30 °C
Relative humidity: 20–75 %
Air pressure: 86–106 kPa

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 6 Measurement uncertainty

6.1 Uncertainty of measurement

Nemko Canada Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 “Uncertainty in EMC measurements.” Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of K=2 with 95% certainty.

Section 7 Terms and definitions

7.1 Product classifications definitions

Title 47: Telecommunication – Part 15-Radio Frequency devices, Subpart A – General

Class A digital device. A digital device that is marketed for use in a commercial, industrial or business environment, exclusive of a device which is marketed for use by the general public or is intended to be used in the home.

Class B digital device. A digital device that is marketed for use in a residential environment notwithstanding use in commercial, business and industrial environments. Examples of such devices include, but are not limited to, personal computers, calculators, and similar electronic devices that are marketed for use by the general public.

Note: The responsible party may also qualify a device intended to be marketed in a commercial, business or industrial environment as a Class B device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B digital device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B digital device, regardless of its intended use.

ICES-003

"Digital apparatus" means an electronic apparatus that generates and uses timing signals at a rate in excess of 10,000 pulses per second and that utilizes radio frequency energy for the purpose of performing functions including computations, operations, transformations, recording, filing, sorting, storage, retrieval and transfer, but does not include an ISM (industrial, scientific or medical) radio frequency generator.

"Class A digital apparatus" means a model of digital apparatus for which, by virtue of its characteristics, it is highly unlikely that any units of the model will be used in a residential environment, which includes a home business. Characteristics considered to be applicable in this assessment include: price, marketing and advertising methodology, the degree to which the functional design inhibits applications suitable to residential environments or any combination of features which would effectively preclude its use in a residential environment.

"Class B digital apparatus" means any model of digital apparatus that cannot qualify as Class A digital apparatus.

7.2 General definitions

Title 47: Telecommunication – Part 15-Radio Frequency devices, Subpart A – General

Digital device. (Previously defined as a computing device). An unintentional radiator (device or system) that generates and uses timing signals or pulses at a rate in excess of 9,000 pulses (cycles) per second and uses digital techniques; inclusive of telephone equipment that uses digital techniques or any device or system that generates and uses radio frequency energy for the purpose of performing data processing functions, such as electronic computations, operations, transformations, recording, filing, sorting, storage, retrieval, or transfer. A radio frequency device that is specifically subject to an emanation requirement in any other FCC Rule part or an intentional radiator subject to subpart C of this part that contains a digital device is not subject to the standards for digital devices, provided the digital device is used only to enable operation of the radio frequency device and the digital device does not control additional functions or capabilities.

Note: Computer terminals and peripherals that are intended to be connected to a computer are digital devices.

Section 8 Testing data

8.1 Radiated disturbance

8.1.1 References

CISPR 22 and ANSI C63.4-2003

8.1.2 Test summary

Verdict Pass

8.1.3 Observations/special notes

The EUT was set up as table top configuration.

8.1.4 Test equipment list

Table 8.1-1: Radiated disturbance equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal./Ver. cycle	Next Cal./Ver.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	Mar. 09/13
Flush mount turntable	Sunol	FM2022	FA002082	—	NCR
Controller	Sunol	SC104V	FA002060	—	NCR
Antenna mast	Sunol	TLT2	FA002061	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 40	FA002071	1 year	Feb. 09/13
Bilog antenna	Sunol	JB3	FA002108	1 year	Feb. 07/13
50 coax cable	Huber + Suhner	NONE	FA002013	1 year	Aug. 15/12
50 coax cable	Huber + Suhner	NONE	FA002074	1 year	Aug. 15/12

