

FCC CFR 47 PART 18 Subpart C RF Lightning Devices**E.M.I. TEST REPORT**

Test report No..... : 01SR001EM-R01
Prepared by..... : C. Carù Signature
Approved by..... : G. Baroni Signature
Date of issue..... : September 20, 2001
Number of pages..... : 18

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..... : 001_Proto
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 FCC 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 Lorenzo Baldo 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

In order to verify and to be sure that all the component set will be in compliance with the applicable limits, the EMI measurements have been performed with two different switching component set (T1, T2, Rs1, Rs2, C14).

In this test report the two set of measurement results will be identified as “ Configuration n.1” MOSFET with package T0251 and “Configuration n. 2” MOSFET with package T0220.

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.

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 15, 2001 and concluded on September 18, 2001.

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 Conference with the registration number C-813.

The "EMC Test Site N. 2" (Free Field) has obtained the approval from VCCI Conference 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	8121170	January 26, 2001
N.1	Biconical Antenna	EMCO	3104	3503	February 28 2001
N.1	Log Periodic 200-1GHz	EMCO	3146	2198	February 28 2001
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 Feb 15, 2001 .					
	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 Feb. 14, 2001 .					
	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:	22°C	20°C
Relative Humidity:	60%	55%
Atmospheric Pressure	1015mbar	1015mbar

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 Configuration n. 1	PASS	PASS
CF30EL/CIRC/830/MED Configuration n. 2	PASS	PASS

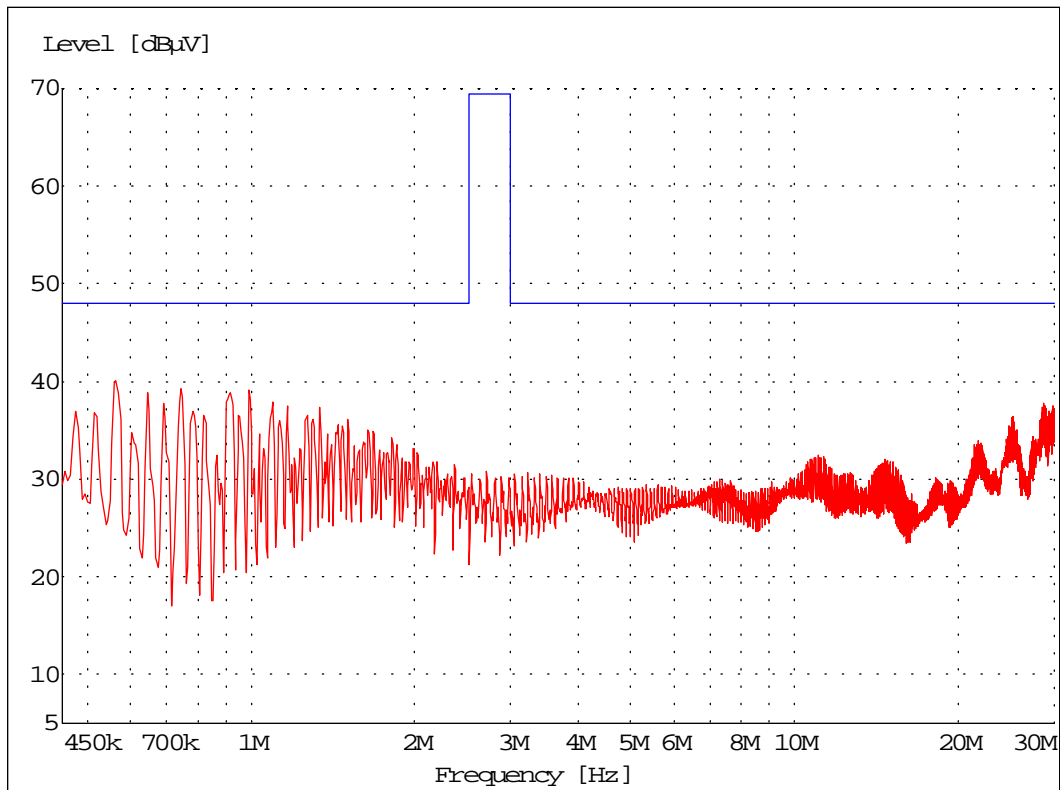
Radiated Emission Summary

EQUIPMENT UNDER TEST	FCC Part 18 Subpart C RF Lightning Devices Consumer Equipment 120v - 60Hz
CF30EL/CIRC/830/MED Configuration n. 1	PASS
CF30EL/CIRC/830/MED Configuration n. 2	PASS

