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Report of Measurements
of Electromagnetic Compatibility Testing

Test Report File No.	:	**NC4085**	Date of issue: 10/22/2002
Applicant	:	Hafele	
Model / Serial No.	:	Central Locking Wall Terminal /	
Product Type	:	Access Controller	
Power Supply	:	120Vac, 60Hz to 12VDC converter	
Manufacturer	:	Same As Applicant	
License holder	:	Same As Applicant	
Address	:	3901 Cheyenne Drive	
	:	Archdale, NC 27263	
Test Type	:	☒ **Compliance Investigation** ☐ **Manufacturer's Specification**	
Test Project Number	:	00ME10760	
References(s)		FCC ID: PW3104	

Underwriters Laboratories Inc. reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. Underwriters Laboratories Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from Underwriters Laboratories Inc. issued reports.

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Report Directory

1.0 G E N E R A L - Product Description

The EUT (equipment under test) is a wall terminal that can open and close doors and motor locks. The device operates by using an intentional radio frequency (RF) to a pre-programmed transponder key. The transponder keys are passive devices that take the energy from the magnetic field of the EUT then sends the information stored within it to the EUT.
The device operates continuously at an intention radiation frequency of 134Khz.
The transmitting antenna is not removable.

The device does not need to undergo RF-exposure measurements/calculations.
Per FCC Part 2.1093(c) this device is not required to undergo test

1.1 Device Configuration During Test

The device under test was configured to operate continuously by transmitting the authorization frequency of 134Khz.
The device was tested in its normal orientation. All other orientations were examined. The data contained in this report represents the worst-case axis.
The device was powered with a Switching mode power supply. The manufacturer is Mean Well, Model number PSU30A-3. Input voltage is 120VAC, 60Hz and the output voltage is 12VDC.

"The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report"

1.2 Deviations from ANSI C63.4

☒ Not Applicable

1.3 Device Modifications Necessary for Compliance

☒ N/A

Environmental conditions in the lab:

	Range
Temperature:	20-25°C
Relative Humidity	30 - 60 %
Atmospheric pressure	680 - 1060 mbar

2.0 EMISSIONS TEST REGULATIONS

FCC Part 15, Subpart C, 15.109 and 15.209
FCC Part 15, Subpart B, Class B

2.1 EUT OPERATION MODE - EMISSIONS TESTS

☐ Standby
☐ Test program (H-Pattern)
☐ Test program (color bar)
☐ Test program (customer specific)
☐ Practice operation
☐ Normal operation Mode:
☒ As per manufacturer's instructions: Continuous operation

2.1.1 Conducted Emissions Tests

☒ **Test Applicable** ☐ **Test Not Applicable**

Temperature:	22.5 °C
Humidity:	40 %RH
Pressure:	1036 mbar
Date test performed:	October 22 2002