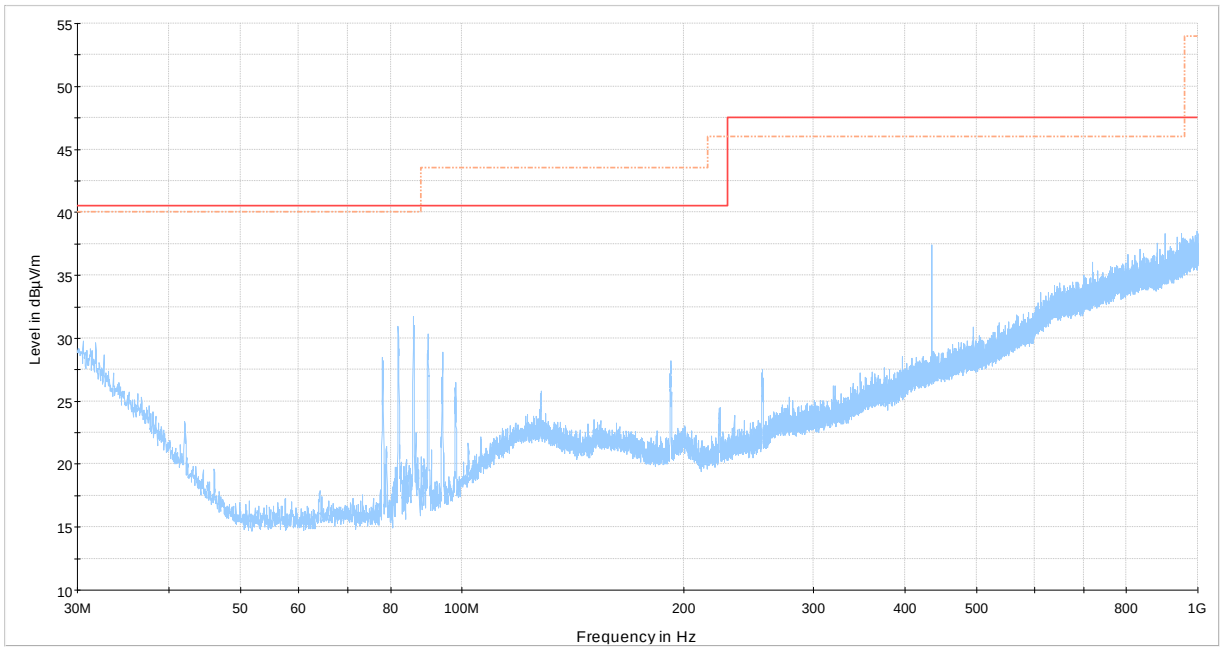
Notes: NCR - no calibration required

8.1.5 Test data

Test date	April 23, 2012	**Test engineer**	Kevin Rose		
Temperature	24 °C	**Air pressure**	1005 mbar	**Relative humidity**	32 %

Port under test	Enclosure
Test facility	3 m Semi anechoic chamber
Measuring distance (m)	3
Antenna height variation (m)	1–4
Turn table position (°)	0–360
Receiver/spectrum analyzer settings	30 MHz to 1 GHz: Preview measurements – Receiver: Peak detector (Max hold), RBW = 120 kHz, VBW = 300 kHz, Measurement time = 100 ms Final measurements – Receiver: Q-Peak detector, RBW = 120 kHz, VBW = 300 kHz, Measurement time = 100 ms
Measurement details	A preview measurement was generated with receiver in continuous scan or sweep mode while the EUT was rotated and antenna adjusted to maximize radiated emission. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

8.1.5 Test data, continued



The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators.

