FCC CFR 47 PART 18 Subpart C RF Lightning Devices

E.M.I. TEST REPORT

Test report No..... :	02SR002EM-R01	
Prepared by..... :	C. Carù	Signature .....
Approved by.....:	G. Baroni	Signature .....
Date of issue.....:	October 29, 2002	
Number of pages..... :	13	

Test Laboratory

Name..... :	CiaoLAB Technologies S.p.A. - Standard Compliance Services
Address..... :	Via ai Laboratori Olivetti, 79 - 20010 Pregnana Milanese (MI) - I

Applicant for the test

Name..... :	OSRAM S.p.A.

Equipment under test

Model.....:	CF30EL/CIRC/830/MED
Serial Number.....:	Proto N1
Trade Mark..... :	OSRAM SYLVANIA
Manufacturer.....:	OSRAM SUD S.p.A. Via delle Ortensie,16 70026 Modugno (Bari) -Italy-
Rating's.....:	120 VAC / 60Hz
Operating temperature range..... :	From 0°C to +40°C

Equipment information

Equipment category..... :	RF Lightning Devices
Classification of the equipment..... :	Consumer Equipment
Weight.....:	218g
Tested for IT power system..... :	No

Test specification

Applicable standard..... :	FCC CFR 47 - Part 18 - Subpart C
Additional installation requirements :	No

Test results

Summary of test results.....:	**COMPLIANT**
Legend:.....:	NA: Not Applicable - P: Pass - F: Fail

General Information of the Appliance

Due to the various needing of the improvements of the ballast (either electrical improvements or those connected to the production), some modifications of the product tested in January 2001 have been done.
The modifications have been identified as a Class 2 Permissive Changes as specified in FFC CFR47 Part 2 §2.1043(b)(2).
The new appliance have been tested both for radiated and conducted noise emission measurements and found in compliance with the specified limits.
All the details about the modifications are available in the attached files.

Manufacturer

OSRAM S.p.A. Via Castagnole, 65/A
31100 Treviso - Italy -

Applicant for Certification

OSRAM SUD S.p.A. Via delle Ortensie, 16
70026 Modugno (Bari) - Italy -

FCC ID

Original FCC ID not subject to modifications: PKFEB329924A

Official of the Responsible Party for Certification

Name Luca Volpato Product Development Engineer

Signature .....

Description of the Appliance

The appliance is ballast for circular fluorescent lamp, the power is 30W and it is powered from the standard 120V / 60Hz AC mains, due to its characteristics it is sold to the general public.

The appliance is shown in the following pictures

General Consideration of the Test

The appliance is classified under the FCC Part 18 INDUSTRIAL, SCIENTIFIC AND MEDICAL EQUIPMENT - Subpart C - RF Lightning Devices - *Consumer Equipment,* and in conformity to the requirements of the table reported in FCC Part 18 Subpart B §18.203, it is subject to "CERTIFICATION" procedure.

As defined in FCC Part 18 Subpart C §18.307 the frequency range for conducted noise measurement is from 450KHz to 30MHz and the Maximum RF line voltage measured specified for RF Lightning Devices - Consumer Equipment is reported in the following table.

Frequency	Level in µV	Level in dbµV
0.45MHz ÷ 2.51MHz	250µV	48dbµV
2.51MHz ÷ 3MHz	3000µV	69.5dbµV
3MHz ÷ 30MHz	250µV	48dbµV

In accordance to FCC Part 18 Subpart C §18.305 the limits for RF Lightning Devices classified as Consumer Equipment are reported in the following table:

Frequency	Limit in µV/m at a distance of 30m	Limit in dbµV/m at a distance of 30m	Limit in dbµV/m at a distance of 10m
30MHz ÷ 88MHz	30µV/m	20dbµV/m	29.5dbµV/m
88MHz ÷ 216MHz	50µV/m	23.5dbµV/m	33dbµV/m
216 MHz ÷1000 MHz	70µV/m	26dbµV/m	35.5dbµV/m

The measurement have been performed at a distance of 10m due to the extremely low signals generated from the EUT and according to NOTE 2 of §18.305 the field strength limits have been adjusted using the attenuation factor of 1/d

A unit of product "CF30EL/CIRC/830/MED" representative of the production was subjected to the test program.