Configuration n. 1 Package T0251 Conducted Emission Graphics and Tables

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

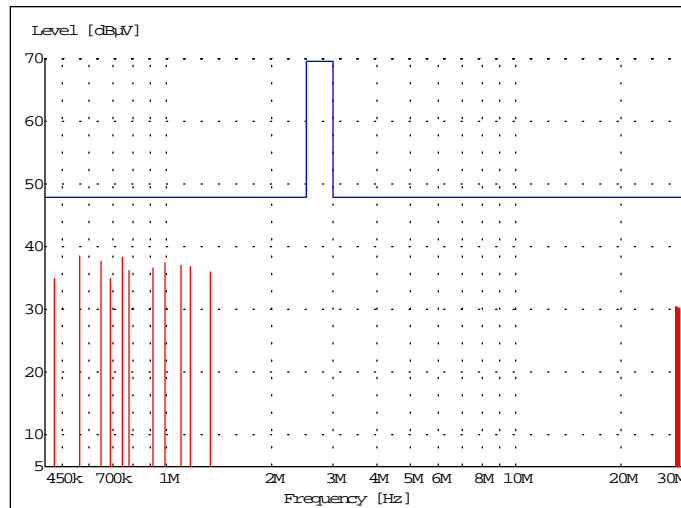
Red line: Peak measurement results
Blue limit line: FCC CFR 47 Part 18 Subpart C - RF Lightning Devices - Consumer Equipment



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

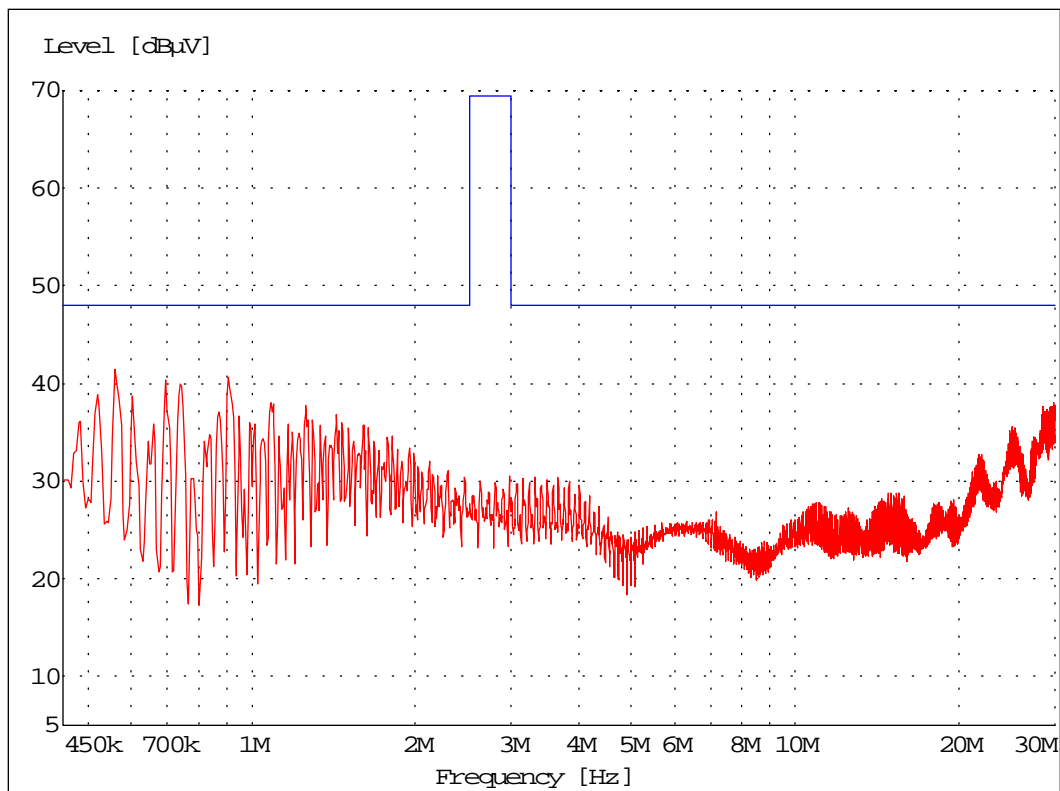
**Table with the Quasi Peak measurements results**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.475000	34.90	0.30	48.00	13.10	N	GND
0.565000	38.50	0.30	48.00	9.50	N	GND
0.645000	37.80	0.40	48.00	10.20	N	GND
0.690000	34.90	0.40	48.00	13.10	N	GND
0.745000	38.30	0.40	48.00	9.70	N	GND
0.780000	36.30	0.40	48.00	11.70	N	GND
0.915000	36.60	0.40	48.00	11.40	N	GND
0.990000	37.40	0.40	48.00	10.60	N	GND
1.095000	37.00	0.40	48.00	11.00	N	GND
1.165000	36.80	0.40	48.00	11.20	N	GND
1.335000	36.00	0.50	48.00	12.00	N	GND
28.625000	30.50	1.50	48.00	17.50	N	GND
28.810000	30.00	1.60	48.00	18.00	N	GND
28.885000	30.50	1.60	48.00	17.50	N	GND
28.970000	30.20	1.60	48.00	17.80	N	GND
29.060000	29.90	1.60	48.00	18.10	N	GND
29.490000	30.30	1.60	48.00	17.70	N	GND
29.835000	31.30	1.60	48.00	16.70	N	GND
29.920000	31.70	1.60	48.00	16.30	N	GND
29.990000	32.80	1.60	48.00	15.20	N	GND

