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Test Report:	2009 03124293 FCC
Project number:	13307
Applicant:	Residential Control Systems 11481 Sunrise Gold Circle, Ste. 1 Rancho Cordova, CA 95742
Equipment Under Test (EUT):	Thermostat
Model:	TZ43TZW005
In Accordance With:	FCC Part 15 Subpart C, 15.249
FCC ID Number:	WIBTZW005
Tested By:	Nemko USA Inc. 11696 Sorrento Valley Road, Suite F San Diego, CA 92121
Authorized By:	Alan Laudani, RF/EMC Test Engineer
Date:	March 9, 2009
Total Number of Pages:	17

Section 1. Summary of Test Results

General

All measurements are traceable to national standards

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15; Subpart C. Radiated tests were conducted is accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

Apparatus Assessed:	Thermostat TZ43TZW005
Specification:	FCC Part 15 Subpart C, 15.249
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None

Report Release History:

REVISION	DATE	COMMENTS
-	March 9, 2009	Prepared By: Alan Laudani
-	March 9, 2009	Initial Release: Alan Laudani

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.

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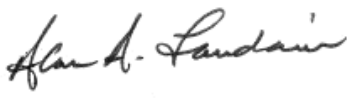

Alan Laudani, RF/EMC Test Engineer

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Section 2: Equipment Under Test

2.1 Theory of Operation

The TZ43TZW005 is a Thermostat. Its function is to communicate set point data with a furnace or air conditioner system. Unterminated typical wiring was added to ensure worst case spurious emissions. The EUT was exercised by an internal test program set to transmit with continuous modulation for RF testing.

The EUT's performance during test was evaluated against the performance criterion specified by applicable test standards. Performance results are detailed in the test results section of this report.

Highest frequency generated or used: 908.42 MHz

2.4 Technical Specifications of the EUT

Manufacturer:	Residential Control Systems		
Operating Frequency:	908.42 MHz in the 902--928 MHz Band		
Measured Power:	Average 82.5 dBuV/m @ 3m Peak 87.2 dBuV/m @ 3m		
Modulation:	FSK		
Antenna Data:	Circuitry trace – Not available		
Antenna Connector:	NONE		
Power Source:	24 Vac adapter "typical" – May be powered by appliance.		
	EUT – Power Adapter	Amseco Model: XR-2440LED Serial: 91438-31012-9	2 prong "wall wart" Input: 120VAC Output: 24VAC 40VA

Section 3: Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.249 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz and 24.0-24.25 GHz bands.

3.2 Deviations From Laboratory Test Procedures

No deviations from Laboratory Test Procedure

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	14 – 22 ^{o}C
Humidity range	:	32--66 %
Pressure range	:	102.0 kPa
Power supply range	:	+/- 5% of rated voltages

3.4 Test Equipment

Nemko ID	Device	Mfr.	Model	Serial Number	Cal Date	Cal Due Date
111	Antenna, LPA	EMCO	3146	1382	20-Oct-08	20-Oct-10
116	Antenna, Bicon	EMCO	3110	1267	12-Nov-08	12-Nov-10
317	Preamplifier	HP	8449A	2749A00167	31-Mar-08	31-Mar-09
384	LISN	Solar	9348-50-R-24-BNC	941716	27-Aug-08	27-Aug-09
438	Quasi-Peak Adapter	HP	85650A	2521A00618	21-Mar-08	21-Mar-09
529	Antenna, DRWG	EMCO	3115	2505	8/27/2007	08/27/08
542	High Pass Filter	Solar	7801-5.0	838132	11-Apr-08	11-Apr-09
NA	Regulating Transfmr, TDGC	0-250VAC	NA	NA	NCR	NCR
681	Transient Limiter	HP	11947A	3107A02634	12-Sep-08	12-Sep-09
835	Spectrum Analyzer	Rohde & Schwarz	RHDFSEK	829058/005	27-Jun-08	27-Jun-09
839	Spectrum Analyzer Display	HP	85662A	3014A18995	21-Mar-08	21-Mar-09
840	Spectrum Analyzer	HP	8566B	2416A00394	21-Mar-08	21-Mar-09
898	EMI Receiver	HP	8546A	3625A00348	1/18/07	1/18/08
899	RF Filter Section	HP	85460A	3448A00288	1/18/07	1/18/08
811	Multimeter	Fluke	111	78130057	17-Nov-08	17-Nov-09

Section 4: Observations

4.1 Modifications Performed During Assessment

No modifications were performed during assessment.

