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Test report

402273-1TRFEMC

Date of issue: July 23, 2020

Applicant:

Calorique LLC

Product:

Flexible sheet floor heating element

Models:

Quiet Warmth Float (also branded as Perfectly Warm Float)

Quiet Warmth Tile (also branded as Perfectly Warm Tile)

Specifications:

- AS/NZS CISPR 32:2015
- IEC 61000-3-2: 2014
- IEC 61000-3-3: 2013

Lab and test locations

Company name	Nemko USA Inc.
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Province	California
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Website	www.nemko.com

Tested by	Mark Phillips, Sr. EMC Test Engineer
Reviewed by	Juan M Gonzalez, EMC & Wireless Divisions Manager
Review date	July 28, 2020
Reviewer signature	

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 USA's ISO/IEC 17025 accreditation. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

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Table of Contents

Section 1 Report summary

1.1 Test specifications

AS/NZS CISPR 32: 2015	Information technology equipment Radio disturbance characteristics Limits and methods of measurement
IEC 61000-3-2: 2014	Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
IEC 61000-3-3: 2013	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

1.2 Exclusions

None.

1.3 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard except as noted in section 1.2 above. 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.

1.4 Test report revision history

Table 1.4-1: *Test report revision history*

Revision #	Details of changes made to test report
402273-1TRFEMC	Original report issued

Notes: None

Section 2 Summary of test results

2.1 International test results

Table 2.1-1: *AS/NZS CISPR 32: 2015 results*

Test description	Verdict
Radiated disturbance [1]	Pass
Conducted disturbance at mains port [1]	Pass
Conducted common mode (asymmetric mode) disturbance at telecommunication ports [1]	Not applicable [2]

Notes: [1] Product classification B
[2] The EUT does not contain any telecommunication ports

Table 2.1-2: *EN 61000-3-2: 2014 results*

Test description	Verdict
Harmonic current emissions	Pass

Notes: [1] Harmonic classification A

Table 2.1-3: *EN 61000-3-3: 2013 results*

Test description	Verdict
Voltage fluctuations and flicker	Pass

Notes: [1] None

2.2 Radiated emissions

Table 2.2-1: *Requirements for radiated emissions at the frequencies up to 1 GHz for Class B equipment*

Table clause	Frequency range [MHz]	Measurement **Distance [m]**	Measurement **Detector type/ bandwidth**	Class B limits dB(µV/m) **SAC (See table A.1[1])**	Verdict
A4.1	30 – 230	10	Quasi Peak/120 kHz	30	Pass
	230 – 1000			37	

Notes: SAC – Semi Anechoic Chamber

[1] With reference to EN 55032.

2.3 Conducted emissions

Table 2.3-1: *Requirements for conducted emissions from the AC mains power ports of Class B equipment*

Table clause	Frequency range [MHz]	Coupling device (See table A.7[1])	Detector type/ bandwidth	Class B limits dB(µV/m)	Verdict
A9.1	0.15 – 0.5	AMN	Quasi Peak/9 kHz	66 – 56	Pass
	0.5 – 5			56	
	5 – 30			60	
A9.2	0.15 – 0.5	AMN	CAverage/9 kHz	56 – 46	Pass
	0.5 – 5			46	
	5 – 30			50	

Notes: [1] With reference to EN 55032.

Section 3 Equipment under test (EUT) details

3.1 Applicant

Company name	Calorique LLC
Address	2380 Cranberry Highway
City	West Wareham
Province/State	MA
Postal/Zip code	02576
Country	United States

3.2 Manufacturer

Company name	Calorique LLC
Address	2380 Cranberry Highway
City	West Wareham
Province/State	MA
Postal/Zip code	02576
Country	United States

3.3 Sample information

Receipt date	July 21, 2020
Nemko sample ID number	NEx 402273

3.4 EUT information

Product name	Flexible sheet floor heating element
Model	Quiet Warmth Tile (also branded as Perfectly Warm Tile) Quiet Warmth Float (also branded as Perfectly Warm Float)
Serial number	N/A
Part number	N/A
Power requirements	230VAC 50Hz
Description/theory of operation	Floor heat product using thin film radiant heat for home heating application.
Operational frequencies	50 Hz
Software details	No software

3.5 EUT exercise and monitoring details

The EUT was powered at 230VAC 50Hz and operated continuously.

3.6 EUT setup details

Table 3.6-1: *EUT sub assemblies*

Description	Brand name	Model/Part number	Serial number	Rev.
Flexible sheet floor heating element	Calorique LLC	Quiet Warmth Tile	--	--
Flexible sheet floor heating element	Calorique LLC	Quiet Warmth Float	--	--

Table 3.6-2: *Inter-connection cables*

Cable description	From	To	Length (m)
AC Mains Power	EUT	AC Mains	3

Figure 3.6-1: *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 USA 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.