Frequency range on each side of line. **Measurement Point**

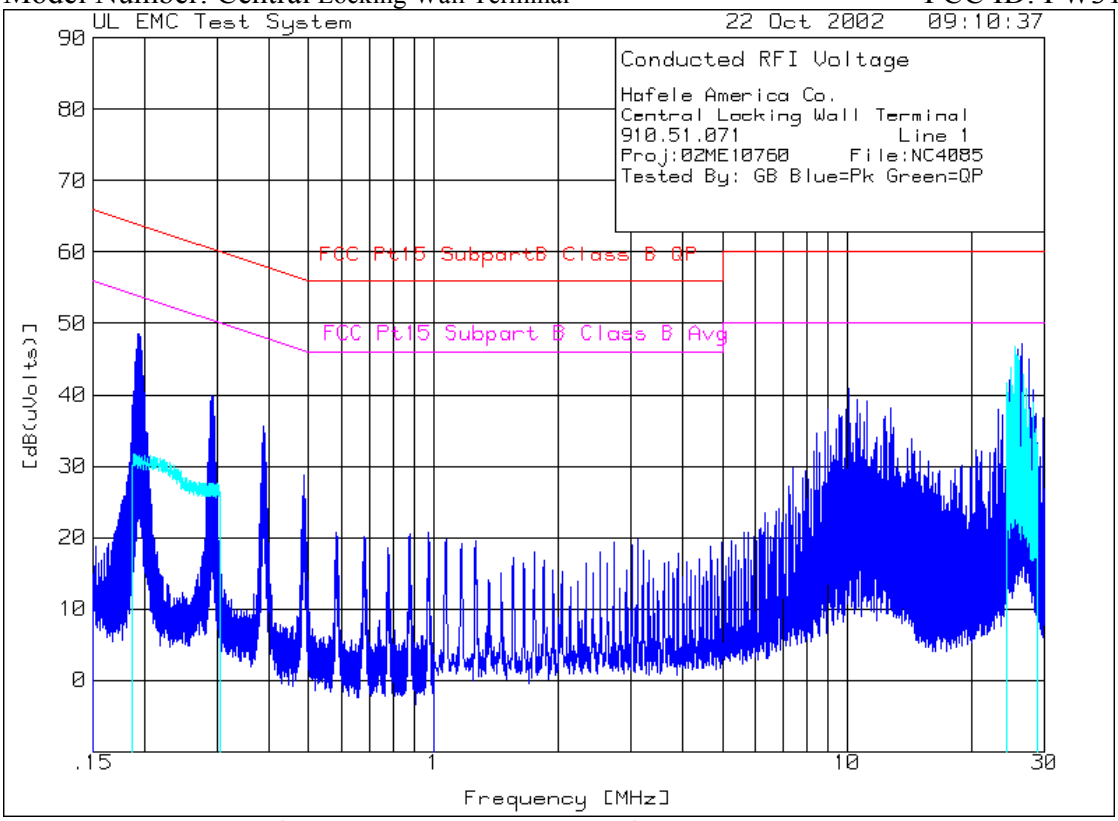
☒150kHz to 30MHz ☒ Voltage ☒ Mains

Test equipment used for conducted emissions:

☒ **ES126** **Rhode & Schwartz** **EMI Receiver** **Equipment No.: ME5B-081**
Resolution BW: 100kHz
Video BW: 100kHz
QP BW: 10kHz
Range: .150 – 30MHz Last Calibration Date: August 20 2002 Calibration Due Date: August 20 2003

Test Accessories for Conducted Emissions:

☒ **11947A** **Hewlett Packard** **Transient Limiter** **Equipment No.: ME5A-443**
Last Calibration Date: January 16 2002 Calibration Due Date: January 16 2003
☒ **9252-50-R-24-BNC** **Solar Electronics** **LISN** **Equipment No.: ME5A-637**
Last Calibration Date: April 4 2002 Calibration Due Date: April 4 2003
☒ **Temp/Pressure** **Oakton** **Barometer** **Equipment No.: ME4-263**
Last Calibration Date: April 3 2002 Calibration Due Date: April 3 2003
☒ **453320** **Ex-Tech** **Hydro-Thermometer Equipment No.: ME4-264**
Last Calibration Date: April 3 2002 Calibration Due Date: April 3 2003



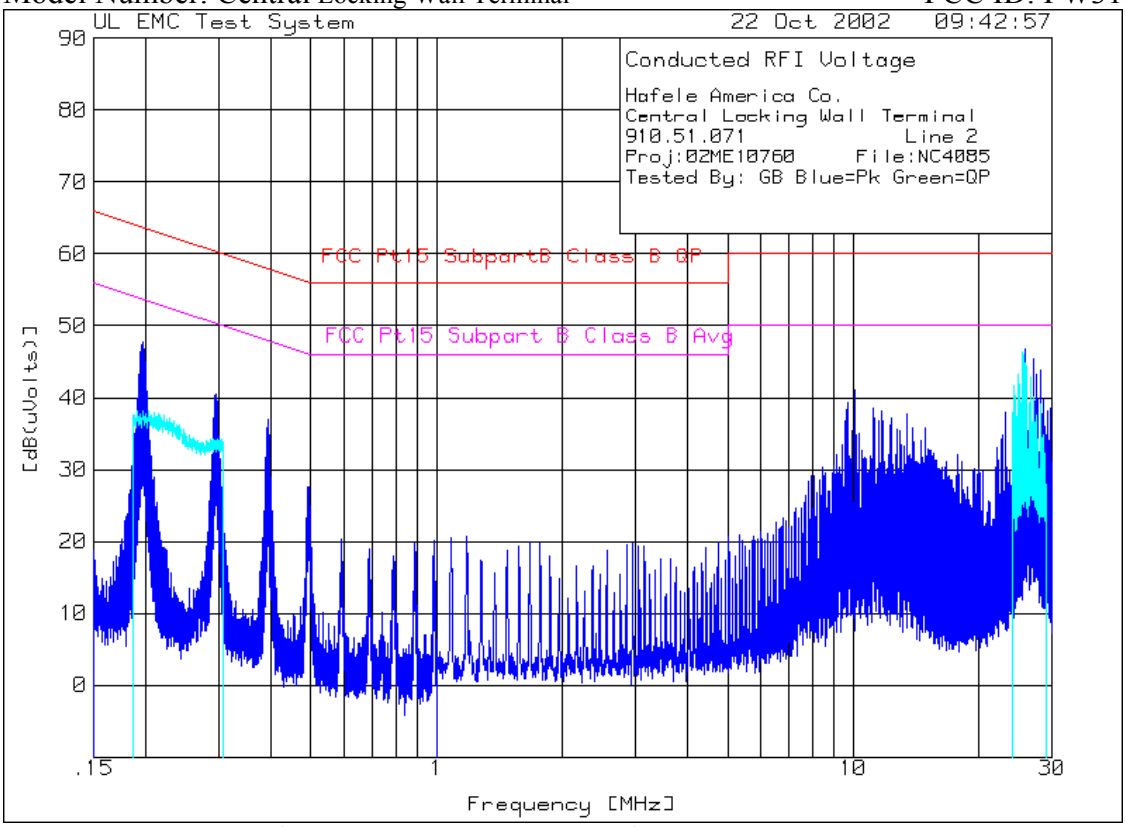
Note: Cyan data displays Average detection