4.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

4.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

4.4 Tests Deleted

No Tests were deleted from this assessment.

4.5 Additional Observations

There were no additional observations made during this assessment.

Section 5: Results Summary

This section contains the following:

FCC Part 15 Subpart C: Test Results.

The column headed “Required” indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N No: not applicable / not relevant
Y Yes: Mandatory i.e. the apparatus shall conform to these tests.
N/T Not Tested, mandatory but not assessed. (See section 4.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

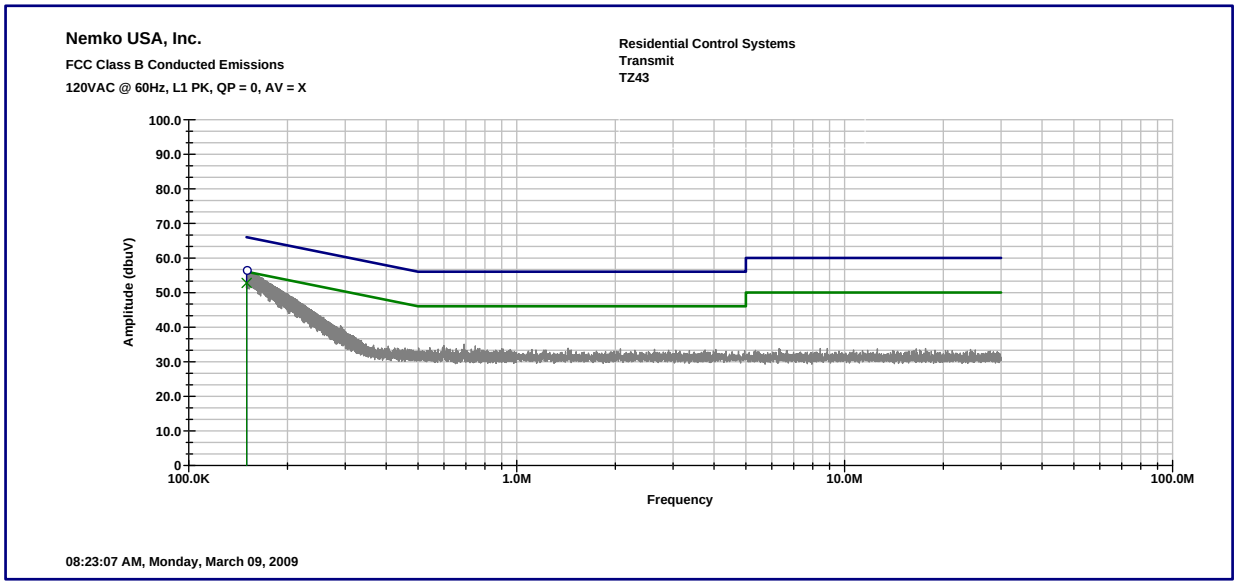
5.1 FCC Part 15 Subpart C Test Results

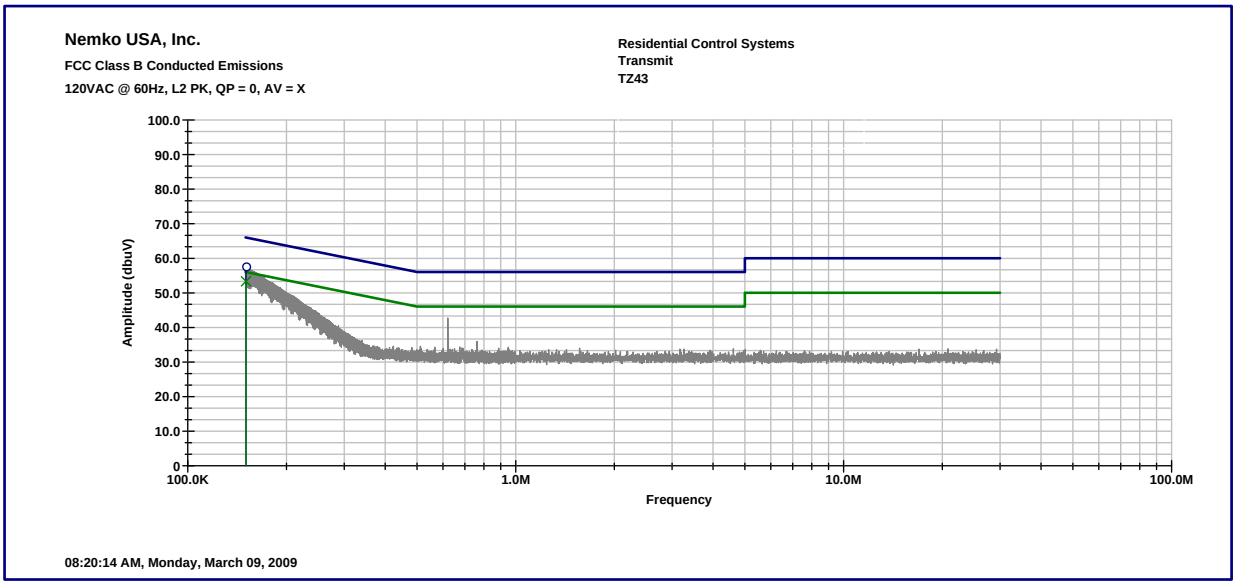
Part 15	Test Description	Required	Result
15.207 (a)	Power line Conducted Emissions	Y	Pass
15.209 (a)	Radiated Emissions within Restricted Bands	Y	Pass