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

Red line: Peak measurement results

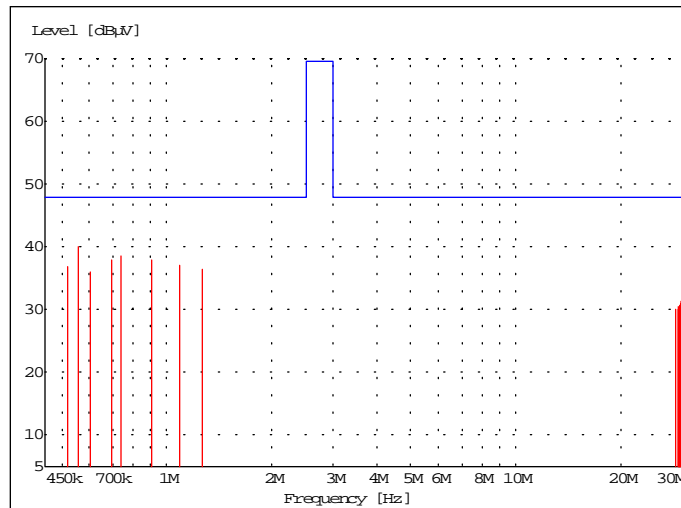
Blue limit line: FCC CFR 47 Part 18 Subpart C - RF Lightning Devices - Consumer Equipment



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
0.520000	36.90	0.30	48.00	11.10	L1	GND
0.560000	40.00	0.30	48.00	8.00	L1	GND
0.605000	36.10	0.40	48.00	11.90	L1	GND
0.695000	37.90	0.40	48.00	10.10	L1	GND
0.740000	38.50	0.40	48.00	9.50	L1	GND
0.905000	38.00	0.40	48.00	10.00	L1	GND
1.085000	37.10	0.40	48.00	10.90	L1	GND
1.260000	36.50	0.50	48.00	11.50	L1	GND
28.635000	30.00	1.50	48.00	18.00	L1	GND
28.970000	30.40	1.60	48.00	17.60	L1	GND
29.065000	30.10	1.60	48.00	17.90	L1	GND
29.315000	30.30	1.60	48.00	17.70	L1	GND
29.400000	30.40	1.60	48.00	17.60	L1	GND
29.490000	30.70	1.60	48.00	17.30	L1	GND
29.575000	30.80	1.60	48.00	17.20	L1	GND
29.660000	31.00	1.60	48.00	17.00	L1	GND
29.745000	31.40	1.60	48.00	16.60	L1	GND
29.835000	31.70	1.60	48.00	16.30	L1	GND
29.920000	32.20	1.60	48.00	15.80	L1	GND
29.990000	34.70	1.60	48.00	13.30	L1	GND