Test name	Measurement uncertainty, dB
Radiated spurious emissions	3.78
AC power line conducted emissions	1.38

Section 7 Terms and definitions

7.1 Product classifications definitions

7.1.1 AS/NZS CISPR 32

Class B ITE	ITE (Information technology equipment) is intended primarily for use in the domestic environment and may include: – Equipment with no fixed place of use; for example, portable equipment powered by built-in batteries; – Telecommunication terminal equipment powered by a telecommunication network; – Personal computers and auxiliary connected equipment.
Class A ITE	is a category of all other ITE, which satisfies the class A ITE limits but not the class B ITE limits. Such equipment should not be restricted in its sale but the following warning shall be included in the instructions for use: WARNING This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

7.2 Equipment classification

Equipment classification	Equipment intended primarily for use in a residential environment shall meet the Class B limits. All other equipment shall comply with the Class A limits. Broadcast receiver equipment is class B equipment. The user documentation and/or manual shall contain details of any special measures required to be taken by the purchaser or user to ensure EMC compliance of the EUT with the requirements of this publication (EN 55032). One example would be the need to use shielded or special cables. Class A equipment shall have the following warning in the instructions for use, to inform the user of the risk of operating this equipment in a residential environment: Warning: This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

7.3 General definitions

7.3.1 Equipment type

Multimedia Equipment (MME)	Equipment that is information technology equipment, audio equipment, video equipment, broadcast receiver equipment, entertainment lighting control equipment or combinations of these.
Information technology equipment [ITE]	Equipment having a primary function of either (or a combination of) entry, storage, display, retrieval, transmission, processing, switching, or control of data and/or telecommunication messages and which may be equipped with one or more ports typically for information transfer. - Examples include data processing equipment, office machines, electronic business equipment and telecommunication equipment.
Audio equipment	Equipment which has a primary function of either (or a combination of) generation, input, storage, play, retrieval, transmission, reception, amplification, processing, switching or control of audio signals
Video equipment	Equipment which has a primary function of either (or a combination of) generation, input, storage, display, play, retrieval, transmission, reception, amplification, processing, switching, or control of video signals.
Broadcast receiver equipment	Equipment containing a tuner that is intended for the reception of broadcast services - These broadcast services are typically television and radio services, including terrestrial broadcast, satellite broadcast and/or cable transmission.
Entertainment lighting control equipment	Equipment generating or processing electrical signals for controlling the intensity, color, nature or direction of the light from a luminaire, where the intention is to create artistic effects in theatrical, televisual or musical productions and visual presentations.

7.3.2 Port type

AC mains power port	Port used to connect to the mains supply network - Equipment with a DC power port which is powered by a dedicated AC/DC power converter is defined as AC mains powered equipment
Antenna port	Port, other than a broadcast receiver tuner port (3.1.8), for connection of an antenna used for intentional transmission and/or reception of radiated RF energy.
Broadcast receiver tuner port	Port intended for the reception of a modulated RF signal carrying terrestrial, satellite and/or cable transmissions of audio and/or video broadcast and similar services - This port may be connected to an antenna, a cable distribution system, a VCR or similar device.
DC network power port	Port, not powered by a dedicated AC/DC power converter and not supporting communication, that connects to a DC supply network. - Equipment with a DC power port which is powered by a dedicated AC/DC power converter is considered to be AC mains powered equipment. - DC power ports supporting communications are considered to be wired networks ports, for example Ethernet ports which include Power Over Ethernet (POE).
Enclosure port	Physical boundary of the EUT through which electromagnetic fields may radiate.
Optical fiber port	Port at which an optical fiber is connected to an equipment.
RF modulator output port	Port intended to be connected to a broadcast receiver tuner port in order to transmit a signal to the broadcast receiver.
Signal/control port	Port intended for the interconnection of components of an equipment under test, or between an equipment under test and local associated equipment and used in accordance with relevant functional specifications (for example for the maximum length of cable connected to it) - Examples include RS-232, Universal Serial Bus (USB), High-Definition Multimedia Interface (HDMI), IEEE Standard 1394 (“Fire Wire”)
Wired network port	Point of connection for voice, data and signaling transfers intended to interconnect widely-dispersed systems by direct connection to a single-user of multi-user communication network (for example CATV, PSTN, ISDN, xDSL, LAN and similar networks) - These ports may support screened or unscreened cables and may also carry AC or DC power where this is an integral part of the telecommunication specification.

7.3 General definitions, continued

7.3.3 AS/NZS CISPR 32

Information technology equipment (ITE)	Any equipment: a) Which has a primary function of either (or a combination of) entry, storage, display, retrieval, transmission, processing, switching, or control, of data and of telecommunication messages and which may be equipped with one or more terminal ports typically operated for information transfer; b) With a rated supply voltage not exceeding 600 V. It includes, for example, data processing equipment, office machines, electronic business equipment and telecommunication equipment.
Telecommunications/network port	Point of connection for voice, data and signaling transfers intended to interconnect widely dispersed systems via such means as direct connection to multi-user telecommunications networks (e.g. public switched telecommunications networks (PSTN) integrated services digital networks (ISDN), x-type digital subscriber lines (xDSL), etc.), local area networks (e.g. Ethernet, Token Ring, etc.) and similar networks NOTE A port generally intended for interconnection of components of an ITE system under test (e.g. RS-232, IEEE Standard 1284 (parallel printer), Universal Serial Bus (USB), IEEE Standard 1394 (“Fire Wire”), etc.) and used in accordance with its functional specifications (e.g. for the maximum length of cable connected to it), is not considered to be a telecommunications/network port under this definition.

