MEASUREMENT/TECHNICAL REPORT

MagneTek S.p.A.

FCC ID: NE455DVLC

August 14th 1998

This report concerns (check one):		☐ Original grant	☒ Class II change
Equipment type: RF lighting devices (ISM)			
Measurement procedure used:			
MP-5:1986			
Application for Certification prepared by:		Applicant for the device:	
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City/Place	: Arnhem	City/Place	: Terranuova-Arrezzo
Country	: The Netherlands	Country	: Italy

1 GENERAL INFORMATION

1.1 Client information

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Postal code	:	6812 AR
Place	:	Arnhem
P.O. Box	:	9035
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Country	:	The Netherlands

2 SYSTEM TEST CONFIGURATION

2.1 Justification

The system was configured for testing in a typical fashion (lamp plane horizontal). The (dimming) potentiometer was mounted in a separate box. The fluorescent ballast with bulb was connected to this box by means of a (bundled, four wire) power lead of approximately 1m. The potentiometer box was connected to the power supply by means of a power supply lead (without protective earth) of approximately 1 m.

2.2 Configuration of Tested System

2.2.1 Device under test

Device	:	Electronic Fluorescent Dimming Ballast with Bulb
Trade mark (brand)	:	Magnetek/GE
Type	:	FEH552D/DV/120
Serial number	:	proto
FCC ID	:	NE455DVLC
Power supply	:	120 V_{ac} / 60 Hz
Operating frequency	:	lowest power setting 87,0 kHz (@ 0 Ohms) medium power setting 49,0 kHz (@ 5 kOhms) highest power setting 48,5 kHz (@ 10 kOhms)
Input power	:	17 - 63,7 W
Enclosure	:	plastic
Interface cabling	:	not applicable
Shield termination	:	not applicable

4 CONDUCTED EMISSION DATA

4.1 Test procedure

In accordance with Section 18.307(c) the conducted radio frequency disturbance voltages between each of the power lines (live, neutral) and the ground terminal were determined over the frequency range from 450 kHz to 30 MHz. The AC power line conducted emission measurements were performed at the line voltage of 120 V_{ac} and at the power frequency of 60 Hz.

The measurement shall show compliance of this consumer (ISM) lighting device with the conducted limit of 250 μV (48 dBμV). The test set-up was in accordance with the requirements of MP-5:1986.

The initial step in collecting conducted data is a peak scan measurement over the frequency range of interest. Significant peaks are then marked, and these signals are then quasi-peaked. In accordance with Section 2.2.2 of MP-5 the detector function of the measurement receiver was set to the CISPR Quasi-Peak function for this lighting device. This procedure is implemented in the utilised test receiver by the incorporated EMI software. The test receiver employs a CISPR quasi-peak detector function with a bandwidth of 9 - 10 kHz.

Measurements were performed during the lowest, medium and the highest power setting of the dimming device.

4.2 Test Instrumentation Used for Conducted Measurements

EMI Equipment	Type	Manufacturer	Serial no.	ORS No.	Cal interval
LISN (1 x 10 A)	ESH3-Z5	Rohde & Schwarz	840062/017	077959	yearly (07-99)
EMI test receiver	ESHS 10	Rohde & Schwarz	840046/009	077969	yearly (07-99)

Note : The Object Registration Number (ORS) is a unique number within the KEMA quality system, which identifies the equipment.

4.4 Measured Data (Mains conducted disturbance voltage) medium power setting

Standard : FCC, Part 18 Subpart C Section 18.307(c) (consumer equipment)

Limits :

Frequency [MHz]	Limit [μV]	Limit [dB(μV)]
0.45 - 30.0	250.0	48.0

Port : AC mains supply line/neutral

Results :

Frequency [MHz]	Level Line [dB(μV)]	Level Neutral [dB(μV)]	Limit [dB(μV)]
0.534	40.1	40.4	48.0
0.618	41.3	41.7	48.0
0.796	39.6	40.0	48.0
1.251	33.4	33.1	48.0
1.608	37.1	36.8	48.0
1.769	35.9	35.7	48.0
2.595	33.5	33.3	48.0
2.924	32.7	32.9	48.0
3.897	31.1	30.9	48.0
5.959	35.0	34.8	48.0
9.662	37.1	37.7	48.0
12.731	37.5	37.8	48.0
16.445	34.3	34.6	48.0
22.276	40.1	40.8	48.0
23.725	41.4	41.2	48.0

Measurement uncertainty: 2 dB

Note : According to section 2.2.2 of MP-5 all readings are quasi-peak unless stated otherwise, using a quasi-peak bandwidth of 9 - 10 kHz.