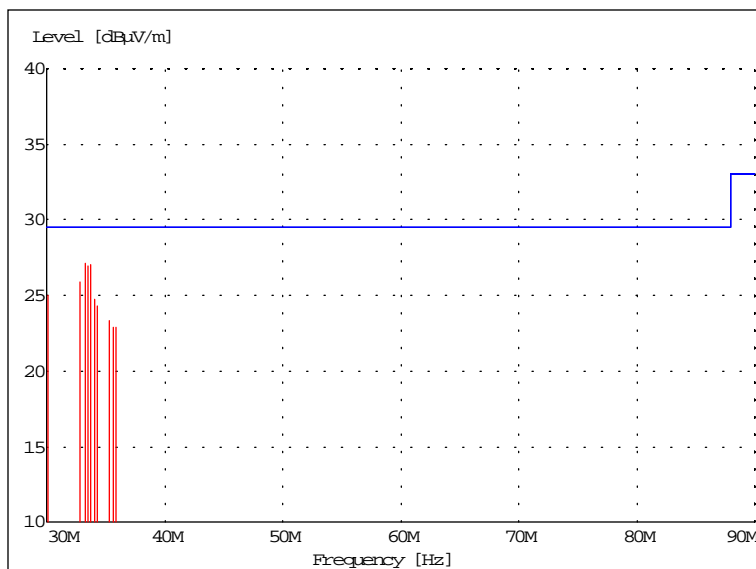
Configuration n. 1 Package T0251 Radiated Emission Graphics and Tables

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
30.130000	25.00	15.60	29.50	4.50	120	100.0	0.00	VER	
32.870000	25.90	13.90	29.50	3.60	120	100.0	0.00	VER	
33.210000	27.10	13.70	29.50	2.40	120	100.0	0.00	VER	
33.490000	26.90	13.60	29.50	2.60	120	100.0	0.00	VER	
33.760000	27.00	13.40	29.50	2.50	120	100.0	0.00	VER	
34.020000	24.70	13.20	29.50	4.80	120	100.0	0.00	VER	
34.330000	24.30	13.10	29.50	5.20	120	100.0	0.00	VER	
35.340000	23.30	12.70	29.50	6.20	120	100.0	0.00	VER	
35.670000	22.90	12.70	29.50	6.60	120	100.0	0.00	VER	
35.890000	22.90	12.70	29.50	6.60	120	100.0	0.00	VER	

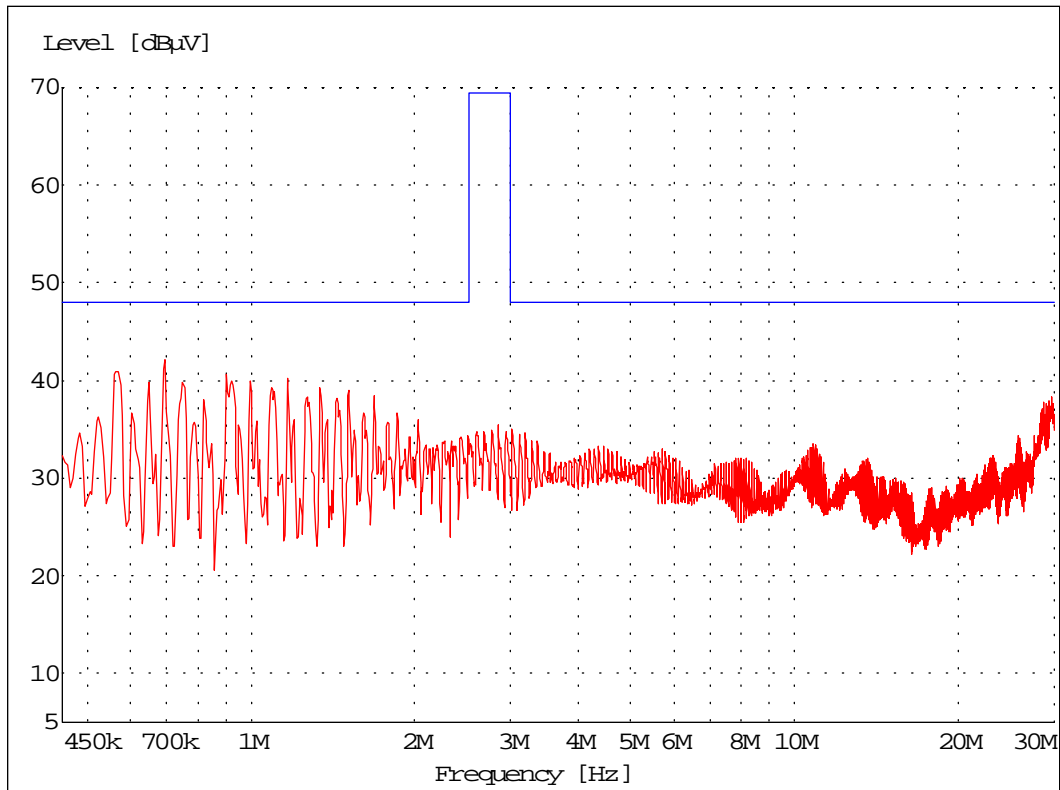
Polarization: HORIZONTAL

No significant signals have been found in horizontal polarization.