15.215 (c)	Occupied Bandwidth	Y	Pass
15.249 (a)	Radiated Emissions not in Restricted Bands	Y	Pass
15.249 (b)	Operation in the 902--928 MHZ Band Fixed, point-to-point operation	N	
15.249 (d)	Spurious Emissions (except Harmonics)	Y	Pass
15.107 (a)	Receiver Spurious Conducted Emissions	Y	Pass
15.109 (a)	Receiver Spurious Radiated Emissions	Y	Pass

Appendix A: Test Results

Conducted Emissions Test Data

Client	Residential Control Systems	Temperature	22	°C
Pan #	13307	Relative Humidity	36	%
EUT Name	Thermostat	Barometric Pressure	102.0	kPa
EUT Model	TZ43TZW005	Test Location	Enclosure 1	
Governing Doc	CFR 47, Part 15B	Test Engineer	Alan Laudani	
Basic Standard	Sec. 15.207 Class “B” Transmit	Date of test	March 9, 2009	
Test Parameters	Peak RBW: 100kHz VBW: 100kHz Quasi-Peak: RBW 9kHz, VBW 30 kHz Average: RBW 9kHz, VBW 30 kHz Quasi-Peak Limit Blue Line, Average Limit Green Line			





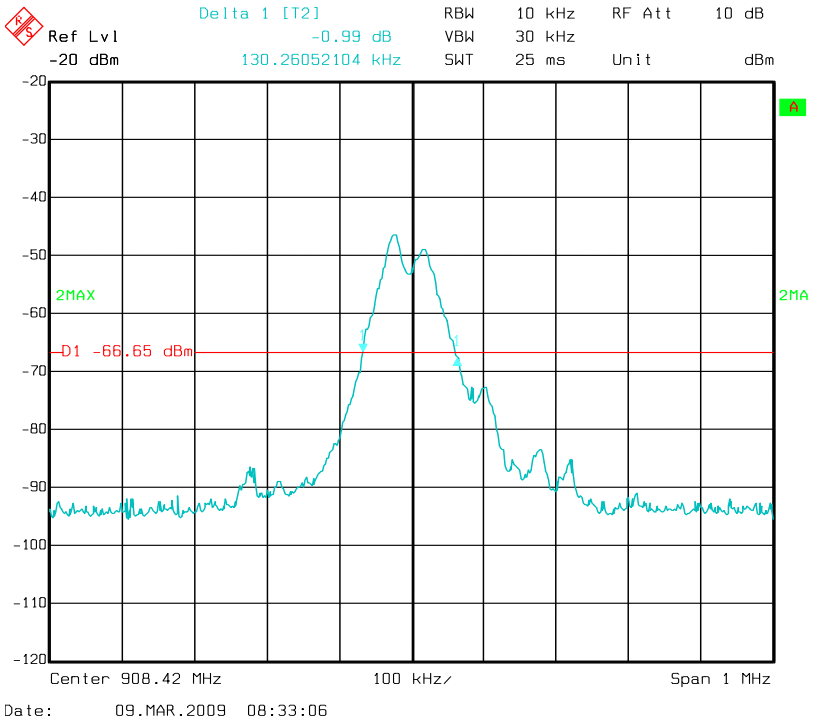
Clause 15.215(c) Occupied Bandwidth

Test Conditions:

Client	Residential Control Systems	Temperature	22
Pan #	13307	Relative Humidity	36
EUT Name	Thermostat	Barometric Pressure	102.0
EUT Model	TZ43TZW005	Test Location	Enclosure 2
Governing Doc	CFR 47, Part 15C	Test Engineer	Alan Laudani
Basic Standard	Sec. 15.249 Transmit	Date of test	March 9, 2009

15.215(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in Sec. Sec. 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Results:



Measured Occupied Bandwidth: 130 kHz

Clause 15.209(a) Radiated Emissions within Restricted Bands

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (uV/meter)	Measurement Distance (meter)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	3
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Clause 15.249(a) Radiated Emissions

Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency (MHz)	Field strength of fundamental (mV/meter)	Field strength of harmonics (uV/meter)
902-928	**50**	**500**
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

Clause 15.249(d) Spurious Emissions

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Sec. 15.209, whichever is the lesser attenuation.

Test Results:

See Table. EUT complies for fundamental power, bandedges and spurious emissions.

Additional Observations:

The Spectrum was searched from 30MHz to the 10th Harmonic (9280 MHz).

These results apply to emissions that may be found in the restricted bands defined in FCC Part 15 Subpart C, 15.205. The EUT was investigated with a variac that showed no output power differences when the line voltage was varied by +/- 15 % of nominal 120 Vac.

All Measurements below 1GHz were performed at 3m employing a CISPR quasi-peak detector, except for the radio's fundamental. Peak measurements above 1GHz were done utilizing RBW of 1MHz and VBW of 3MHz. Average measurements above 1GHz were done utilizing RBW of 1MHz and VBW of 10Hz as the duty cycle was 100%.

Measurements made at the 3 meter Outside Area Test Site, all measurements max hold after peaking for EUT rotation and antenna height from 1 to 4 meters.

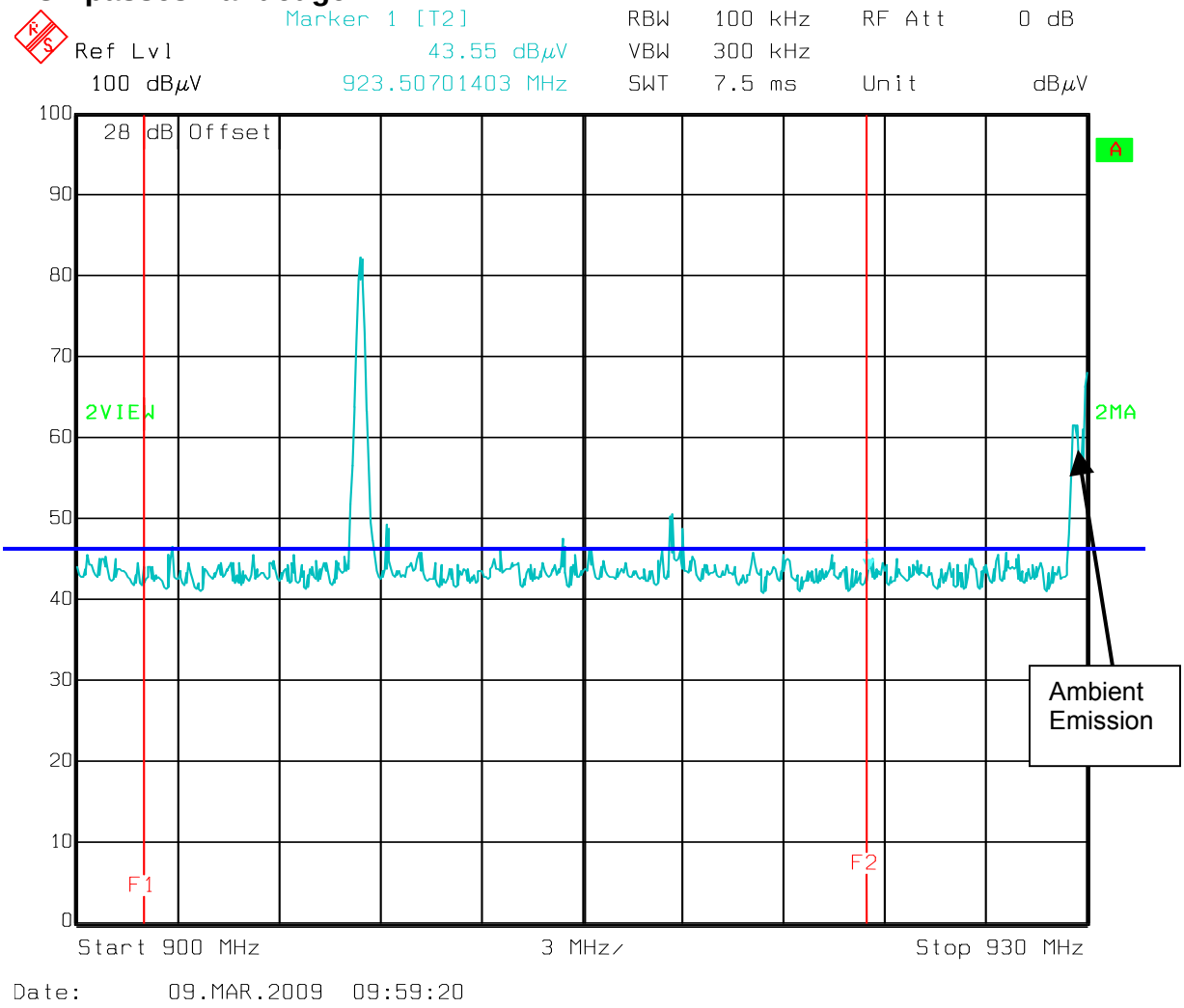
Fundamental power was measured at 1 MHz RBW, 3 MHz VBW to ensure capture of entire emissions envelope. 15.249(e). And the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. The peak field strength emission passes when measured at max hold RBW of 1 MHz with 3 MHz VBW.