During the radiated and conducted emission test, the appliance was powered from a standard 120V / 60Hz AC main.

Date of Test

The test started on September 18, 2002 and concluded on September 20, 2002.

Reference Documents

FCC CFR 47 Code of Federal Regulations, Title 47 Part 18, Subpart C, RF Lightning Devices, Consumer Equipments.

FCC/OST MP-5 FCC Methods of measurement of radio noise emission from Industrial, Scientific and Medical Equipment

EMC Test Site N.2 description report Code QRD-RQ-0660.

Test Laboratory Information

Radiated and conducted measurements was performed at the CiaoLAB Technologies EMI Measurement Test Site (Open Area Test Site and Shielded Room) denominated "EMC Test Site N. 2" and located at the following address:

CiaoLab eTechnologies S.p.A.
Via ai Laboratori Olivetti, 79
20010 Pregnana Milanese
Milano - ITALY

The "EMC Test Site N. 2" is compliant with the requirements of section 9.248 of the FCC rules.
The CiaoLAB test facility is in the Commission's list whose measurement data will be accepted in conjunction with application for certification or notification under part 15 and 18 of the FCC Rules.
The "EMC Test Site N. 2" complies also with the radiated and AC line conducted test site criteria described in ANSI C63.4-1992 and it is recognized by FCC with the filing number 90470.

CiaoLAB Technologies S.p.A. is also member of VCCI (Voluntary Control Council for Interference of ITE) in Japan.
The "EMC Test Site N. 2" (Shielded Room) has obtained the approval from VCCI with registration number C-813.
The "EMC Test Site N. 2" (Free Field) has obtained the approval from VCCI with the registration number R-777.

Test Equipment List

	Instrument Type	Manufacturer	Model number	Serial Number	Cal./ Ver. Date
N.1	Artificial Main Network	Schwarzbeck	NNLK8121	8121165	August 28, 2002
N.1	Biconical Antenna	EMCO	3109	3105	August 26, 2002
N.1	Log Periodic 200-1GHz	EMCO	3146	4922	August 22, 2002
N. 1	EMI RECEIVER	Hewlett Packard	HP 8574B		
The system is composed by four parts and it is yearly calibrated from Hewlett Packard, the date of the last calibration is **August 22, 2002**.					
	RF Preselector	Hewlett Packard	HP 85685A	2602A00237	
	Spectrum Analyzer RF	Hewlett Packard	HP 85680A	2634A02785	
	Spectrum Analyzer IF	Hewlett Packard	HP 85662A	2542A12241	
	Quasi peak Adapter	Hewlett Packard	HP 85650A	2521A00799	
N.1	EMI TEST RECEIVER	Rohde & Schwarz	ESBI		
The system is composed by two parts and it is yearly calibrated from Rohde & Schwarz, the date of the last calibration is **August 22, 2002**.					
	Display Section	Rohde & Schwarz		844348/017	
	RF Section	Rohde & Schwarz		845658/002	

Devices
Antenna support
Control panel
Antenna tower
Turntable

Environmental Conditions

AC Main: Voltage: 120V
Frequency: 60Hz

	Conducted noise emission test	Radiated noise emission test
Temperature:	22ºC	20ºC
Relative Humidity:	62%	65%
Atmospheric Pressure	1017mbar	1018mbar

Operating Conditions

During the test the appliance was switched ON, a warm up time of few minutes was respected before to start the noise emission measurements.

EUT Test Setup

During radiated noise emission measurements according to FCC/OST MP-5 Par. 5.4 the appliance was placed on a wooden table 80cm high over the ground plane, the radiated noise emission measurements were performed in free field at antenna to EUT distance of 10mt.