Hafele America Co.
Central Locking Wall Terminal
910.51.071 Line 1
Proj:02ME10760 File:NC4085
Tested By: GB Blue=Pk Green=QP

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
Range: 1 .15 - 1MHz							
1	.18942	62.24 avlg	-30.6	0	31.64	64.1	54.1
				Margin [dB]		-32.46	-22.46
2	.22438	61.54 avlg	-30.6	0	30.94	62.7	52.7
				Margin [dB]		-31.76	-21.76
3	.29491	58.22 avlg	-30.6	0	27.62	60.4	50.4
				Margin [dB]		-32.78	-22.78
Range: 2 1 - 30MHz							
4	24.83419	74.44 avlg	-30.6	0	43.84	60	50
				Margin [dB]		-16.16	-6.16
5	25.49609	77.34 avlg	-30.6	0	46.74	60	50
				Margin [dB]		-13.26	-3.26
6	25.889	76.05 avlg	-30.6	0	45.45	60	50
				Margin [dB]		-14.55	-4.55

LIMIT 1: FCC Pt15 SubpartB Class B QP
LIMIT 2: FCC Pt15 Subpart B Class B Avg

avlg - denotes average log detection



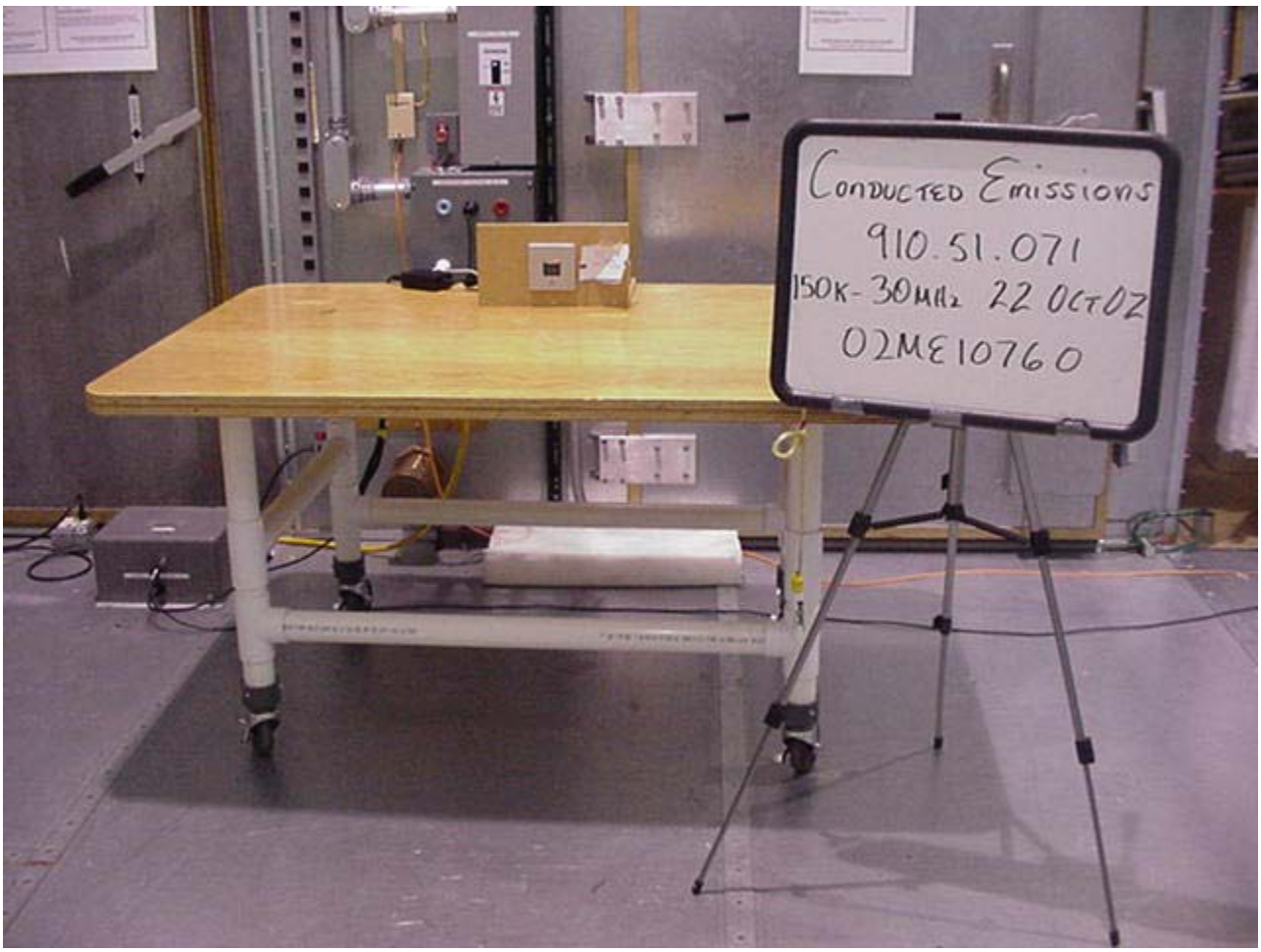
Note: Cyan data displays Average detection