Configuration n. 2 Package T0220 Conducted Emission Graphics and Tables

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

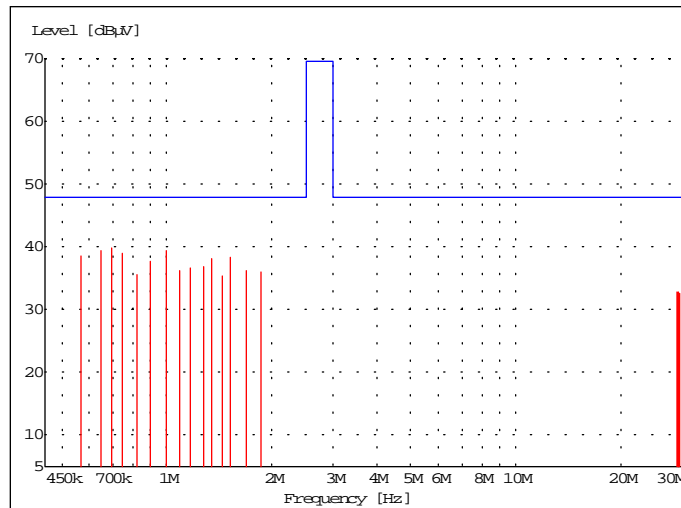
Red line: Peak measurement results
Blue limit line: FCC CFR 47 Part 18 Subpart C - RF Lightning Devices - Consumer Equipment



Quasi Peak measurement results Phase N

Red line: Quasi Peak measurement results

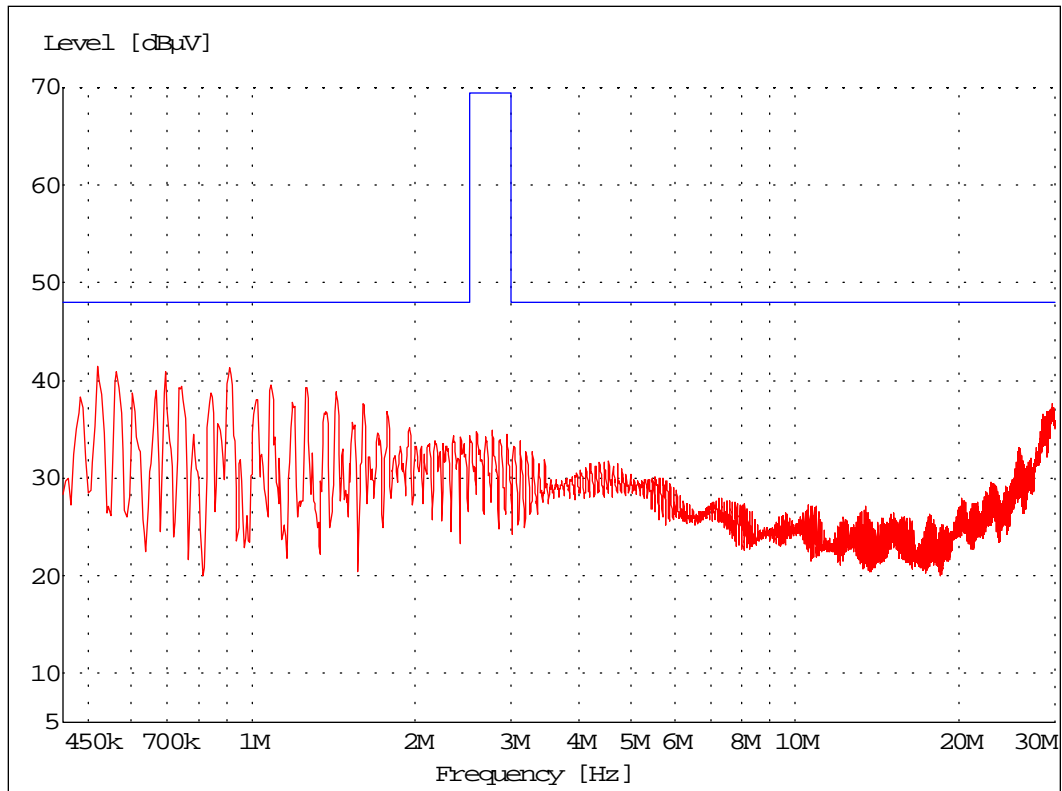
Blue limit line: FCC CFR 47 Part 18 Subpart C - RF Lightning Devices - Consumer Equipment