Judgement : Pass (Passed by 6.3 dBμV at 0.618 MHz)

Test personnel:

Tester Signature :

Date: 1998-08-10

Name : H.T. Jonker

6 RADIATED EMISSION DATA

6.1 Test Procedure

In accordance with § 18.305c the field strength levels of radiated emissions from this digital device at a distance of 3 meters were determined over the frequency range from 30 MHz up to 1000 MHz. The measurement shall show compliance of this consumer RF lighting device. The test set-up was in accordance with the requirements of MP-5:1986.

Preliminary radiation measurements were performed in a compact anechoic room at a 3 meter test distance using the LogBicon antenna. The investigated frequency range from 30 MHz to 1000 MHz was scanned with aid of the automatic test receiver ESVS10. This receiver automatically calculates the resulting field strength using the entered correction factor for cable loss and antenna factor. The resulting radiation levels are plotted.

Radiation scans were made for various angles of the set-up with respect to the antenna and also for vertical as well as for horizontal antenna polarizations. As a result of the preliminary scans a list remains with frequencies at which relevant spurious radiation levels were detected.

See annex A1 and A2 for the plots using a horizontal antenna polarization and annex A3 and A4 for the plots using a vertical antenna polarization.

The final measurements in the frequency range 30 - 1000 MHz were performed on the open area test site (OATS) as authorized by the FCC. At those frequencies where significant levels were detected in the compact anechoic room measurements were made on the open field to determine the actual field strength levels. At the open area test site the test receiver, type ESV make Rohde & Schwarz, is used for determining the levels. This receiver automatically selects the quasi-peak detector function with a bandwidth of 120 kHz when switched to the CISPR weighing mode. Signals in the frequency range 30 - 300 MHz were measured using the biconical antenna and signal levels in the frequency range 300 - 1000 MHz were determined with aid of the logperiodic antenna.

The antennas were oriented both for vertical and horizontal polarizations. At each frequency at which a spurious component is present the receiving antenna is raised and lowered through the range of heights of 1 to 4 meter and the table with the test set-up is rotated through 360° in the horizontal plane to ensure maximum signal reception by the receiver.

The data presented in clause 6.4 and 6.5 lists the significant emission frequencies, measured levels, correction factor (includes cable correction and antenna factors), the corrected reading, plus the limit. An explanation of the Correction Factor is given in paragraph 6.2.

6.4 Radiated electromagnetic field strength lowest power setting

Standard : FCC, Part 18 Subpart C Section 18.305(c) (consumer equipment)
Limits : Measurement distance of 3 m

Frequency [MHz]	Limit [dB(μV/m)]
30 - 88	40.0
88 - 216	43.5
216 - 1000	46.0

The permissible field strength limits were adjusted using 1/d as attenuation factor.

Port : Enclosure with cabling
Results :

Frequency [MHz]	Pol [V/H]	Measured [dB(μV)]	Correction [dB/m]	Level [dB(μV/m)]	Limit [dB(μV/m)]
62.2	V	24.0	10.8	34.8	40.0
74.2	V	23.0	7.7	30.7	40.0
162.4	H	8.0	17.5	25.5	43.5
201.5	H	6.0	19.2	25.2	43.5

Measurement uncertainty: 3 dB

Note : All readings are quasi-peak values using a quasi-peak bandwidth of 120 kHz

Judgement : Pass (Margin is 5.2 dB at 62.2 MHz).

Test personnel:

Tester Signature : Date: 1998-08-12

Name : H.T. Jonker

ANNEX A1 HORIZONTAL ANTENNA POLARIZATION LOWEST POWER SETTING

82524 MAGNETEC/GE

11. Aug 98 13:50

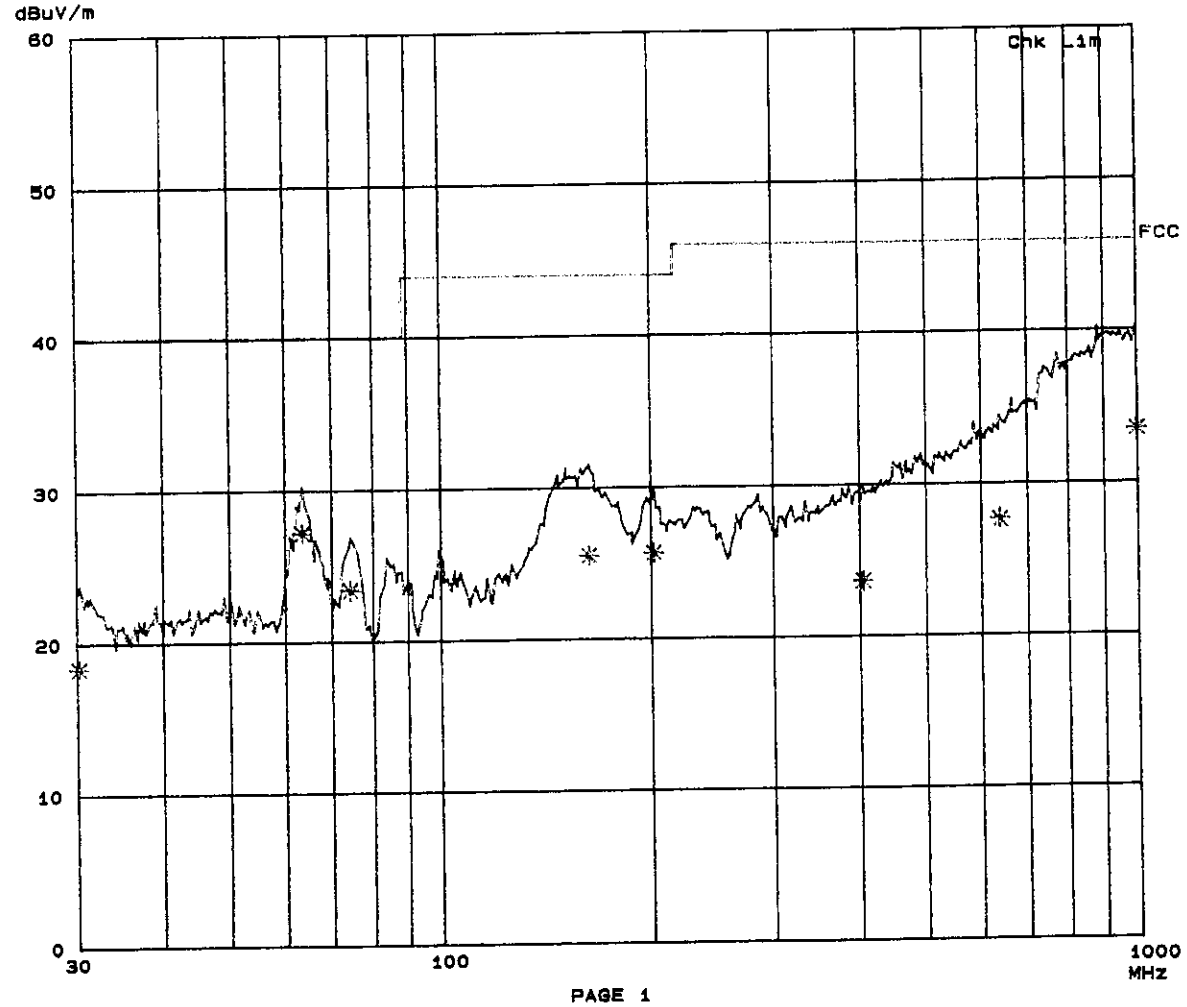
Radiated EM-field 3m anechoic room

EUT: MODEL FEH552D/DV/120
Manuf: MagneTek S.p.A.
Op Cond: 120Vac/60Hz lowest power setting HORIZON
Operator: HJo
Test Spec: FCC Part 18 B/MP-5
Comment: CLASS II CHANGE FCCID: NE455DVLC
Torchiere Style 2Dtm Adapter Electronic FDB with bulb

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	1000M	100k	120k	PK	100ms	AUTO	LN ON	60dB

Final Measurement: x Hor-Max / + Vert-Max Transducer No. Start Stop Name
21 30M 1000M logbicon
Meas Time: 1 s
Subranges: 8
Acc Margin: 25dB