During conducted noise measurements according to FCC/OST MP-5 Par. 7.1 the appliance was installed inside the shielded room and placed on a wooden table 40 high over the ground plane. A distance of 80cm have been kept from any other earthed conducting surface.

It is possible to see the pictures of the radiated and conducted test setups in the pictures paragraph.

E.M.I. Measurements Procedures

The EUT was installed in the Open Area Test Site and inside the shielded room in accordance to requirements of FCC/OST MP-5, the system setup is prepared in order to maximize the emissions.

The radiated noise emission measurements were performed in the Open Area Test Site and the EUT to antenna distance was 10m as specified in the FCC part 18 Subpart C for RF Lightning Devices - Consumer Equipment §18.305 Note 2.
The maximum radiated emissions are found by using the following step-by-step procedure:

- The whole frequency range (30MHz ÷ 1GHz) is divided in sub-ranges of about 7 - 8MHz up to 1GHz.
- For all the sub ranges a peak measurement is performed at fixed antenna high (1m for the Vertical polarization and 3.5m for the Horizontal Polarization), and rotating of 360° the turntable, holding the Spectrum Analyzer in max. hold conditions.
- The highest peaks are corrected with the antenna factors and cable losses from the software, and they are added to a list called "Suspect List".
- Now I have the availability of two different lists, the first one for the vertical polarization and the second one for the horizontal polarization.
- For each one of the Suspect list all the signals with less then 10db of margins from the specific limit are remeasured in Quasi Peak Mode as follows:
  - The test receiver is tuned on the highest point of the signal.
  - The Quasi Peak Detector is activated to store the maximum value.
  - The turntable is rotated of 360°, and the azimuth of maximum emission is found.
  - The turntable is stopped on the angle of maximum emission.
  - The antenna high is varied from 1m to 4m, and the antenna is stopped on the high of maximum emission.
  - The turntable is rotated of 360°, and the new maximum emission is found.
  - The system cables are manipulated to produce the highest amplitude signal.
  - A new scan changing the antenna height and rotating the turntable as described before is performed.
  - The Quasi Peak maximum value is corrected with cable's losses and antenna factors, and it is added to a list called "Final List".

The conducted noise emission measurements were performed in the shielded room.
The maximum conducted emissions were found by using the following step-by-step procedure:

- A peak scan of the full range of measurement is automatically performed by the measuring software.
- The peak measurement is automatically plotted on a graphics with the specific limit.
- The twenty highest signals are automatically chosen from the measurement software and re-measured with the quasi peak detector.
- The measured signal are reported in a list called “Final List”.

Measurement Results

Conducted Emission Summary

EQUIPMENT UNDER TEST	FCC Part 18 Subpart C RF Lightning Devices Consumer Equipment 120v - 60Hz	
	PHASE L1	NEUTRAL N
CF30EL/CIRC/830/MED	PASS	PASS