No other emissions found within 20 dB of the limits.

28 dB offset to account for Antenna factor plus cable loss.

Actual measurements Bandedge were done using a Quasi-Peak detector, see table below.

EUT passes Bandedge.



Q-P limit blue line 46 dBuV/m

Red lines are band edge 902 to 928 MHz

Note: *Corrected Reading Computations*
Average = Maximum Meter Reading + Antenna Factor + Path Loss
82.5 = 54.5 + 23.6 + 4.4

EUT **passes**
Limit = 50 mV/m
Corrected Average Reading = 82.5 dBuV/m
$10^{((82.5-120)/20)}$ *= 0.0133V/m, or 13.3 mV/m*

Radiated Emissions Data

Job # :	13307	Date :	3-9-09	Page 1 of 1	
NEX #:	124283	Time :	1030		
		Staff :	aal		
Client Name :	Residential Control Systems			EUT Voltage :	120
EUT Name :	Thermostat			EUT Frequency :	60
EUT Model # :	TZ43TZW005			Phase:	1
EUT Serial # :	na			NOATS	
EUT Config. :	Transmit			SOATS	X
				Distance < 1000 MHz:	3 m
	15.249, 15.209			Distance > 1000 MHz:	3 m
Specification :	CFR47 Part 15, Subpart B, Class B				
Loop Ant. #:	NA				
Bicon Ant.#:	116_3m	Temp. (°C) :	14		
Log Ant.#:	111_3m	Humidity (%) :	58		
DRG Ant. #	529	Spec An.#:	898		
Cable LF#:	SOATS	Spec An. Display #:	898		
Cable HF#:	60FT	QP #:	898		
Preamp LF#:	NA	PreSelect#:	899		
Preamp HF#	317				