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ANNEX A3 VERTICAL ANTENNA POLARIZATION LOWEST POWER SETTING

82524 MAGNETEC/GE 11. Aug 98 13:13

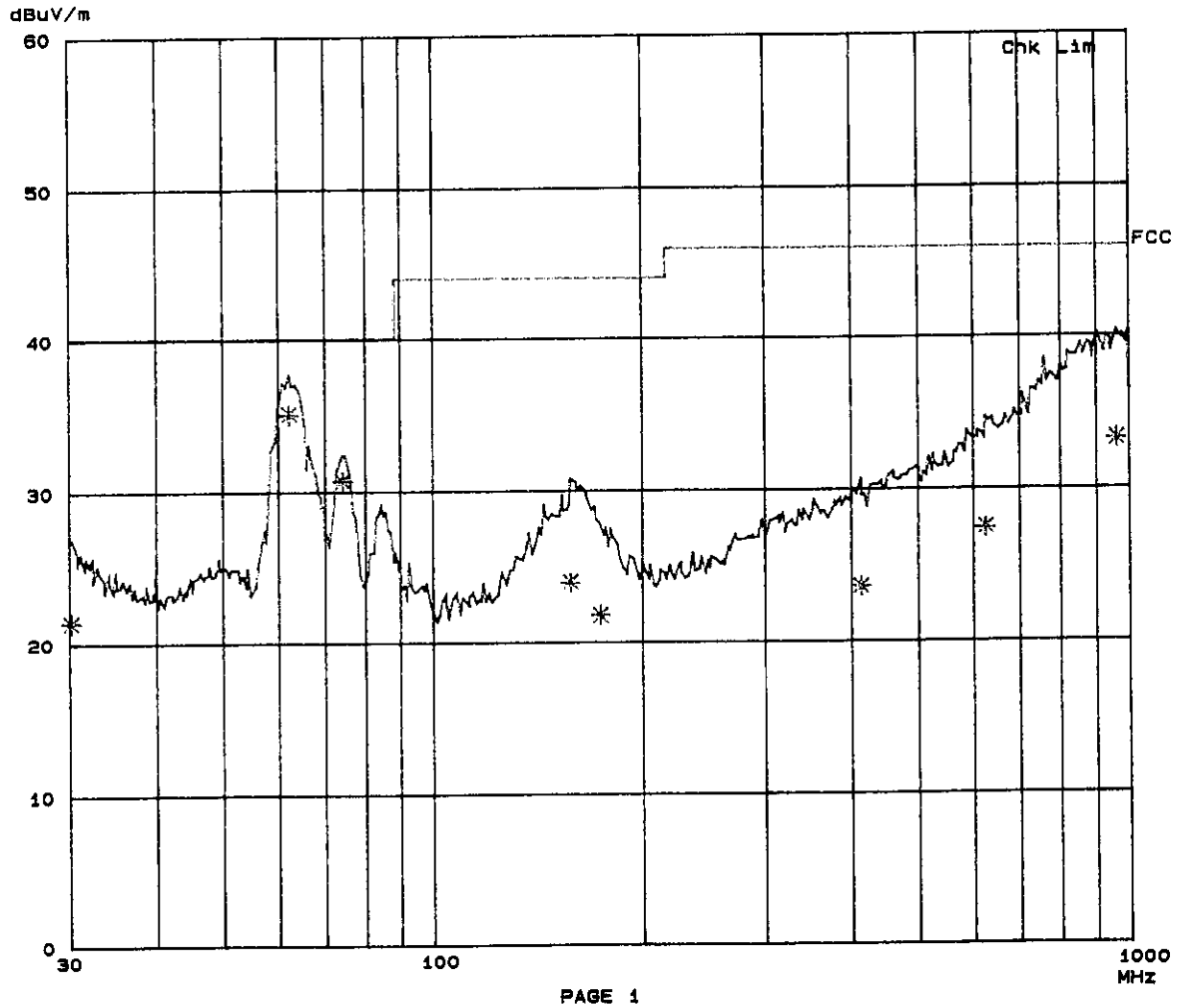
Radiated EM-field 3m anechoic room

EUT: MODEL FEH552D/DV/120
Manuf: MagneTek S.p.A.
Op Cond: 120Vac/60Hz lowest power setting VERT 1m
Operator: HJo
Test Spec: FCC Part 18 B/MP-5
Comment: CLASS II CHANGE FCCID: NE455DVLC
Torchiere Style 20tm Adapter Electronic FDB with bulb

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	1000M	100k	120k	PK	100ms	AUTO	LN ON	60dB