Section 8 Testing data

8.1 Radiated disturbance

8.1.1 References

CISPR 32: 2015

8.1.2 Test summary

Verdict	Pass		
Test date	July 23, 2020	Temperature	23 °C
Test engineer	Mark Phillips, Sr. EMC Test Engineer	Air pressure	1002 mbar
Test location	10m semi anechoic chamber	Relative humidity	53 %

8.1.3 Notes

None

8.1.4 Setup details

EUT setup configuration	Table top
Test facility	10 m Semi anechoic chamber
Measuring distance	10 m
Antenna height variation	1–4 m
Turn table position	0–360°
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.

Receiver/spectrum analyzer settings for frequencies below 1 GHz:

Resolution bandwidth	120 kHz
Video bandwidth	300 kHz
Detector mode	– Peak (Preview measurement) – Quasi-peak (Final measurement)
Trace mode	Max Hold
Measurement time	– 100 ms (Peak preview measurement) – 5000 ms (Quasi-peak final measurement)

Receiver/spectrum analyzer settings for frequencies above 1 GHz:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Peak (Preview measurement) Peak and CAverage (Final measurement)
Trace mode	Max Hold
Measurement time	– 100 ms (Peak preview measurement) – 5000 ms (Peak and CAverage final measurement)

8.1.4 Setup details, continued

Table 8.1-1: *Radiated disturbance equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMI Test Receiver	Rohde & Schwarz	ESU40	E1121	2 year	25 Nov 2020
System Controller	Sunoc Sciences	SC104V	E1129	NCR	NCR
Bilog Antenna	Schaffner	CBL 6111D	1480	1 year	18 Oct 2020

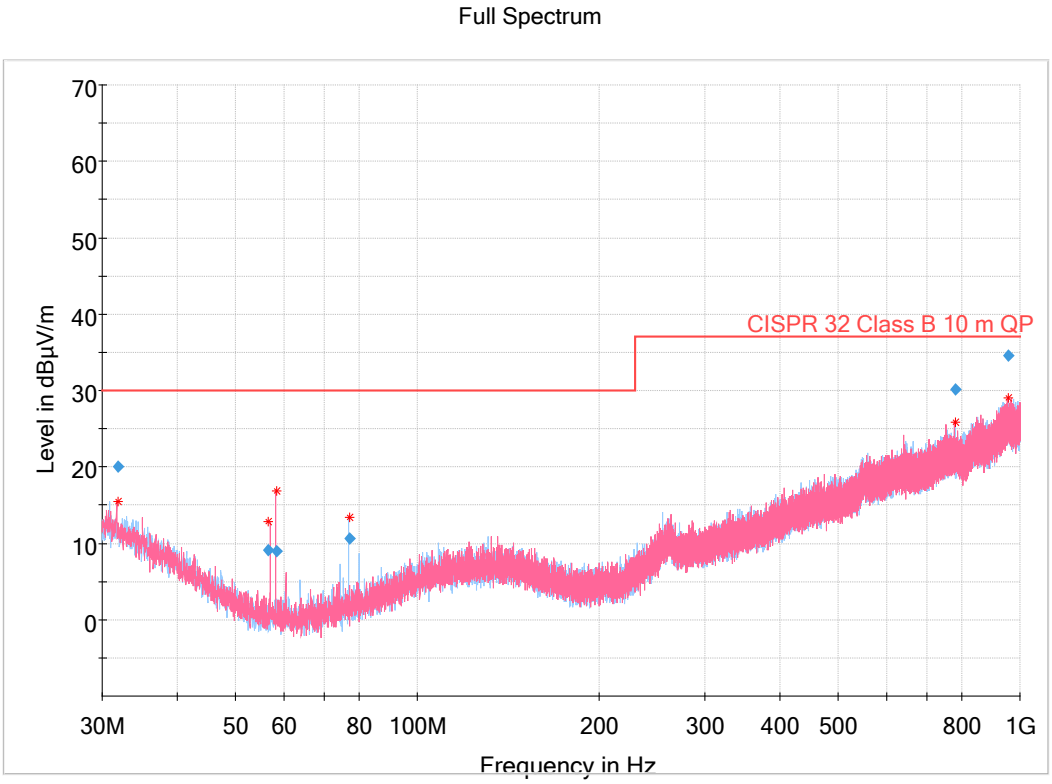
Notes: None

Table 8.1-2: *Radiated disturbance test software details*

Manufacturer of Software	Details
Rohde & Schwarz	EMC 32 V10.0.00

Notes: None

8.1.5 Test data



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).

Figure 8.1-1: *Radiated disturbance spectral plot (30 to 1000 MHz) at 230V 50Hz*

Table 8.1-3: *Radiated disturbance (Quasi-Peak) results at 230V 50Hz*

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.913667	20.05	30.00	9.95	5000.0	120.000	202.2	V	1.0	24.3
56.518333	9.17	30.00	20.83	5000.0	120.000	318.0	V	138.0	12.9
58.490000	8.90	30.00	21.10	5000.0	120.000	157.6	V	72.0	12.7
77.298667	10.68	30.00	19.32	5000.0	120.000	140.7	H	140.0	14.2
780.436333	30.10	37.00	6.90	5000.0	120.000	284.9	H	223.0	32.4
956.048000	34.56	37.00	2.44	5000.0	120.000	303.3	H	173.0	36.5

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factor = antenna factor ACF (dB) + cable loss (dB)
[3] The maximum measured value observed over a period of 5 seconds was recorded.