Plot 8.1-1: Radiated disturbance

8.1.6 Setup photos

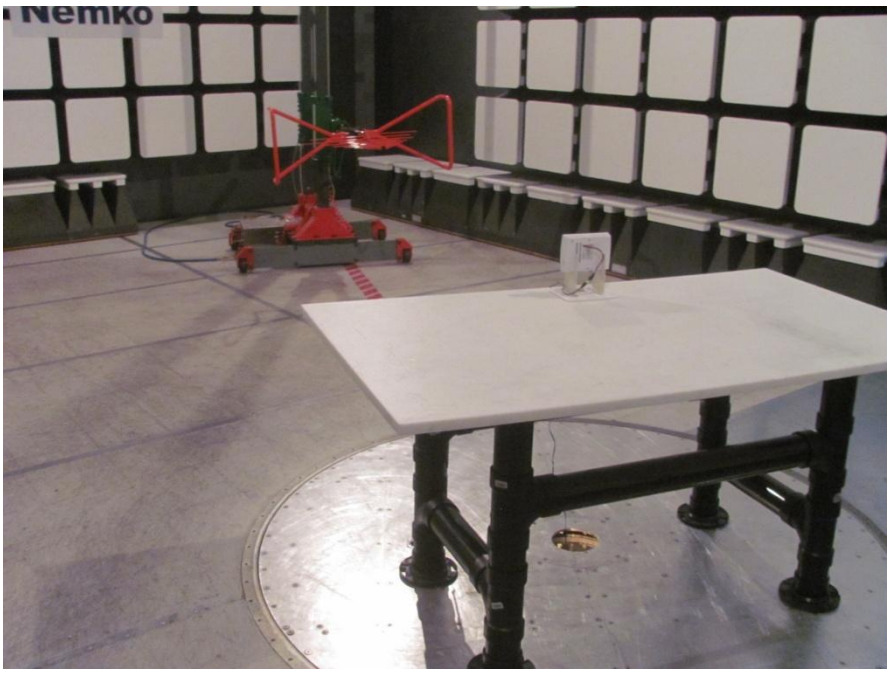


Photo 8.1-1: Radiated disturbance setup

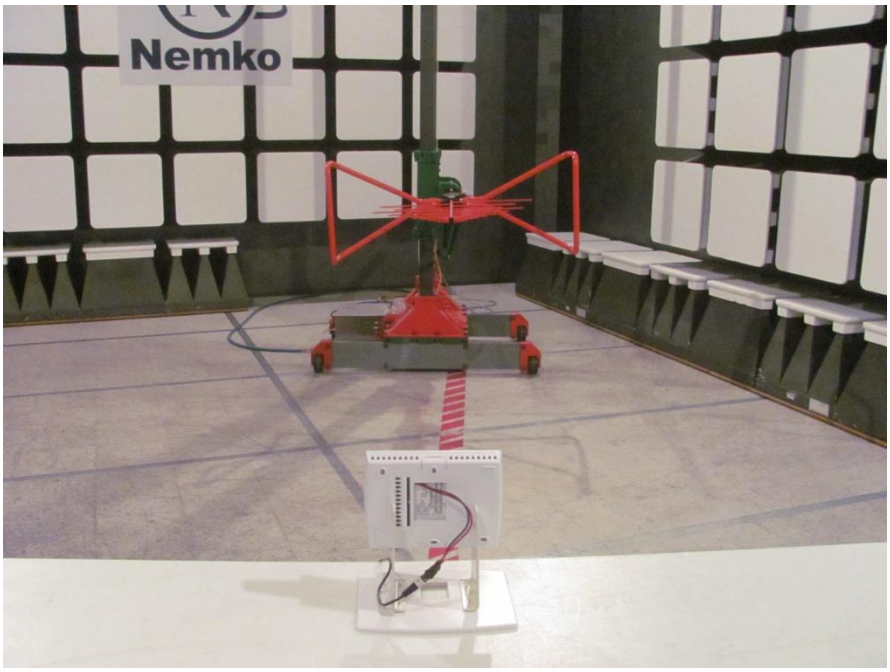


Photo 8.1-2: Radiated disturbance setup

8.2 Conducted disturbance at mains port

8.2.1 References

CISPR 22 and ANSI C63.4-2003

8.2.2 Test summary

Verdict Pass

8.2.3 Observations/special notes

The EUT was set up as table top configuration.

8.2.4 Test equipment list

Table 8.2-1: Conducted disturbance at mains port equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal./Ver. cycle	Next Cal./Ver.
50 coax cable	Huber + Suhner	None	FA002015	1 year	Aug. 15/12
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 40	FA002071	1 year	Feb. 09/13
LISN	Rohde & Schwarz	ENV216	FA002023	1 year	Nov. 18/12
Notes: None					

8.2.5 Test data

Test date	April 23, 2012	**Test engineer**	Kevin Rose		
Temperature	24 °C	**Air pressure**	1005 mbar	**Relative humidity**	32 %