Final Measurement: x Hor-Max / + Vert-Max Transducer No. Start Stop Name
21 30M 1000M logbicon
Meas Time: 1 s
Subranges: 8
Acc Margin: 25dB



ANNEX A4 VERTICAL ANTENNA POLARIZATION HIGHEST POWER SETTING

82524 MAGNETEC/GE 12. Aug 98 08: 15

Radiated EM-field 3m anechoic room

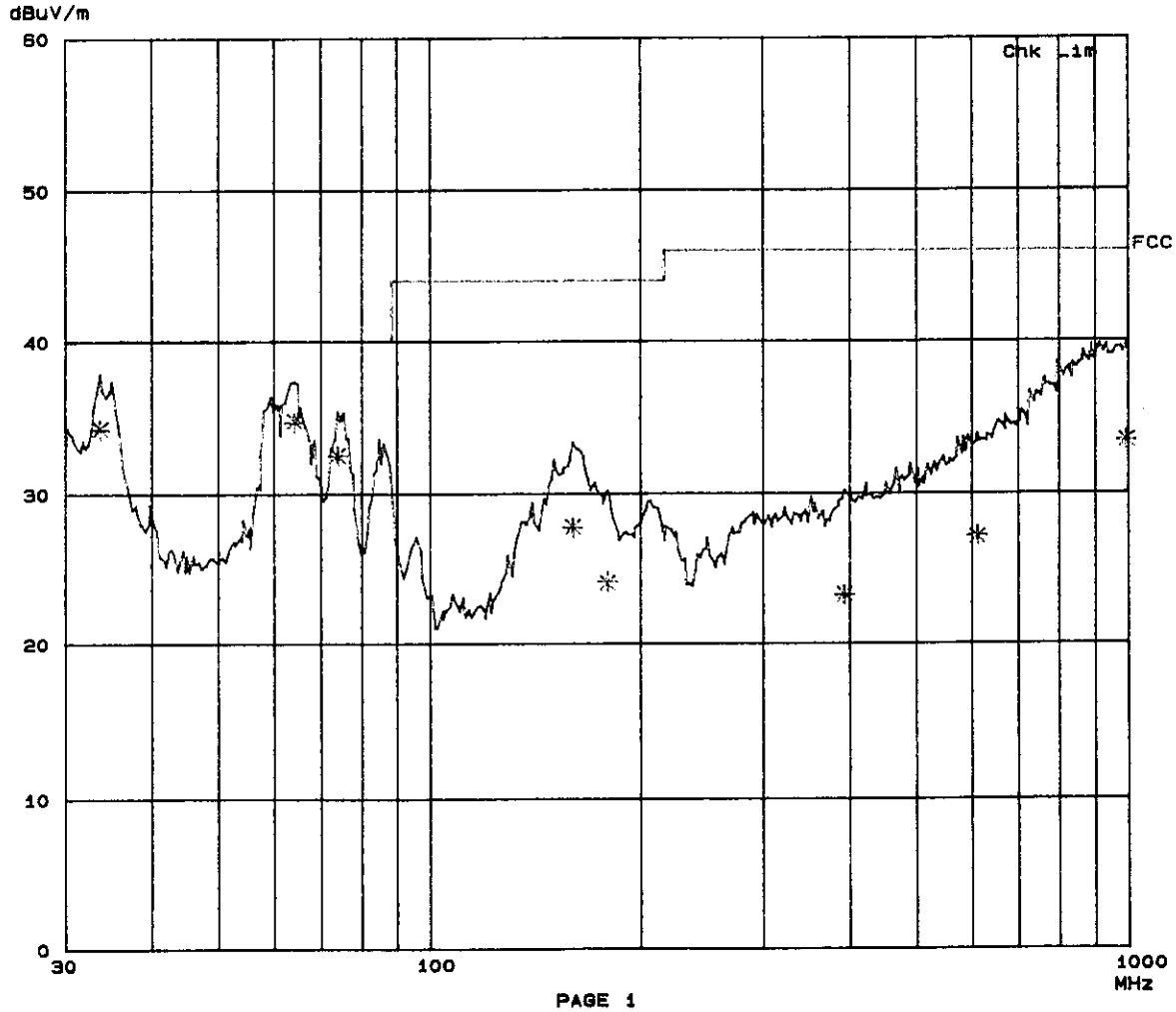
EUT: MODEL FEH552D/DV/120
Manuf: MagneTek S.p.A.
Op Cond: 120Vac/60Hz highest power setting VERT
Operator: HJo
Test Spec: FCC Part 18 B/MP-5
Comment: CLASS II CHANGE FCCID: NE455DVLC
Torchiere Style 2Dtm Adapter Electronic FDB with bulb