**Table with the Quasi Peak measurements results**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.570000	38.50	0.30	48.00	9.50	N	GND
0.650000	39.30	0.40	48.00	8.70	N	GND
0.695000	39.80	0.40	48.00	8.20	N	GND
0.750000	39.00	0.40	48.00	9.00	N	GND
0.820000	35.60	0.40	48.00	12.40	N	GND
0.900000	37.70	0.40	48.00	10.30	N	GND
0.995000	39.40	0.40	48.00	8.60	N	GND
1.090000	36.30	0.40	48.00	11.70	N	GND
1.165000	36.70	0.40	48.00	11.30	N	GND
1.270000	36.90	0.50	48.00	11.10	N	GND
1.340000	38.20	0.50	48.00	9.80	N	GND
1.440000	35.30	0.50	48.00	12.70	N	GND
1.515000	38.30	0.50	48.00	9.70	N	GND
1.685000	36.20	0.50	48.00	11.80	N	GND
1.860000	36.10	0.50	48.00	11.90	N	GND
28.710000	32.80	1.50	48.00	15.20	N	GND
29.100000	32.20	1.60	48.00	15.80	N	GND
29.185000	32.80	1.60	48.00	15.20	N	GND
29.270000	32.60	1.60	48.00	15.40	N	GND
29.805000	32.20	1.60	48.00	15.80	N	GND

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

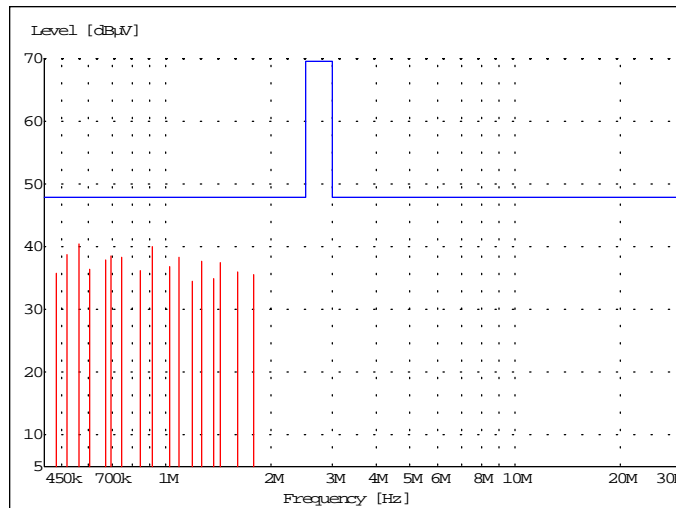
Red line: Peak measurement results
Blue limit line: FCC CFR 47 Part 18 Subpart C - RF Lightning Devices - Consumer Equipment



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
0.485000	35.90	0.30	48.00	12.10	L1	GND
0.520000	38.80	0.30	48.00	9.20	L1	GND
0.565000	40.40	0.30	48.00	7.60	L1	GND
0.605000	36.50	0.40	48.00	11.50	L1	GND
0.670000	38.00	0.40	48.00	10.00	L1	GND
0.695000	38.60	0.40	48.00	9.40	L1	GND
0.745000	38.30	0.40	48.00	9.70	L1	GND
0.840000	36.30	0.40	48.00	11.70	L1	GND
0.910000	40.00	0.40	48.00	8.00	L1	GND
1.025000	36.90	0.40	48.00	11.10	L1	GND
1.085000	38.40	0.40	48.00	9.60	L1	GND
1.190000	34.60	0.40	48.00	13.40	L1	GND
1.260000	37.80	0.50	48.00	10.20	L1	GND
1.370000	35.00	0.50	48.00	13.00	L1	GND
1.430000	37.50	0.50	48.00	10.50	L1	GND
1.600000	36.00	0.50	48.00	12.00	L1	GND
1.775000	35.60	0.50	48.00	12.40	L1	GND
29.115000	31.30	1.60	48.00	16.70	L1	GND
29.205000	30.90	1.60	48.00	17.10	L1	GND
29.690000	31.20	1.60	48.00	16.80	L1	GND