Hafele America Co.
Central Locking Wall Terminal
910.51.071 Line 2
Proj:02ME10760 File:NC4085
Tested By: GB Blue=Pk Green=QP

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
Range: 1 .15 - 1MHz							
1	.19127	68.68 avlg	-30.6	0	38.08	64	54
				Margin [dB]		-25.92	-15.92
2	.23783	66.78 avlg	-30.6	0	36.18	62.2	52.2
				Margin [dB]		-26.02	-16.02
3	.29867	64.9 avlg	-30.6	0	34.3	60.3	50.3
				Margin [dB]		-26	-16
Range: 2 1 - 30MHz							
4	24.83562	73.74 avlg	-30.6	0	43.14	60	50
				Margin [dB]		-16.86	-6.86
5	25.48852	76.94 avlg	-30.6	0	46.34	60	50
				Margin [dB]		-13.66	-3.66
6	25.88751	75.48 avlg	-30.6	0	44.88	60	50
				Margin [dB]		-15.12	-5.12

LIMIT 1: FCC Pt15 SubpartB Class B QP
LIMIT 2: FCC Pt15 Subpart B Class B Avg

avlg - denotes average log detection



Conducted Emissions Test .150 – 30 MHz

2.1.2 Radiated Emissions Test (10 Meter Semi-Anechoic Chamber)

☒ **Test Applicable** Date test performed: 6-5-2000

120kHz – 30MHz using Magnetic loop Antenna
The measurement antenna distance ☒ 1 ☐ 10 meters from the EUT.

Measurement obtained at 1 meter due to low operating frequency emissions. The operating frequency was not measurable at 3 meters therefore the antenna was moved into 1 meter from the EUT.
The measurement at 1 meter was compared to the 3-meter limit. Since the measurement at 1 meter is lower than the 3-meter limit, data was not extrapolated and is found to be well within the limits.

30MHz – 1000MHz
The measurement antenna distance ☒ 3 ☐ 10 meters from the EUT.

Tests were performed on the transmitter in accordance with the limitation set forth by CFR47 FCC Part 15 Subpart B, Class B, Paragraphs 15.209 and tested in accordance with the test procedures and methodologies in ANSI C63.4:1992.

The EUT was checked throughout the frequency band 120kHz to 1000MHz. The transmitter operated at 134kHz. The allowable field strength limits in accordance with 15.209 were applied to the fundamental frequency. All other emissions were tested in accordance with the general limitations 15.209.

From 120kHz to 30MHz, measurements were made at a distance of 1 meter. The limit was adjusted using the 40dB/decade limit extrapolation method to a distance of 3 meters and all 1 meter measurements were compared to the 3 meter limit.

Test equipment used for final radiated emissions tests:

☒ **HP 8574A** **Hewlett-Packard** **EMI Receiver,** **Equipment No.: ME5A-461**
Range: 0.1 – 1000MHz Last Calibration Date: January 27 2000 Calibration Due Date: January 27 2001

Consisting of:

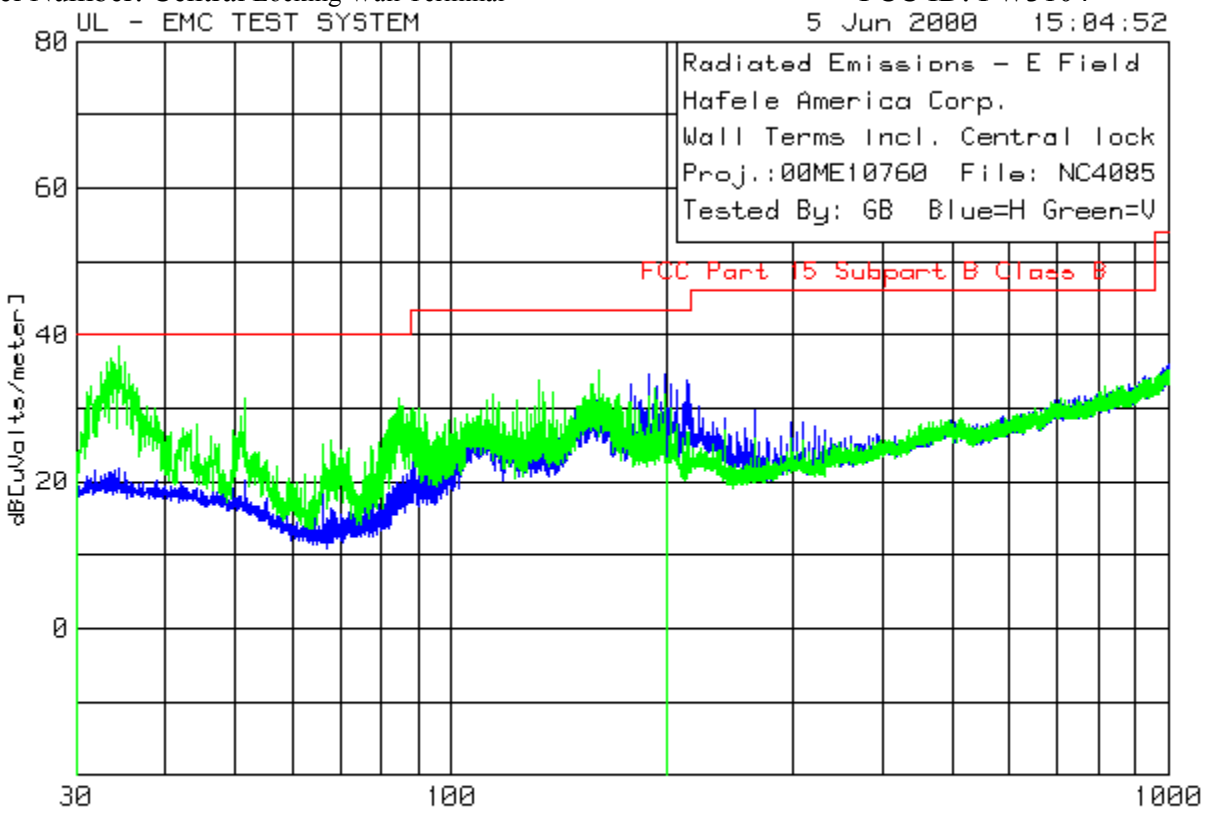
HP - 8566B	**Hewlett-Packard**		**Spectrum Analyzer,**
	Resolution BW:	**100kHz**	**9kHz to 30 MHz**
		1MHz	**30MHz to 1000 MHz**
	Video BW:	**100kHz**	**9kHz to 30 MHz**
		1MHz	**30MHz TO 1000**MHz
	Average BW:	**1Hz**	**10kHz to 30MHz**
HP - 85662A	**Hewlett-Packard**		**Analyzer Display**
HP - 85650A	**Hewlett-Packard**		**Quasi-Peak Adapter,**
	Quasi Peak BW:	**200Hz**	**9kHz to 150kHz**
		9kHz	**150kHz to 30MHz**
		120kHz	**30 to 1000 MHz**
HP - 85685A	**Hewlett-Packard**		**Preselector**

Test Accessories for Radiated Emissions:

☒ **94455-1** **Ailtech** **Biconnical Antenna** **Equipment No.: ME5-439**
Last Calibration Date: October 5 1999 Calibration Due Date: October 5 2000

☒ **3146** **EMCO** **Log Periodic Antenna** **Equipment No.: ME5-451**
Last Calibration Date: September 28 1999 Calibration Due Date: September 28 2000

☒ **6507** **EMCO** **Active Loop Antenna** **Equipment No.: ME5A-288**
Last Calibration Date: January 14 2000 Calibration Due Date: January 14 2001



Radiated Emissions 30 – 1000 MHz

Hafele America Corp.
Wall Terms incl. Central lock
Proj.:00ME10760 File: NC4085
Tested By: GB Blue=H Green=V

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter] Limit:1	2	3	4
188.1089	19.6 pk	1.1	13.8	34.5	43.5	N/A	N/A	N/A
51.5314	19.7 pk	.5	11.2	31.4	40	N/A	N/A	N/A
160.4197	17.6 pk	1	16.5	35.1	43.5	N/A	N/A	N/A
213.7219	20.8 pk	1.1	11.9	33.8	43.5	N/A	N/A	N/A
960.5662	6.7 pk	2.9	24.5	34.1	54	N/A	N/A	N/A
470.5745	8.7 pk	1.9	17.6	28.2	46	N/A	N/A	N/A
816.4197	7.8 pk	2.6	22.7	33.1	46	N/A	N/A	N/A

LIMIT 1: FCC Part 15 Subpart B Class B

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
tm - Trace Math Result

MARKER NO.	TEST FREQUENCY	LEVEL dB[uVolts/meter]	LIMIT:1	2	3	4	TABLE	TOWER
1	188.1089	34.5	43.5	N/A	N/A	N/A	141	98 H
2	51.5314	31.4	40	N/A	N/A	N/A	99	99 V
3	160.4197	35.1	43.5	N/A	N/A	N/A	271	99 V
4	213.7219	33.8	43.5	N/A	N/A	N/A	8	98 H
5	960.5662	34.1	54	N/A	N/A	N/A	141	98 H
6	470.5745	28.2	46	N/A	N/A	N/A	143	201 V
7	816.4197	33.1	46	N/A	N/A	N/A	74	301 V

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Hafele America Corp.
 Wall Terms incl. Central lock
 Proj.:00ME10760  File: NC4085
 Tested By: GB  Blue=H Green=V