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	1000M	100k	120k	PK	100ms	AUTO	LN ON	80dB

Final Measurement: x Hor-Max / + Vert-Max
Meas Time: 1 s
Subranges: 8
Acc Margin: 25dB

Transaducer No.	Start	Stop	Name
21	30M	1000M	logbicon



ANNEX A2 HORIZONTAL ANTENNA POLARIZATION HIGHEST POWER SETTING

82524 MAGNETEC/GE 12. Aug 98 08:57

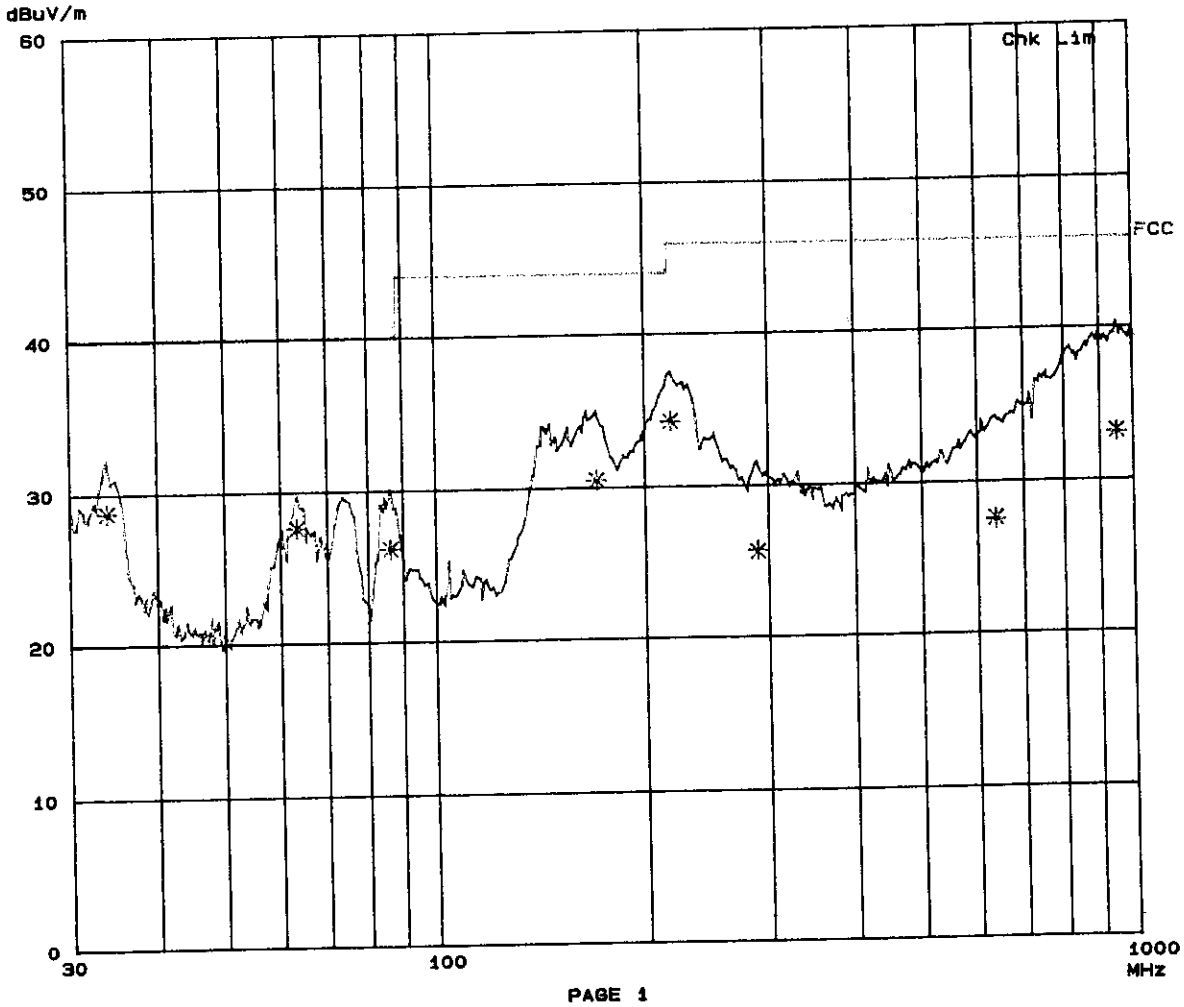
Radiated EM-field 3m anechoic room

EUT: MODEL FEH552D/DV/120
Manuf: MagneTek S.p.A.
Op Cond: 120Vac/60Hz highest power setting HORIZ
Operator: HJo
Test Spec: FCC Part 18 B/MP-5
Comment: CLASS II CHANGE FCCID: NE455DVLC
Torchiere Style 2Dtm Adapter Electronic FDB with bulb

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	1000M	100k	120k	PK	100ms	AUTO	LN ON	60dB

Final Measurement: x Hor-Max / + Vert-Max Transducer No. Start Stop Name
21 30M 1000M logbicon
Meas Time: 1 s
Subranges: 8
Acc Margin: 25dB



6.5 **Radiated electromagnetic field strength highest power setting**

Standard : FCC, Part 18 Subpart C Section 18.305(c) (consumer equipment)
Limits : Measurement distance of 3 m

Frequency [MHz]	Limit [dB(μV/m)]
30 - 88	40.0
88 - 216	43.5
216 - 1000	46.0

The permissible field strength limits were adjusted using 1/d as attenuation factor.

Port : Enclosure with cabling
Results :

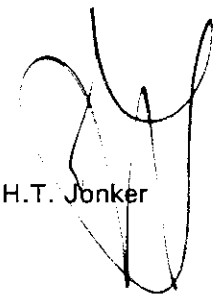
Frequency [MHz]	Pol [V/H]	Measured [dB(μV)]	Correction [dB/m]	Level [dB(μV/m)]	Limit [dB(μV/m)]
33.7	V	7.0	27.4	34.4	40.0
64.2	V	24.0	11.2	35.2	40.0
73.9	V	25.0	7.7	32.7	40.0
170.1	H	13.0	17.7	30.7	43.5
217.1	H	15.0	19.6	34.6	46.0
201.5	H	6.0	19.2	25.2	43.5

Measurement uncertainty: 3 dB

Note : All readings are quasi-peak values using a quasi-peak bandwidth of 120 kHz