8.1.6 Setup photos

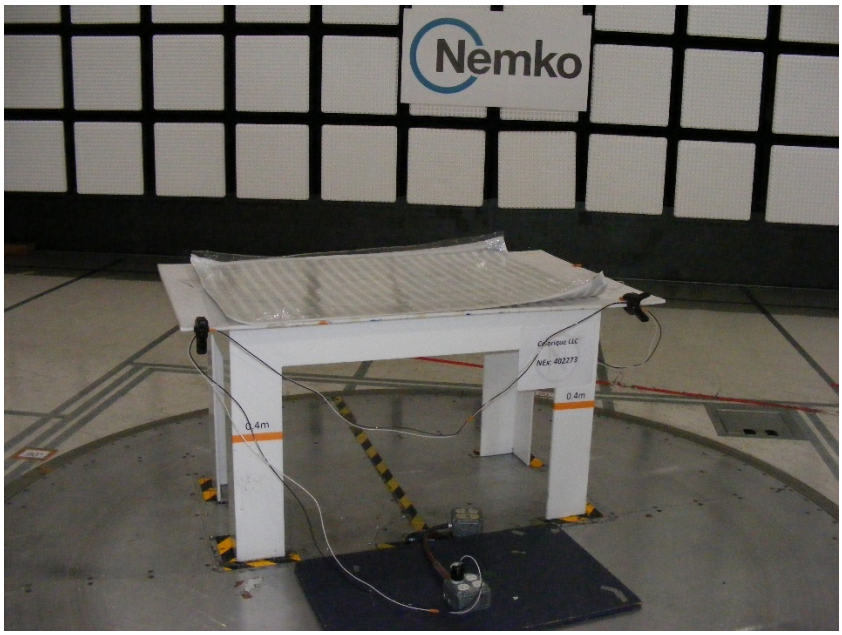


Figure 8.1-2: *Radiated disturbance setup photo*

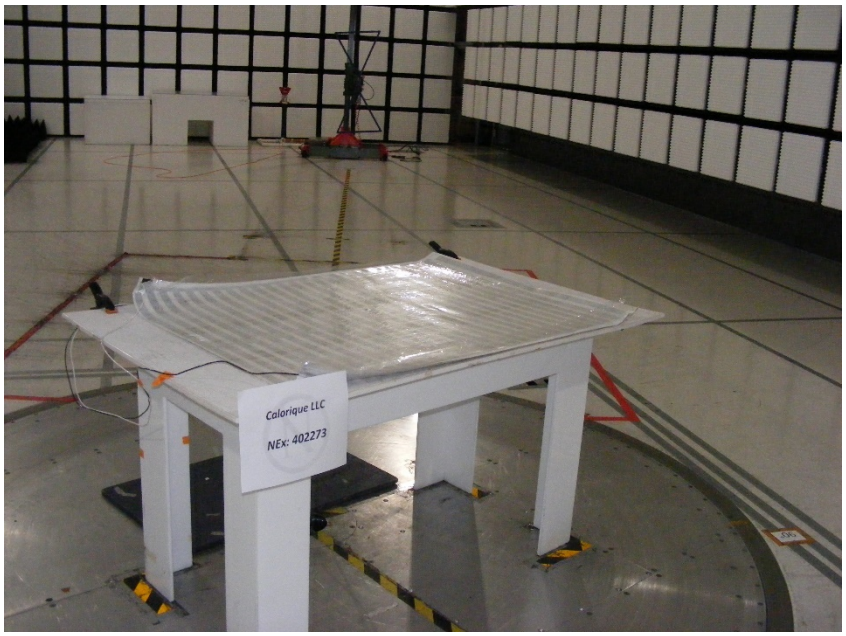


Figure 8.1-3: *Radiated disturbance setup photo*

8.2 Conducted disturbance at mains port

8.2.1 References

CISPR 32: 2015

8.2.2 Test summary

Verdict	Pass		
Test date	July 23, 2020	Temperature	23 °C
Test engineer	Mark Phillips, Sr. EMC Test Engineer	Air pressure	1002 mbar
Test location	Ground Plane	Relative humidity	53 %

8.2.3 Notes

None

8.2.4 Setup details

Port under test	AC Mains Input
EUT setup configuration	Table top
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.

Receiver settings:

Resolution bandwidth	9 kHz
Video bandwidth	30 kHz
Detector mode	– Peak and Average (Preview measurement) – Quasi-peak and CAverage (Final measurement)
Trace mode	Max Hold
Measurement time	– 100 ms (Peak and Average preview measurement) – 5000 ms (Quasi-peak final measurement) – 5000 ms (CAverage final measurement)

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

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMI Test Receiver	Rohde & Schwarz	ESCI 7	E1026	1 yr	29 Nov 2020
Two Line V-Network	Rohde & Schwarz	ENV216	E1020	1 yr	29 Aug 2020
Transient Limiter (10 dB pad)	Hewlett Packard	11947A	E1159	1 yr	8 Aug 2020