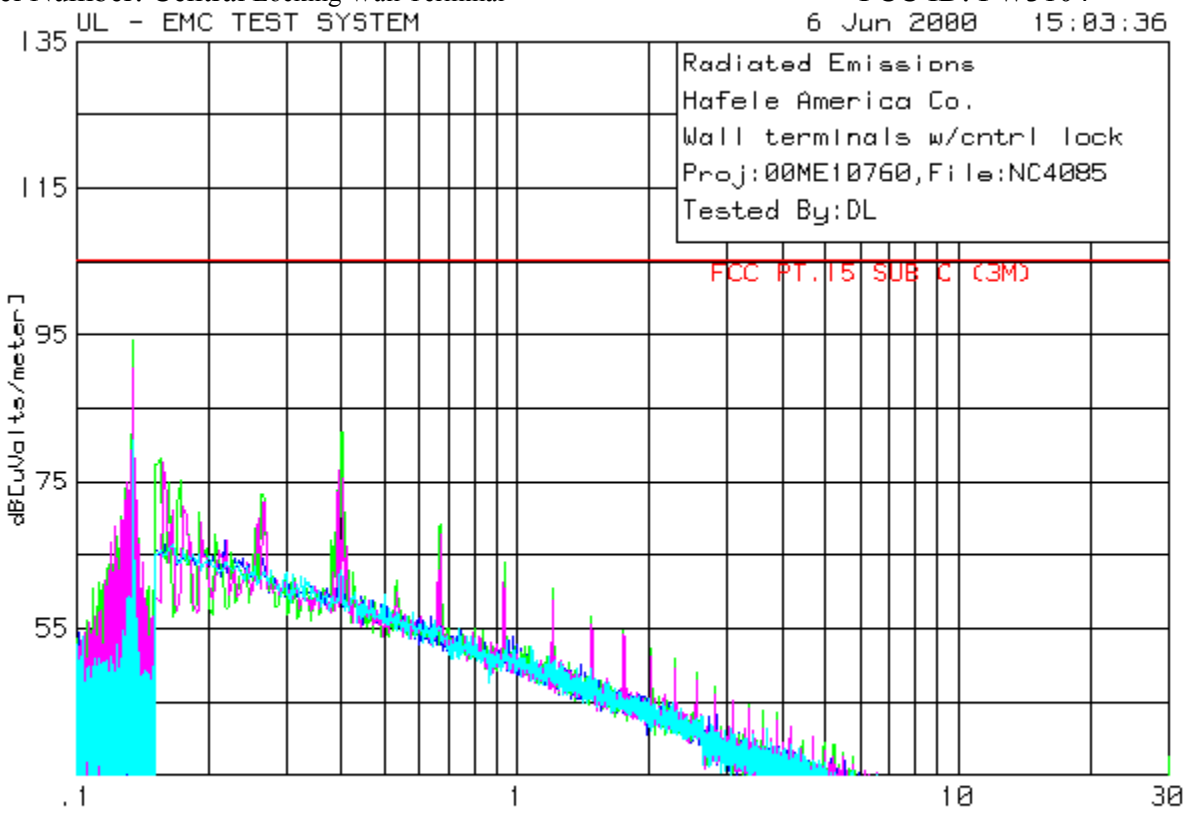
  Test    Meter  Gain/Loss Transducer Level Limit:1     2     3     4
Frequency Reading  Factor    Factor    dB[uVolts/meter]
  [MHz]   [dB(uV)]  [dB]      [dB]
================================================================================
32.5076    17.31 qp  .3       14       31.61  40       N/A    N/A    N/A
Azimuth: 101  Height:100 Vert    Margin [dB]  -8.39    N/A    N/A    N/A

33.1859    16.75 qp  .3       14       31.05  40       N/A    N/A    N/A
Azimuth: 160  Height:100 Vert    Margin [dB]  -8.95    N/A    N/A    N/A

34.3244    22.71 qp  .3       14       37.01  40       N/A    N/A    N/A
Azimuth: 137  Height:100 Vert    Margin [dB]  -2.99    N/A    N/A    N/A