Judgement : Pass (Margin is 5.6 dB at 33.7 MHz).

Test personnel:

Tester Signature : 

Date: 1998-08-12

Name : H.T. Jonker

6.2 Field Strength Calculation

The final field strength is calculated by adding the Antenna Factor and Cable Factor to the reading on the test receiver. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - (G)

where:

FS = Field strength
RA = Receiver amplitude
AF = Antenna factor
CF = Cable attenuation factor
G = Pre-amplifier gain (used in frequency range 1 - 2 GHz)

Example of calculating the field strength level:

Assume the receiver reading of 26.0 dBuV at a frequency of 113.6 MHz as obtained for the system with the bus-clock set at 66 MHz:

Measuring value, RA:	26.0 dB(μV)
Antenna factor, AF:	13.0 (dB/m)
Cable factor, CF:	1.1 (dB)
Thus resulting in a	
Field strength, FS:	40.1 dB(μV/m)

The Correction Factor mentioned in the result tables of clause 7.4 comprises the Antenna factor AF and the Cable attenuation factor CF. The Correction Factor mentioned for measurement frequencies in excess of 1 GHz includes the pre-amplifier gain.

6.3 Test Instruments Used for Radiated Measurements

EMI Equipment	Type	Manufacturer	Serial no.	ORS No.	Cal interval
EMI Test receiver	ESV	Rohde & Schwarz	872146/016	067254	yearly (05-99)
EMI test receiver	ESVS 10	Rohde & Schwarz	827864/001	078086	yearly (12-98)
Biconical antenna	3110	EMCO	1076	078268	yearly (09-98)
Logper antenna	3146	EMCO	9111-3294	074650	yearly (09-98)
LogBicon	VULB9161	Schwarzbeck	S/N 4009	116982	yearly (10-98)

4.5 **Measured Data (Mains conducted disturbance voltage) highest power setting**

Standard : FCC, Part 18 Subpart C Section 18.307(c) (consumer equipment)

Limits :