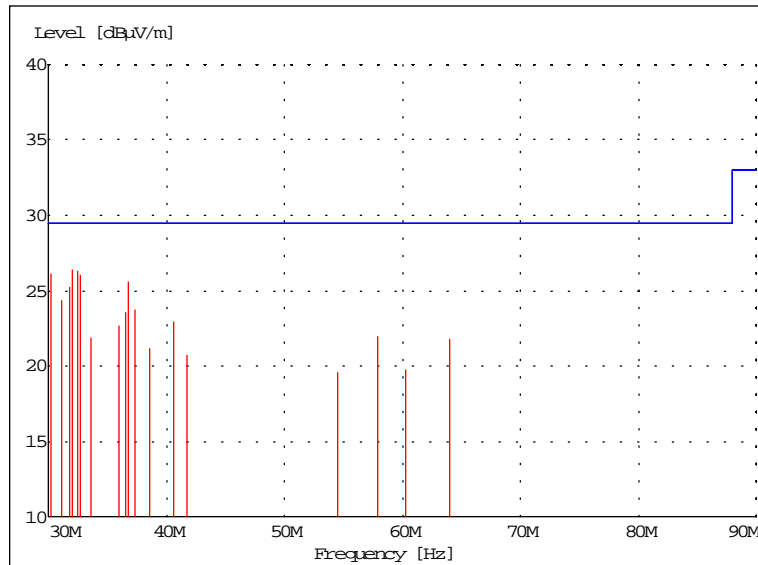
Configuration n. 2 Package T0220 Radiated Emission Graphics and Tables

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
30.160000	26.10	15.60	29.50	3.40	120	100.0	0.00	VER	
31.110000	24.30	15.00	29.50	5.20	120	100.0	0.00	VER	
31.830000	25.20	14.60	29.50	4.30	120	100.0	0.00	VER	
32.060000	26.40	14.40	29.50	3.10	120	100.0	0.00	VER	
32.510000	26.30	14.20	29.50	3.20	120	100.0	0.00	VER	
32.710000	26.00	14.00	29.50	3.50	120	100.0	0.00	VER	
33.580000	21.90	13.50	29.50	7.60	120	100.0	0.00	VER	
36.010000	22.70	12.70	29.50	6.80	120	100.0	0.00	VER	
36.500000	23.50	12.70	29.50	6.00	120	100.0	0.00	VER	
36.810000	25.60	12.70	29.50	3.90	120	100.0	0.00	VER	
37.360000	23.70	12.80	29.50	5.80	120	100.0	0.00	VER	
38.560000	21.20	12.80	29.50	8.30	120	100.0	0.00	VER	
40.640000	22.90	12.80	29.50	6.60	120	100.0	0.00	VER	
41.710000	20.70	12.70	29.50	8.80	120	100.0	0.00	VER	
54.501000	19.60	12.40	29.50	9.90	120	100.0	0.00	VER	
57.880000	22.00	11.70	29.50	7.50	120	100.0	0.00	VER	
60.300000	19.70	11.10	29.50	9.80	120	100.0	0.00	VER	
64.010000	21.80	9.80	29.50	7.70	120	100.0	0.00	VER	

Polarization: HORIZONTAL

No significant signals have been found in horizontal polarization.

Index

<i>General Information of the Appliance</i>	2
Manufacturer	2
Applicant for Certification	2
FCC ID	2
Official of the Responsible Party for Certification	2
<i>Description of the Appliance</i>	2
<i>General Consideration of the Test</i>	3
<i>Date of Test</i>	3
<i>Reference Documents</i>	3
<i>Test Laboratory Information</i>	4
<i>Test Equipment List</i>	4
<i>Environmental Conditions</i>	5
<i>Operating Conditions</i>	5
<i>EUT Test Setup</i>	5
<i>E.M.I. Measurements Procedures</i>	6
<i>Measurement Results</i>	7
Conducted Emission Summary	7
Radiated Emission Summary	7
Configuration n. 1 Package T0251 Conducted Emission Graphics and Tables	8
Configuration n. 1 Package T0251 Radiated Emission Graphics and Tables	12
Configuration n. 2 Package T0220 Conducted Emission Graphics and Tables	13
Configuration n. 2 Package T0220 Radiated Emission Graphics and Tables	17
<i>Index</i>	18