LIMIT 1: FCC Part 15 Subpart B Class B

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
```



Radiated Emissions .1 – 30 MHz

Measurement obtained at 1 meter due to low operating frequency emissions. The operating frequency was not measurable at 3 meters therefore the antenna was moved into 1 meter from the EUT.
The measurement at 1 meter was compared to the 3-meter limit. Since the measurement at 1 meter is lower than the 3-meter limit, data was not extrapolated and is found to be well within the limits.

Hafele America Co.
Wall terminals w/cntrl lock
Proj:00ME10760,File:NC4085
Tested By:DL

Test Frequency [MHz]	Meter Reading [dB(uV)]		Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
.13434	79.3	pk	.3	14.7	94.3	105.05	N/A	N/A	N/A
.15497	63.4	pk	.3	14.6	78.3	105.05	N/A	N/A	N/A
.39852	66.6	pk	.3	14.8	81.7	105.05	N/A	N/A	N/A
.66941	54.2	pk	.3	14.7	69.2	105.05	N/A	N/A	N/A
.93782	48.8	pk	.3	15	64.1	105.05	N/A	N/A	N/A
1.20622	44.7	pk	.3	15.3	60.3	105.05	N/A	N/A	N/A
1.47462	41.1	pk	.3	15.3	56.7	105.05	N/A	N/A	N/A
1.74303	38.9	pk	.3	15.4	54.6	105.05	N/A	N/A	N/A

LIMIT 1: FCC PT.15 SUB C (3M)
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
tm - Trace Math Result

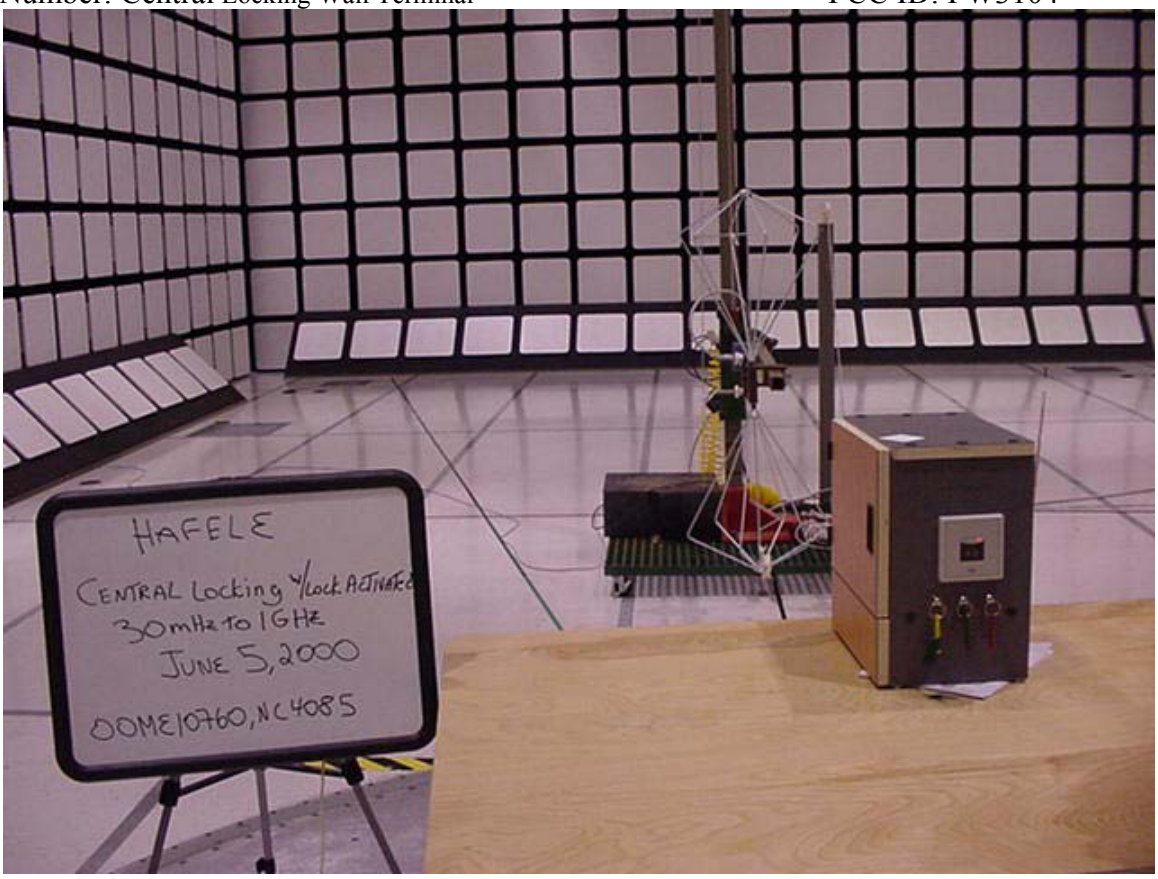
```
Hafele America Co.
 Wall terminals w/cntrl lock
 Proj:00ME10760,File:NC4085
 Tested By:DL


  Test    Meter  Gain/Loss Transducer Level Limit:1     2     3     4
Frequency Reading  Factor    Factor  dB[uVolts/meter]
  [MHz]   [dB(uV)]  [dB]     [dB]
================================================================================
.13434    76.43 av      .3      14.7     91.43   105.05    N/A   N/A   N/A
Azimuth 0 Height: 100