Frequency [MHz]	Limit [μV]	Limit [dB(μV)]
0.45 - 30.0	250.0	48.0

Port : AC mains supply line/neutral

Results :

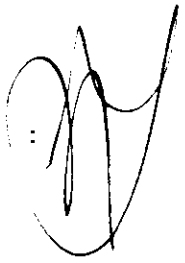
Frequency [MHz]	Level Line [dB(μV)]	Level Neutral [dB(μV)]	Limit [dB(μV)]
0.527	40.7	40.4	48.0
0.758	39.6	39.1	48.0
0.761	39.1	39.3	48.0
1.076	35.8	36.0	48.0
1.391	34.1	34.6	48.0
1.706	32.6	32.7	48.0
2.802	29.5	29.3	48.0
3.197	29.7	29.9	48.0
4.769	27.8	27.9	48.0
5.007	30.6	30.3	48.0
7.163	32.4	32.9	48.0
9.329	35.4	35.8	48.0
11.942	37.6	37.3	48.0
13.659	32.3	32.8	48.0
22.986	38.1	38.0	48.0
26.984	45.4	45.4	48.0

Measurement uncertainty: 2 dB

Note : According to section 2.2.2 of MP-5 all readings are quasi-peak unless stated otherwise, using a quasi-peak bandwidth of 9 - 10 kHz.

Judgement : Pass (Passed by 2.3 dBμV at 26.984 MHz)

Test personnel:

Tester Signature :  Date: 1998-08-10

Name : H.T. Jonker

4.3 **Measured Data (Mains conducted disturbance voltage) lowest power setting**

Standard : FCC, Part 18 Subpart C Section 18.307(c) (consumer equipment)

Limits :

Frequency [MHz]	Limit [μV]	Limit [dB(μV)]
0.45 - 30.0	250.0	48.0

Port : AC mains supply line/neutral

Results :

Frequency [MHz]	Level Line [dB(μV)]	Level Neutral [dB(μV)]	Limit [dB(μV)]
0.453	38.0	37.8	48.0
0.632	41.3	41.7	48.0
0.810	38.9	38.8	48.0
1.265	34.6	33.7	48.0
1.440	37.0	36.1	48.0
1.797	35.6	35.3	48.0
2.777	34.2	34.3	48.0
2.952	33.4	33.5	48.0
4.685	32.3	32.1	48.0
6.025	36.3	36.5	48.0
7.656	35.1	34.7	48.0
9.270	39.0	39.2	48.0
13.008	38.3	38.9	48.0
16.438	38.8	38.9	48.0
20.690	43.2	43.7	48.0
23.375	37.5	37.6	48.0

Measurement uncertainty: 2 dB

Note : According to section 2.2.2 of MP-5 all readings are quasi-peak unless stated otherwise, using a quasi-peak bandwidth of 9 - 10 kHz.

Judgement : Pass (Passed by 4.3 dBμV at 20.690 MHz)

Test personnel:

Tester Signature : 

Date: 1998-08-10

Name : H.T. Jonkas

1.2 Class II permissive change

The initial certification was granted on May 19th 1998. Refer to the original application report "Electromagnetic Interference Test Report for MagneTek/General Electric, Electronic Fluorescent Dimming Ballast with bulb, model FEH552D/DV/120, FCC ID: NE455DVLC, Torchiere version", prepared by Smith Electronics Inc., dated April 14th, 1998.

The change from the original production FEH552D/DV/120 55W models are:

1 The two electrolytic 68μF capacitors C7 and C10 are now 47μF capacitors

2 The (radiated 80MHz) EMI filter inductor L3 is eliminated

Refer to the above mentioned report for the product description.

1.3 Test Methodology

Conducted and radiated emission testing was performed according to the procedures as mentioned in Section 18.305(c) and 18.307(c) 47CFR, Part 18 subpart C. According to Section 18.203(a) this type of device shall be classified as a consumer ISM (lighting) device and thus is subject to certification. The measurements were performed in accordance with the test methodology of Measurement Procedure MP-5:1986.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated and conducted measurement data are located at the premises of KEMA Nederland B.V., Utrechtseweg 310, in Arnhem, The Netherlands. The FCC has per Public Notice declared this measurement facility had been reviewed and to be in compliance with the requirements of Section 2.948 of the FCC Rules. It was accepted by letter with accreditation number 31040/SIT; 1300F2, dated January 13 1998.

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