Port under test AC mains

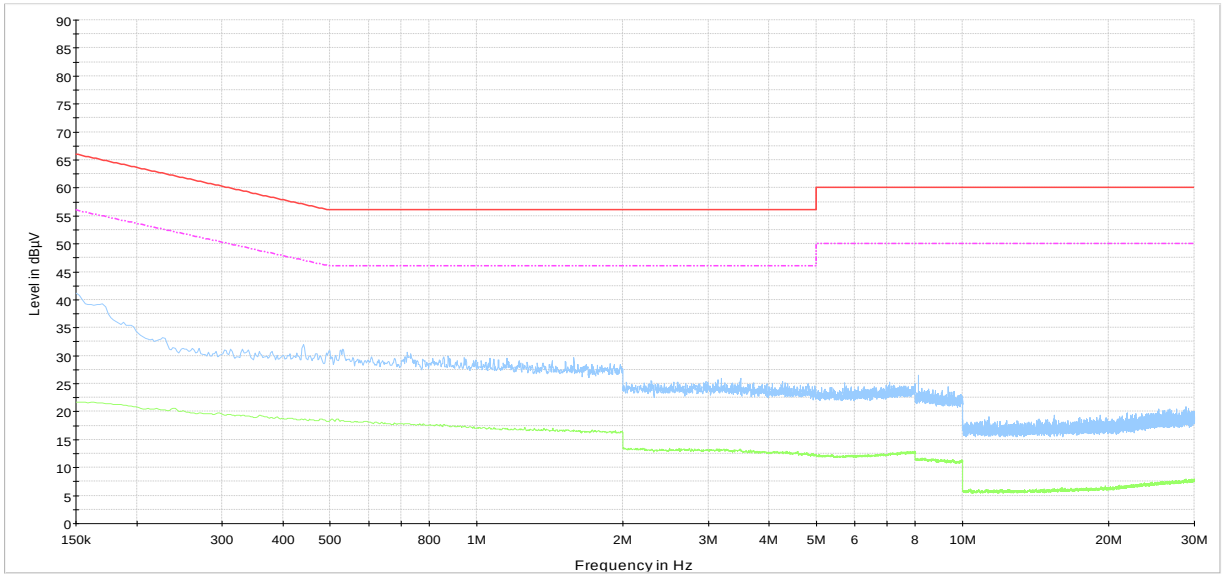
Receiver/spectrum analyzer settings

Preview measurements – Receiver:
Peak and Average detector (Max hold), RBW = 9 kHz, VBW = 30 kHz, Measurement time = 100 ms
Final measurements – Receiver:
Q-Peak and Average detector, RBW = 9 kHz, VBW = 30 kHz, Measurement time = 100 ms

Measurement details

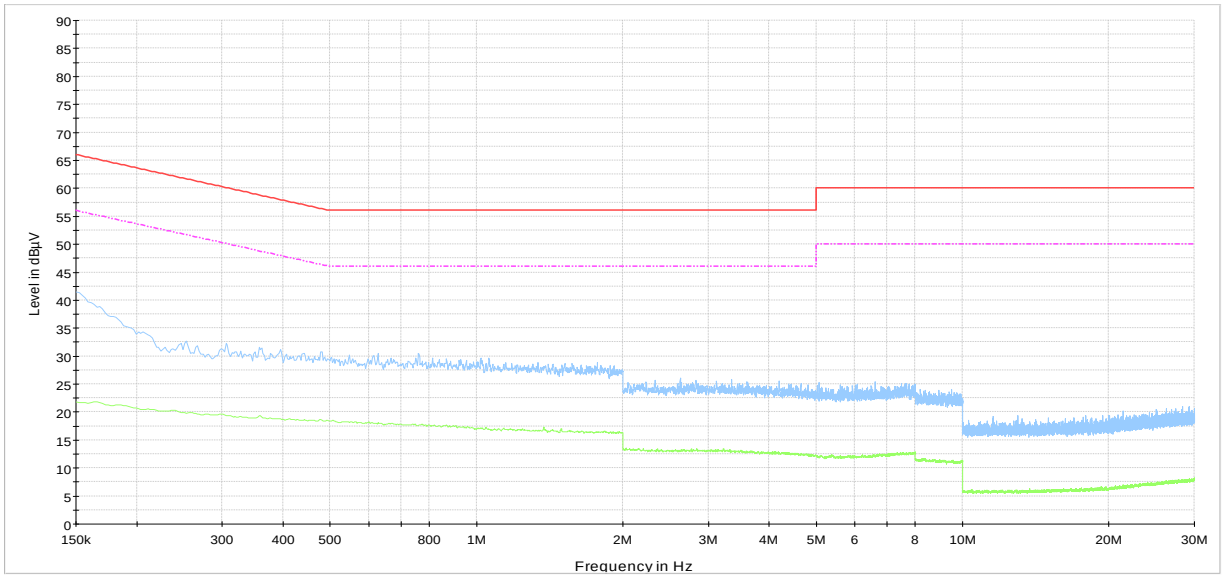
A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

8.2.5 Test data, continued



The spectral plot has been corrected with transducer factors. (i.e. cable loss, LISN factors, and attenuators)

Plot 8.2-1: Conducted disturbance on phase line (green trace is made with average detector, blue trace is made with peak detector, red line is a quasi-peak limit line and pink line is an average limit line)



The spectral plot has been corrected with transducer factors. (i.e. cable loss, LISN factors, and attenuators)

Plot 8.2-2: Conducted disturbance on neutral line (green trace is made with average detector, blue trace is made with peak detector, red line is a quasi-peak limit line and pink line is an average limit line)