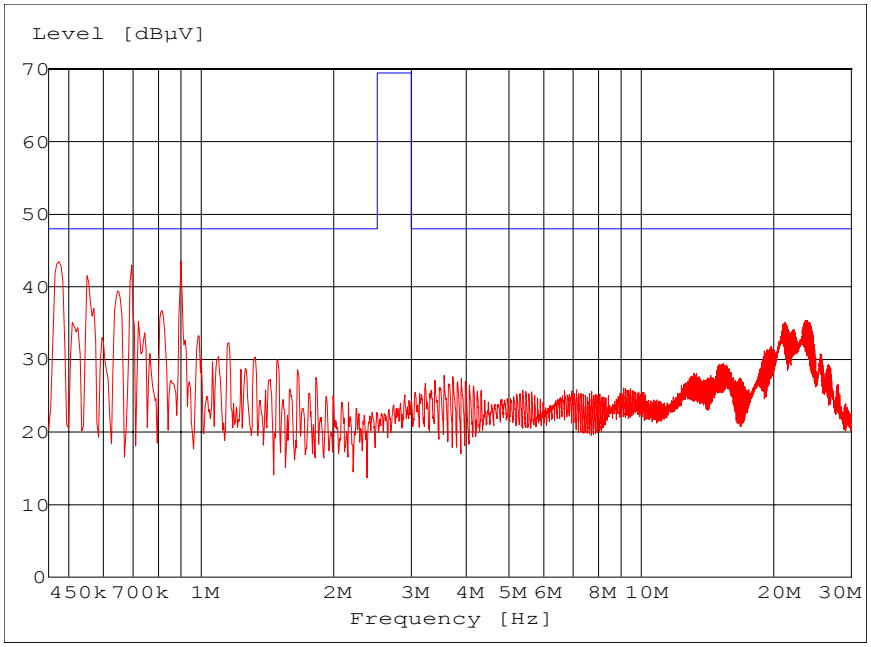
Radiated Emission Summary

EQUIPMENT UNDER TEST	FCC Part 18 Subpart C RF Lightning Devices Consumer Equipment 120v - 60Hz
CF30EL/CIRC/830/MED	PASS

Conducted Emission Graphics and Tables

Supply Voltage: **120V**
Frequency: **60Hz**
Noise measured on: **N**

Red line: Peak measurement results
Blue limit line: FCC CFR 47 Part 18 Subpart C - RF Lightning Devices - Consumer Equipment



Quasi Peak measurement results Phase N

Red line: Quasi Peak measurement results
Blue limit line: FCC CFR 47 Part 18 Subpart C - RF Lightning Devices - Consumer Equipment

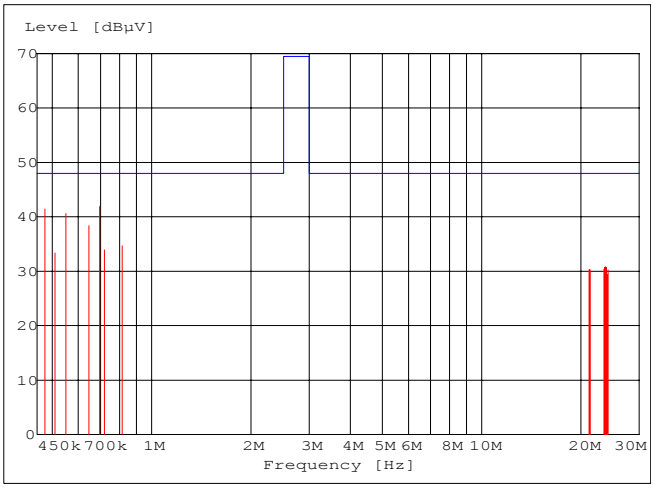
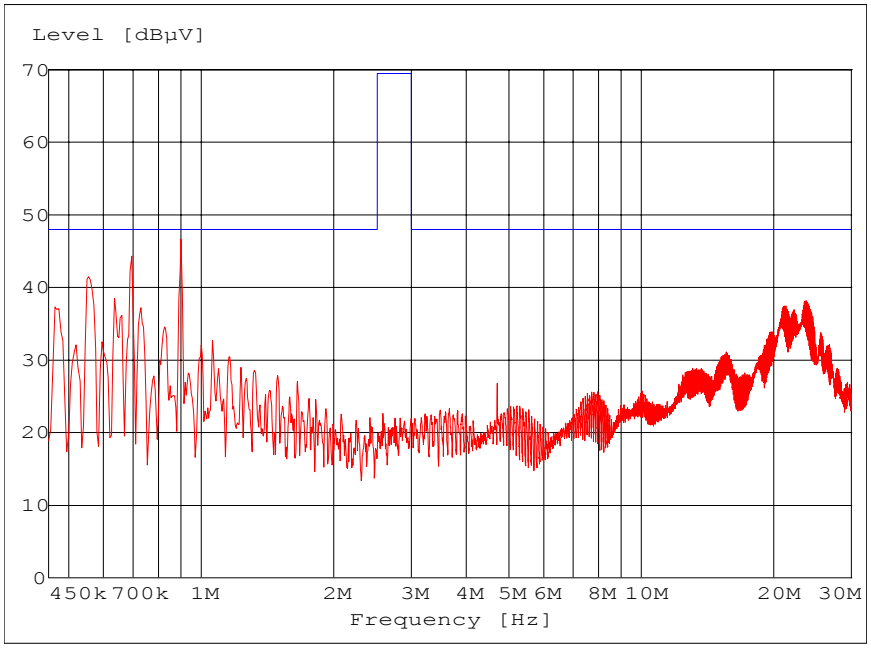