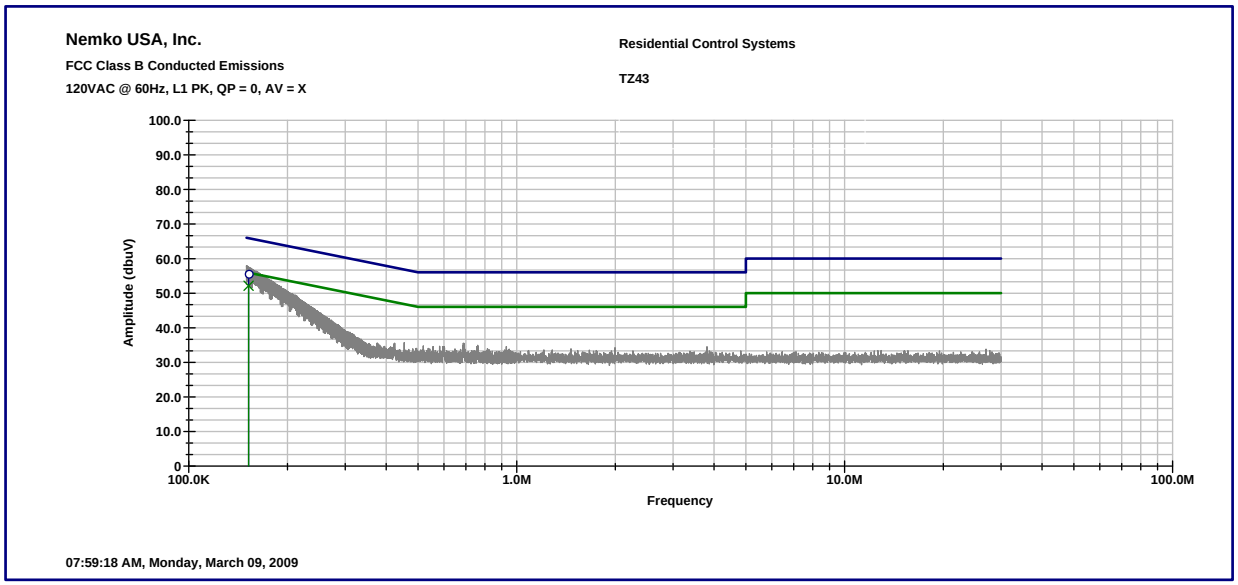
Quasi-Peak	RBW:	120 kHz
	Video Bandwidth	300 kHz
Peak	RBW:	1 MHz
	Video Bandwidth	3 MHz
Average	RBW:	1 MHz
	Video Bandwidth	10 Hz

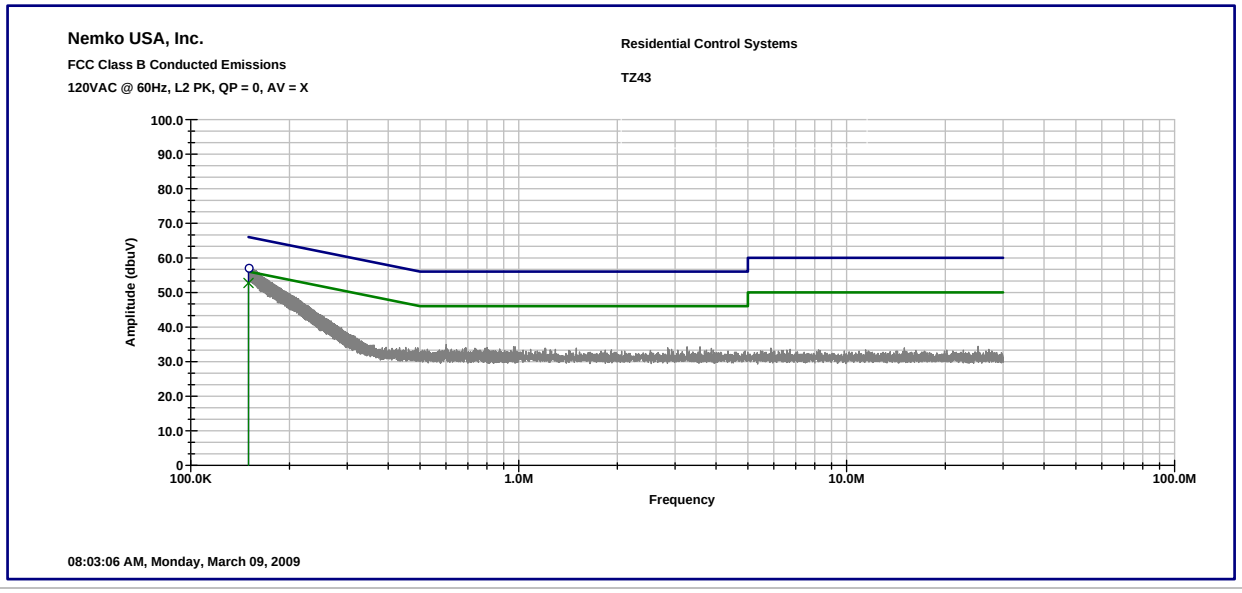
Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.
Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading **Vertical**	Meter Reading **Horizontal**	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBµV/m)	Spec. limit (dBµV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
46.0	10.5	6.9	Q	-	1.0	10.5	24.0	40.0	-16.0	Pass	
117.0	6.7	6.1	Q	-	1.0	6.7	21.0	43.5	-22.5	Pass	
163.0	5.8	6.1	Q	-	1.0	6.1	24.0	43.5	-19.5	Pass	
180.0	7.9	14.7	Q	-	1.0	14.7	33.2	43.5	-10.3	Pass	
293.0	6.2	6.1	Q	-	1.0	6.2	24.1	46.0	-21.9	Pass	
340.0	5.9	5.9	Q	-	1.0	5.9	24.4	46.0	-21.7	Pass	
640.0	6.8	6.6	Q	-	1.0	6.8	30.2	46.0	-15.8	Pass	
902.0	6.5	6.5	Q	-	1.0	6.5	34.5	46.0	-11.5	Pass	
908.42	59.2	55.8	P	-	1.0	59.2	87.2	94.0	-6.8	Pass	RBW 1 MHz
908.42	54.5	53.5	A	-	1.0	54.5	82.5	94.0	-11.5	Pass	RBW 1 MHz
928.0	6.9	6.8	Q	-	1.0	6.9	34.8	46.0	-11.2	Pass	
1816.8	48.1	48.2	P	-	1.0	48.2	49.5	74.0	-24.5	Pass	
1816.8	33.4	33.7	A	-	1.0	33.7	35.0	54.0	-19.0	Pass	
2725.3	50.2	49.2	P	-	1.0	50.2	52.4	74.0	-21.5	Pass	
2725.3	38.7	37.2	A	-	1.0	38.7	40.9	54.0	-13.0	Pass	