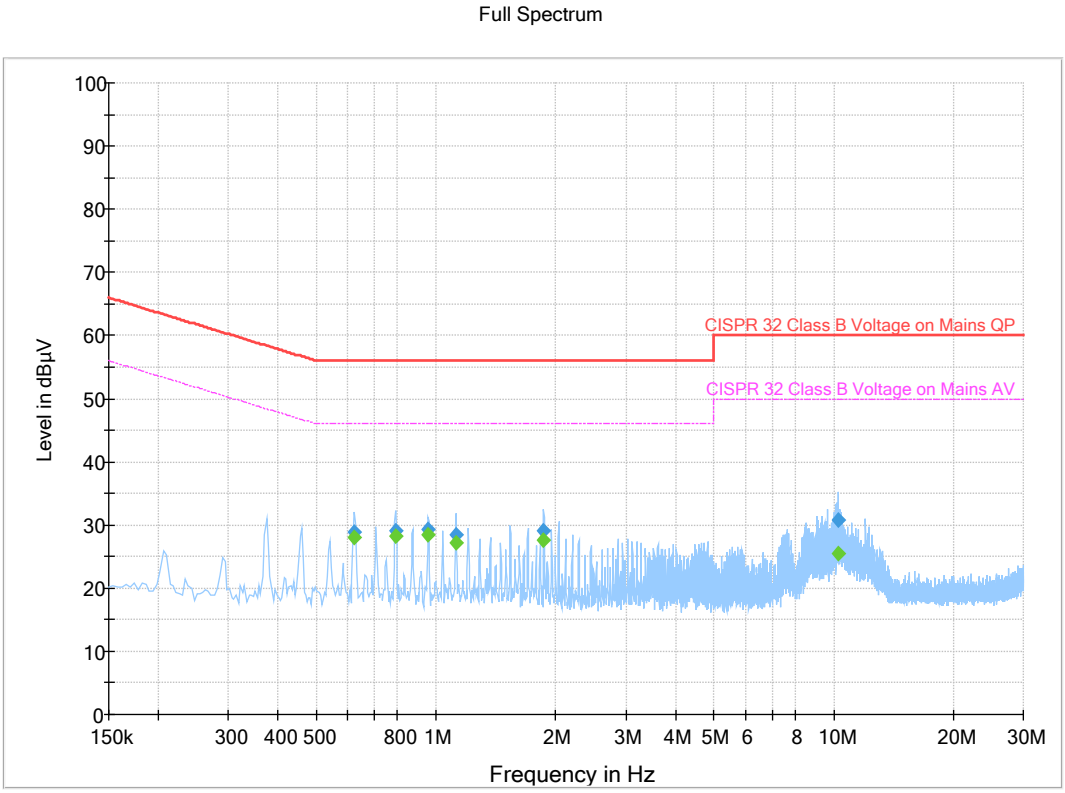
Notes: None

Table 8.2-2: *Conducted disturbance at mains port test software details*

Manufacturer of Software	Details
Rohde & Schwarz	EMC 32 V10.20.01

Notes: None

8.2.5 Test data



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

Figure 8.2-1: *Conducted disturbance at mains port spectral plot on phase and neutral lines at 230V 50Hz*

Table 8.2-3: *Conducted disturbance at mains port (Quasi-Peak and CAverage) results on phase and neutral lines at 230V 50Hz*

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.622000	---	27.99	46.00	18.01	5000.0	9.000	N	ON	19.4
0.622000	28.87	---	56.00	27.13	5000.0	9.000	N	ON	19.4
0.790000	---	28.20	46.00	17.80	5000.0	9.000	N	ON	19.4
0.790000	29.08	---	56.00	26.92	5000.0	9.000	N	ON	19.4
0.954000	---	28.48	46.00	17.52	5000.0	9.000	N	ON	19.4
0.954000	29.27	---	56.00	26.73	5000.0	9.000	N	ON	19.4
1.122000	---	27.18	46.00	18.82	5000.0	9.000	N	ON	19.4
1.122000	28.44	---	56.00	27.56	5000.0	9.000	N	ON	19.4
1.866000	---	27.65	46.00	18.35	5000.0	9.000	N	ON	19.4
1.866000	28.99	---	56.00	27.01	5000.0	9.000	N	ON	19.4
10.294000	---	25.50	50.00	24.50	5000.0	9.000	N	ON	19.6
10.294000	30.85	---	60.00	29.15	5000.0	9.000	N	ON	19.6

Notes:
[1] Result (dBµV) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factor (dB) = LISN factor IL (dB) + cable loss (dB) + transient limiter (dB)
[3] The maximum measured value observed over a period of 5 seconds was recorded.