Table with the Quasi Peak measurements results

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.475000	41.40	0.30	48.00	6.60	N	GND
0.510000	33.30	0.30	48.00	14.70	N	GND
0.550000	40.60	0.30	48.00	7.40	N	GND
0.645000	38.40	0.40	48.00	9.60	N	GND
0.695000	41.90	0.40	48.00	6.10	N	GND
0.720000	33.90	0.40	48.00	14.10	N	GND
0.815000	34.70	0.40	48.00	13.30	N	GND
21.140000	30.30	1.20	48.00	17.70	N	GND
21.225000	30.30	1.20	48.00	17.70	N	GND
21.310000	30.20	1.30	48.00	17.80	N	GND
23.470000	30.40	1.30	48.00	17.60	N	GND
23.555000	30.70	1.30	48.00	17.30	N	GND
23.640000	30.70	1.30	48.00	17.30	N	GND
23.725000	30.80	1.30	48.00	17.20	N	GND
23.810000	30.70	1.40	48.00	17.30	N	GND
23.895000	30.60	1.40	48.00	17.40	N	GND
23.975000	29.10	1.40	48.00	18.90	N	GND
24.060000	29.40	1.40	48.00	18.60	N	GND
24.145000	30.20	1.40	48.00	17.80	N	GND

Supply Voltage: **120V**
Frequency: **60Hz**
Noise measured on: **L1**

Red line: Peak measurement results
Blue limit line: FCC CFR 47 Part 18 Subpart C - RF Lightning Devices - Consumer Equipment



Quasi Peak measurement results Phase L1

Red line: Quasi Peak measurement results
Blue limit line: FCC CFR 47 Part 18 Subpart C - RF Lightning Devices - Consumer Equipment