Conducted Emissions Test Data—Receive Mode

Client	Residential Control Systems	Temperature	22	°C
Pan #	13307	Relative Humidity	36	%
EUT Name	Thermostat	Barometric Pressure	102.0	kPa
EUT Model	TZ43TZW005	Test Location	Enclosure 1	
Governing Doc	CFR 47, Part 15B	Test Engineer	Alan Laudani	
Basic Standard	Sec. 15.107 Class "B"	Date of test	March 9, 2009	
Test Parameters	Peak RBW: 100kHz VBW: 100kHz Quasi-Peak: RBW 9kHz, VBW 30 kHz Average: RBW 9kHz, VBW 30 kHz Quasi-Peak Limit Blue Line, Average Limit Green Line			





Conducted Emissions Test Data—Receive Mode

Radiated Emissions Data

Job # :	13307	Date :	3-9-09	Page	1 of 1
NEX #:	124283	Time :	1130		
		Staff :	aal		
Client Name :	Residential Control Systems			EUT Voltage :	120
EUT Name :	Thermostat			EUT Frequency :	60
EUT Model # :	TZ43TZW005			Phase:	1
EUT Serial # :	na			NOATS	
EUT Config. :	Receive mode			SOATS	X
				Distance < 1000 MHz:	3 m
	15.249, 15.109			Distance > 1000 MHz:	3 m
Specification :	CFR47 Part 15, Subpart B, Class B				
Loop Ant. #:	NA				
Bicon Ant.#:	116_3m	Temp. (°C) :	14		
Log Ant.#:	111_3m	Humidity (%) :	58		
DRG Ant. #	529	Spec An.#:	898		
Cable LF#:	SOATS	Spec An. Display #:	898		
Cable HF#:	60FT	QP #:	898		
Preamp LF#:	NA	PreSelect#:	899		
Preamp HF#	317				

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	Video Bandwidth	300 kHz
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Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.
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Meas. Freq. (MHz)	Meter Reading **Vertical**	Meter Reading **Horizontal**	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBµV/m)	Spec. limit (dBµV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
46.0	10.5	6.9	Q	-	1.0	10.5	24.0	40.0	-16.0	Pass	
117.0	6.7	6.1	Q	-	1.0	6.7	21.0	43.5	-22.5	Pass	
163.0	5.8	6.1	Q	-	1.0	6.1	24.0	43.5	-19.5	Pass	
180.0	7.9	14.7	Q	-	1.0	14.7	33.2	43.5	-10.3	Pass	
293.0	6.2	6.1	Q	-	1.0	6.2	24.1	46.0	-21.9	Pass	
340.0	5.9	5.9	Q	-	1.0	5.9	24.4	46.0	-21.7	Pass	
640.0	6.8	6.6	Q	-	1.0	6.8	30.2	46.0	-15.8	Pass	