8.2.6 Setup photos

Figure 8.2-2: *Conducted disturbance at mains port setup photo*

8.3 Harmonic current emissions

8.3.1 References

IEC 61000-3-2: 2014

8.3.2 Test summary

Verdict	Pass		
Test date	July 23, 2020	Temperature	23 °C
Test engineer	Mark Phillips, Sr. EMC Test Engineer	Air pressure	1002 mbar
Test location	Ground Plane	Relative humidity	53 %

8.3.3 Notes

None

8.3.4 Setup details

Port under test	AC mains
Measurement time	10 min

Table 8.4-1: *Harmonic current emissions equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
AC & DC Power Source Analyzer	California Instruments/Ametek	90003ix	1851	1 Yr	17 Nov 2020

Notes: None

Table 8.4-2: *Harmonic current emissions test software details*

Manufacturer of Software	Details
California Instruments	AC Source CIGui SII Version 3.0.0

Notes: None

8.3.5 Test data

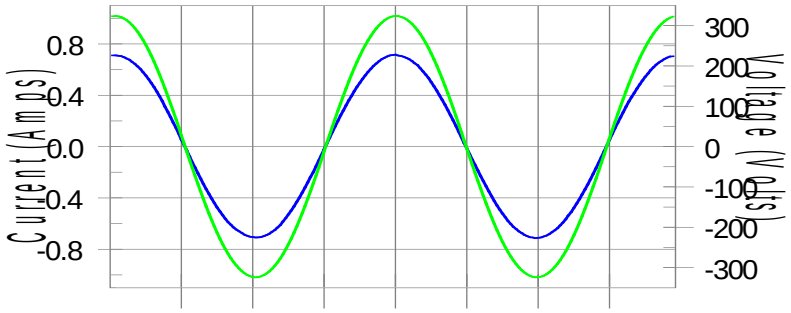
Harmonics – Class-A per Ed. Ed. 5.0 (2018)(Run time)

EUT: Quiet Warmth Floor heating sheet
Test category: Class-A per Ed. 5.0 (2018) (European limits)
Test date: 7/23/2020 Start time: 4:11:29 PM End time: 4:21:41 PM
Test duration (min): 10 Data file name: H-000124.cts_data
Comment: NEx. 402273
Customer: Calorique LLC

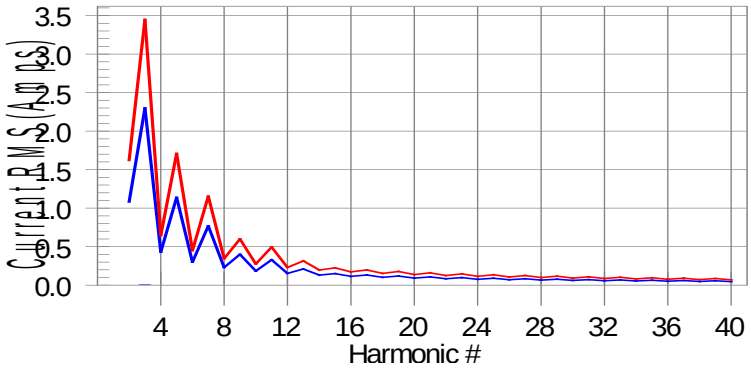
Tested by: Mark Phillips
Test Margin: 100

Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line European Limits



Test result: Pass Worst harmonics H0-0.0% of 150% limit, H0-0% of 100% limit

Current Test Result Summary (Run time)

EUT: Quiet Warmth Floor heating sheet
Test category: Class-A per Ed. 5.0 (2018) (European limits)
Test date: 7/23/2020 Start time: 4:11:29 PM
Test duration (min): 10 Data file name: H-000124.cts_data
Comment: NEx. 402273
Customer: Calorique LLC

Tested by: Mark Phillips
Test Margin: 100
End time: 4:21:41 PM

Test Result: Pass Source qualification: Normal
THC(A): 0.002 I-THD(%): 0.5 POHC(A): 0.000 POHC Limit(A): 0.251

Highest parameter values during test:

V_RMS (Volts):	230.02	Frequency(Hz):	50.00
I_Peak (Amps):	0.719	I_RMS (Amps):	0.505
I_Fund (Amps):	0.505	Crest Factor:	1.426
Power (Watts):	116.1	Power Factor:	1.000

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status	
2	0.000	1.080	N/A	0.000	1.620	N/A	Pass	
3	0.002	2.300	N/A	0.002	3.450	N/A	Pass	
4	0.000	0.430	N/A	0.000	0.645	N/A	Pass	
5	0.000	1.140	N/A	0.000	1.710	N/A	Pass	
6	0.001	0.300	N/A	0.001	0.450	N/A	Pass	
7	0.000	0.770	N/A	0.000	1.155	N/A	Pass	
8	0.000	0.230	N/A	0.000	0.345	N/A	Pass	
9	0.000	0.400	N/A	0.000	0.600	N/A	Pass	
10	0.000	0.184	N/A	0.000	0.276	N/A	Pass	
11	0.000	0.330	N/A	0.000	0.495	N/A	Pass	
12	0.000	0.153	N/A	0.000	0.230	N/A	Pass	
13	0.000	0.210	N/A	0.000	0.315	N/A	Pass	
14	0.000	0.131	N/A	0.000	0.197	N/A	Pass	
15	0.000	0.150	N/A	0.000	0.225	N/A	Pass	
16	0.000	0.115	N/A	0.000	0.173	N/A	Pass	
17	0.000	0.132	N/A	0.000	0.198	N/A	Pass	
18	0.000	0.102	N/A	0.000	0.153	N/A	Pass	
19	0.000	0.118	N/A	0.000	0.178	N/A	Pass	
20	0.000	0.092	N/A	0.000	0.138	N/A	Pass	
21	0.000	0.107	N/A	0.000	0.161	N/A	Pass	
22	0.000	0.084	N/A	0.000	0.125	N/A	Pass	
23	0.000	0.098	N/A	0.000	0.147	N/A	Pass	
24	0.000	0.077	N/A	0.000	0.115	N/A	Pass	
25	0.000	0.090	N/A	0.000	0.135	N/A	Pass	
26	0.000	0.071	N/A	0.000	0.107	N/A	Pass	
27	0.000	0.083	N/A	0.000	0.125	N/A	Pass	
28	0.000	0.066	N/A	0.000	0.099	N/A	Pass	
29	0.000	0.078	N/A	0.000	0.116	N/A	Pass	
30	0.000	0.061	N/A	0.000	0.092	N/A	Pass	
31	0.000	0.073	N/A	0.000	0.109	N/A	Pass	
32	0.000	0.058	N/A	0.000	0.086	N/A	Pass	
33	0.000	0.068	N/A	0.000	0.102	N/A	Pass	
34	0.000	0.054	N/A	0.000	0.081	N/A	Pass	
35	0.000	0.064	N/A	0.000	0.096	N/A	Pass	
36	0.000	0.051	N/A	0.000	0.077	N/A	Pass	
37	0.000	0.061	N/A	0.000	0.091	N/A	Pass	
38	0.000	0.048	N/A	0.000	0.073	N/A	Pass	
39	0.000	0.058	N/A	0.000	0.087	N/A	Pass	
40	0.000	0.046	N/A	0.000	0.069	N/A	Pass	