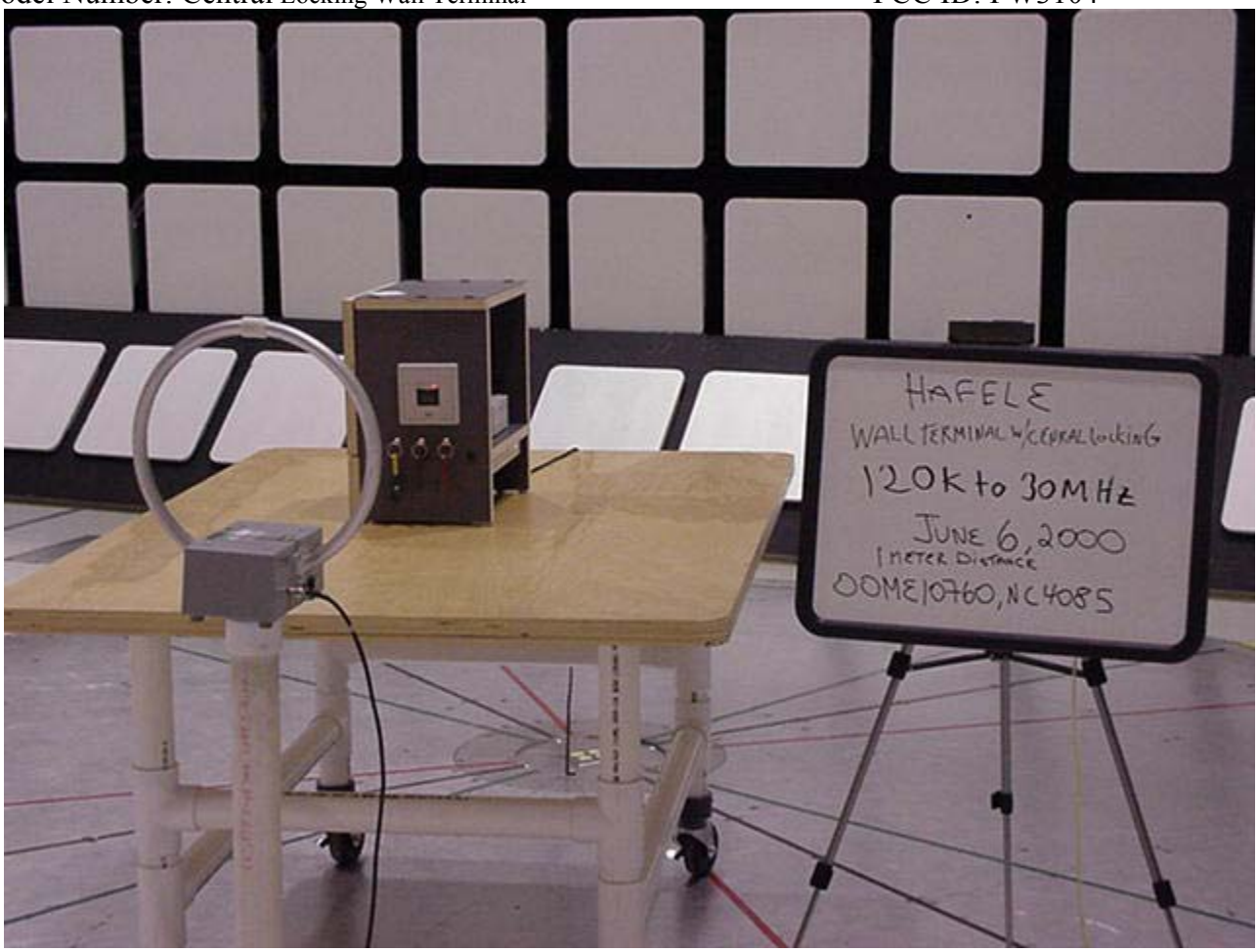
LIMIT 1: FCC PT.15 SUB C (3M)
```

Spectrum Analyzer Settings:

Frequency Span = 0Hz, Resolution Bandwidth = 100kHz, Video Bandwidth = 10Hz



Radiated Emissions Test 30 – 1000 MHz



Radiated Emissions Test .1 – 30 MHz

3.0 Sample Calculations

Radiated Emissions Limit conversion from μV/m to dBμV/m
(limits in accordance with paragraph 15.109)

Radiated Emissions Limit (dBμV/m) = 20*log (μV/m)

Radiated Emissions Limit (dBμV/m) = 20 * log (90)
Radiated Emissions Limit (dBμV/m) = 39.1

Radiated Emissions test data obtained during measurements.

Field Strength (dBμV/m) = Measured field strength (dBμV/m) + Antenna Factor(dB) + Cable Factor(dB)

Field Strength (dBμV/m) = 19.7dBμV/m + 12.5dB + 0.3dB
Field Strength (dBμV/m) = 32.5

Radiated Emissions Limit conversion from μV/m to dBμV/m and 40dB/decade
(limits in accordance with paragraph 15.209)

Radiated Emission Limits; General Requirements

Frequency between 0.009-0.490 MHz 2400/F(kHz) at 300 meters = Field Strength in μV/meter

134kHz 2400/(134) at 300 meters

Radiated emissions at 134 kHz at 300 meters =17.9μV/meter

dBμV/m=20*log(17.9μV/m)

dBμV/m=25.05 at 300meters

40dB/decade

300 meters to 3 meters = 80 dB

Radiated Emissions Limit = dbμV/m + dB

25.05 + 80

105.05 dBμV/m

4.0 SUMMARY:

The equipment under test has

☒ met the technical requirements as defined under section(s) ☒ 2.0 and ☐ 3.0

☐ not met the technical requirements as defined under section(s) ☐ 2.0 and ☐ 3.0

Test Start Date: 5-19-2000

Test Completion Date: 10-22-2002

- UNDERWRITERS LABORATORIES, INC. -

Project Engineer

Reviewer

Donald Lerner (Ext.22765)
Project Engineer
International EMC Services
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Conformity Assessment Services -3014AMEL