8.2.6 Setup photos

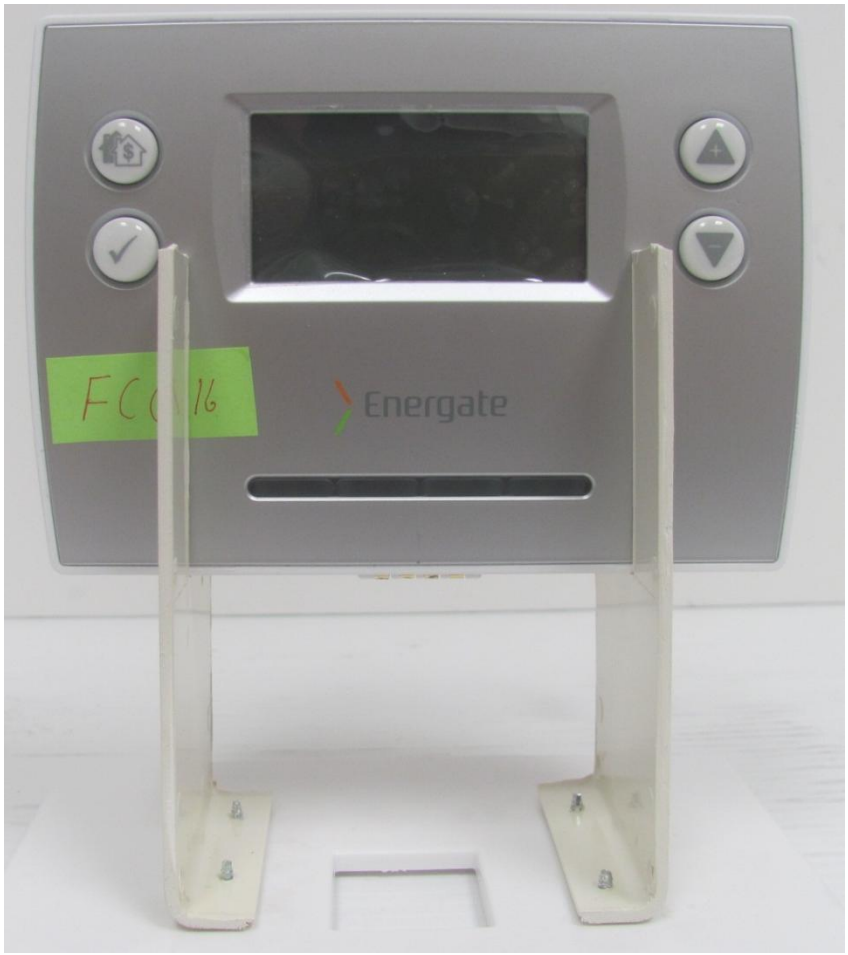
Photo 8.2-1: Conducted disturbance setup

Photo 8.2-2: Conducted disturbance setup

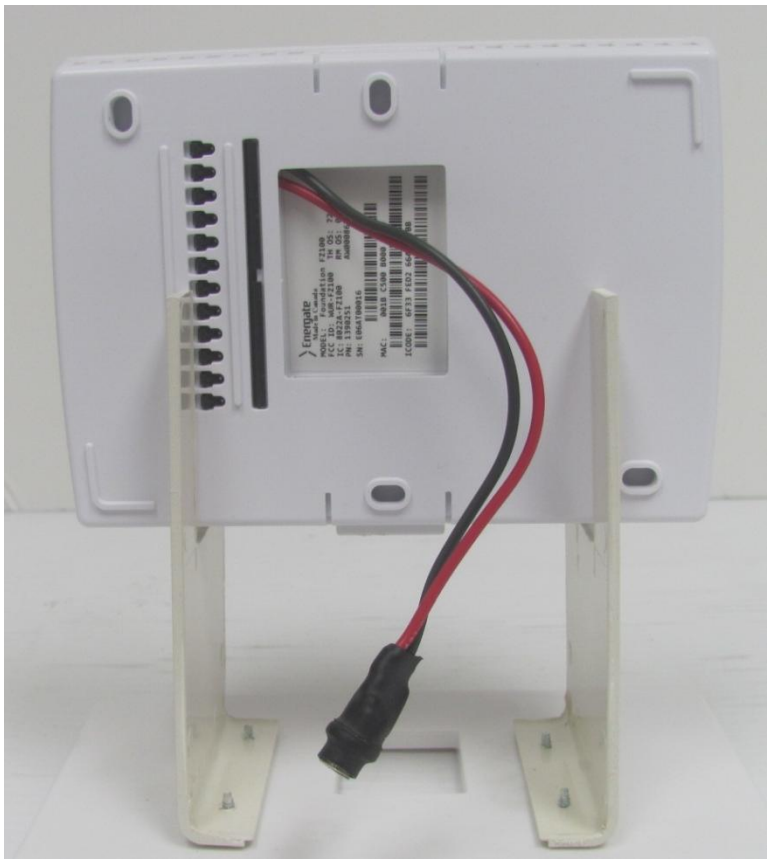
Section 9 EUT photos

9.1 External photos

Front view



Rear view



Side view