Voltage Source Verification Data (Run time)

EUT: Quiet Warmth Floor heating sheet
Test category: Class-A per Ed. 5.0 (2018) (European limits)
Test date: 7/23/2020 Start time: 4:11:29 PM
Test duration (min): 10 Data file name: H-000124.cts_data
Comment: NEx. 402273
Customer: Calorique LLC

Tested by: Mark Phillips
Test Margin: 100
End time: 4:21:41 PM

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms):	230.02	Frequency(Hz):	50.00
I_Peak (Amps):	0.719	I_RMS (Amps):	0.505
I_Fund (Amps):	0.505	Crest Factor:	1.426
Power (Watts):	116.1	Power Factor:	1.000

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status	
2	0.024	0.460	5.15	OK	
3	1.069	2.070	51.63	OK	
4	0.075	0.460	16.27	OK	
5	0.044	0.920	4.83	OK	
6	0.065	0.460	14.03	OK	
7	0.041	0.690	5.94	OK	
8	0.009	0.460	2.06	OK	
9	0.098	0.460	21.31	OK	
10	0.004	0.460	0.91	OK	
11	0.041	0.230	17.84	OK	
12	0.014	0.230	5.95	OK	
13	0.018	0.230	7.84	OK	
14	0.004	0.230	1.75	OK	
15	0.014	0.230	6.22	OK	
16	0.009	0.230	4.06	OK	
17	0.007	0.230	2.94	OK	
18	0.016	0.230	6.94	OK	
19	0.009	0.230	4.10	OK	
20	0.008	0.230	3.44	OK	
21	0.004	0.230	1.61	OK	
22	0.003	0.230	1.40	OK	
23	0.005	0.230	2.36	OK	
24	0.004	0.230	1.94	OK	
25	0.002	0.230	0.81	OK	
26	0.002	0.230	0.90	OK	
27	0.004	0.230	1.93	OK	
28	0.004	0.230	1.92	OK	
29	0.002	0.230	0.99	OK	
30	0.006	0.230	2.60	OK	
31	0.002	0.230	0.75	OK	
32	0.003	0.230	1.18	OK	
33	0.002	0.230	1.01	OK	
34	0.002	0.230	0.87	OK	
35	0.003	0.230	1.20	OK	
36	0.002	0.230	1.05	OK	
37	0.003	0.230	1.45	OK	
38	0.002	0.230	0.71	OK	
39	0.003	0.230	1.29	OK	
40	0.003	0.230	1.39	OK	

8.3.6 Setup photos

Figure 8.4-1: *Harmonic current emissions setup photo*

8.4 Voltage fluctuations and flicker

8.4.1 References

IEC 61000-3-3: 2013

8.4.2 Test summary

Verdict	Pass		
Test date	July 23, 2020	Temperature	23 °C
Test engineer	Mark Phillips, Sr. EMC Test Engineer	Air pressure	1002 mbar
Test location	Ground Plane	Relative humidity	53 %

8.4.3 Notes

None

8.4.4 Setup details

Port under test	AC mains
Measurement time	20 min

Table 8.5-1: *Voltage fluctuations and flicker equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
AC & DC Power Source Analyzer	California Instruments/Ametek	90003ix	1851	1 Yr	17 Nov 2020

Notes: None

Table 8.5-2: *Voltage fluctuations and flicker test software details*

Manufacturer of Software	Details
California Instruments	AC Source CIGui SII Version 3.0.0

Notes: None

8.4.5 Test data

Measurement data

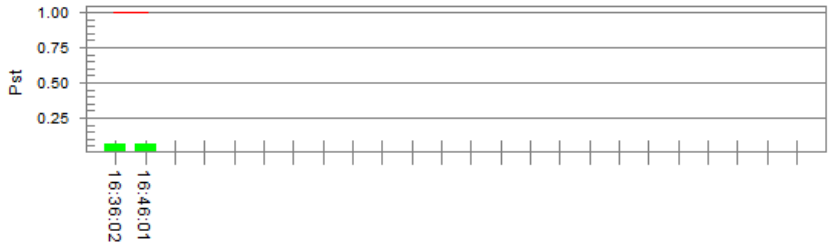
California Instruments 7/23/2020
San Diego, California 9:54 PM