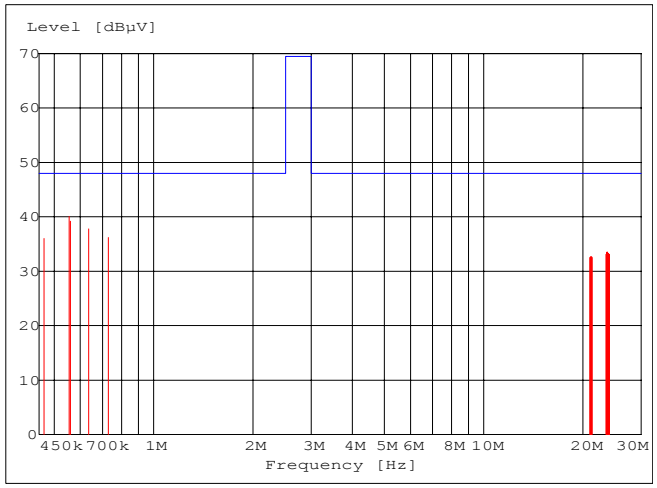


Table with the Quasi Peak measurements results

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.465000	36.00	0.30	48.00	12.00	L1	GND
0.555000	40.10	0.30	48.00	7.90	L1	GND
0.560000	39.20	0.30	48.00	8.80	L1	GND
0.635000	37.80	0.40	48.00	10.20	L1	GND
0.730000	36.20	0.40	48.00	11.80	L1	GND
20.965000	32.50	1.20	48.00	15.50	L1	GND
21.050000	32.60	1.20	48.00	15.40	L1	GND
21.135000	32.70	1.20	48.00	15.30	L1	GND
21.220000	32.60	1.20	48.00	15.40	L1	GND
21.305000	32.50	1.30	48.00	15.50	L1	GND
23.465000	33.10	1.30	48.00	14.90	L1	GND
23.550000	33.40	1.30	48.00	14.60	L1	GND
23.635000	33.50	1.30	48.00	14.50	L1	GND
23.720000	33.50	1.30	48.00	14.50	L1	GND
23.805000	33.20	1.40	48.00	14.80	L1	GND
23.890000	33.20	1.40	48.00	14.80	L1	GND
23.975000	33.10	1.40	48.00	14.90	L1	GND
24.060000	33.10	1.40	48.00	14.90	L1	GND

Radiated Emission Graphics and Tables

Supply Voltage: **120V**
Frequency: **60Hz**
Measurement distance: **10m**
Polarization: **VERTICAL**

Quasi Peak measurement results

Blue limit line: FCC CFR 47 Part 18 Subpart C - RF Lightning Devices - Consumer Equipment
Red bar graph: Quasi Peak measured signals.

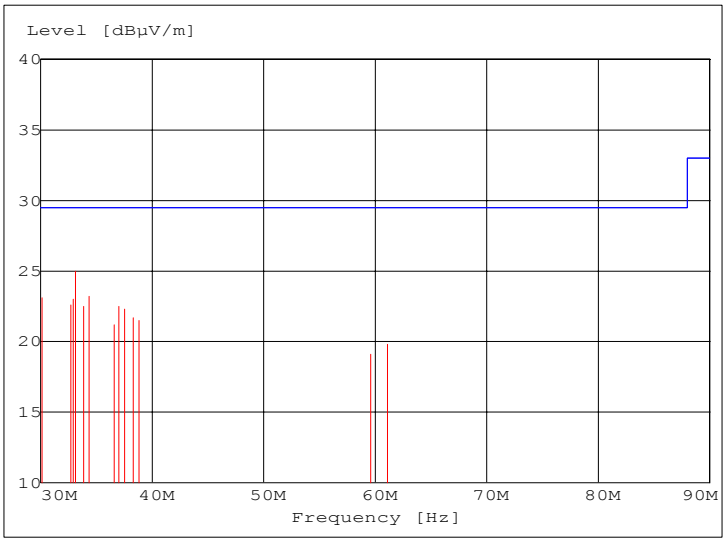


Table with Quasi Peak measurements results **Vertical Polarization**

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	IFBW kHz	Height cm	Azi deg	Pol	Comment
30.140000	23.10	15.40	29.50	6.40	120	100.0	0.00	VER	
32.707000	22.60	15.70	29.50	6.90	120	100.0	0.00	VER	
32.927000	23.00	15.70	29.50	6.50	120	100.0	0.00	VER	
33.110000	25.00	15.70	29.50	4.50	120	100.0	0.00	VER	
33.862000	22.50	15.80	29.50	7.00	120	100.0	0.00	VER	
34.334000	23.20	15.90	29.50	6.30	120	100.0	0.00	VER	
36.601000	21.20	15.40	29.50	8.30	120	100.0	0.00	VER	
37.034000	22.50	15.20	29.50	7.00	120	100.0	0.00	VER	
37.548000	22.30	15.00	29.50	7.20	120	100.0	0.00	VER	
38.324000	21.70	14.70	29.50	7.80	120	100.0	0.00	VER	
38.813000	21.50	14.50	29.50	8.00	120	100.0	0.00	VER	
59.603000	19.10	10.40	29.50	10.40	120	100.0	0.00	VER	
61.107000	19.80	10.30	29.50	9.70	120	100.0	0.00	VER	

Polarization: **HORIZONTAL**

No significant signals have been found in horizontal polarization.

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