Flicker Test Summary per EN/IEC61000-3-3 Ed. 3.0 (2013) (Run time)

EUT: Quiet Warmth Floor heating sheet **Tested by: Mark Phillips**
Test category: All parameters (European limits) **Test Margin: 100**
Test date: 7/23/2013 **Start time: 4:25:41 PM** **End time: 4:46:14 PM**
Test duration (min): 20 **Data file name: F-000125.cts data**
Comment: NEx. 402273
Customer: Calorique LLC

Test Result: Pass **Status: Test Completed**

Pst and limit line **European Limits**



Plt and limit line

Parameter values recorded during the test:

Vrms at the end of test (Volt):	**229.93**			
T-max (mS):	**0**	**Test limit (mS):**	**500.0**	**Pass**
Highest dc (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Highest dmax (%):	**0.00**	**Test limit (%):**	**4.00**	**Pass**
Highest Pst (10 min. period):	**0.064**	**Test limit:**	**1.000**	**Pass**
Highest Plt (2 hr. period):	**0.035**	**Test limit:**	**0.650**	**Pass**

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8.4.6 Setup photos

Figure 8.5-1: *Voltage fluctuations and flicker setup photo*

Section 9 EUT photos

9.1 External photos

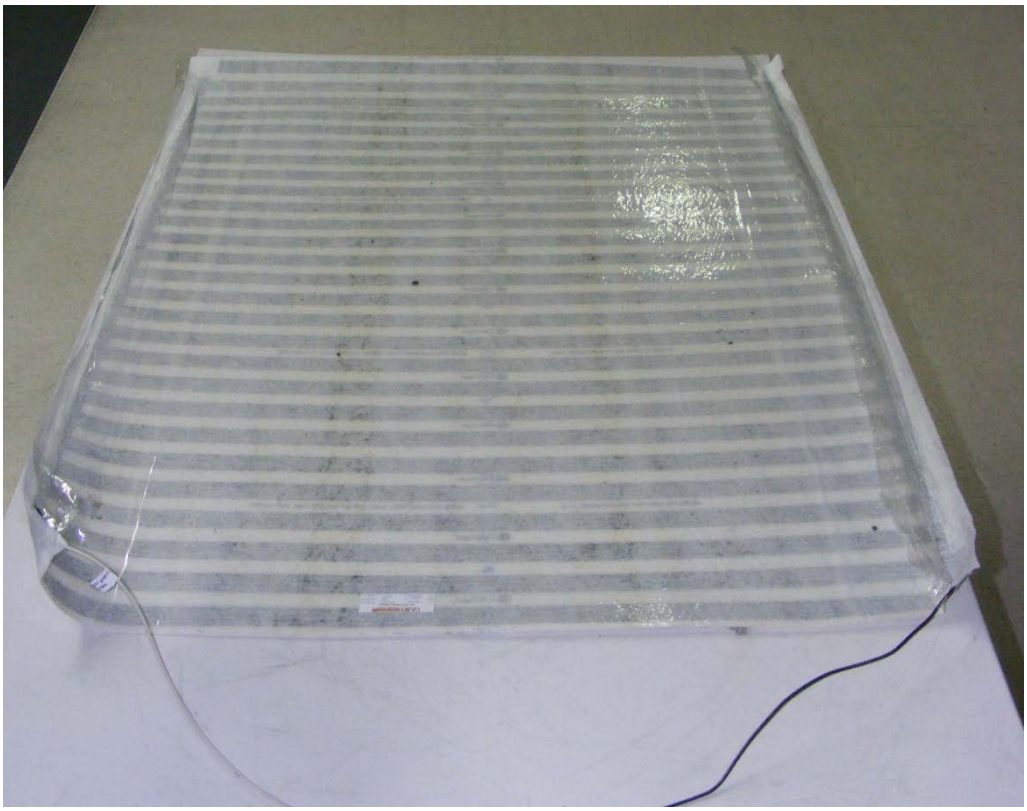

Figure 9.1-1: *Front view photo*

Figure 9.1-2: *Rear view photo*

Section 10 Model similarity attestation

10.1 Manufacturer attestation letter

Calorique

7/22/2020

ATTESTATION LETTER

The two floor heat products, Quiet Warmth Tile and Quiet Warmth Float (also branded as Perfectly Warm Tile and Perfectly Warm Float respectively), use thin film radiant heat for home heating application. These two mats have similar specifications in their construction, namely,

(a) 4-7 mil substrate

(b) 4-7 mil laminate

(c) Operating voltage =240 V

(d) Dielectric strength of the insulator ≥300,000V/cm

(e) Power density= 10.4 W/ft^2 i.e. 112 W/m^2

Therefore, the safety certifications for the mats should be interchangeable and the results of testing one mat should qualify the other too.

Sincerely,

Yudhisthira Sahoo 7/22/2020

Dr. Yudhisthira Sahoo
R&D Director
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West Wareham, MA 02576
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