

# TEST REPORT

Ref. Report No.

02-341-022

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**Name and address of the applicant**

Sungnam Electronics Co., Ltd.  
146-8, Sandaewon-dong, Joongwon-gu, Sungnam-shi,  
Kyounggi-do, 462-807, Korea

**Standard / Test regulation**

FCC Part 18

**Test result**

Pass

Incoming date : July 25, 2002

Test date : December 04, 2002

**Test item(s) ;**

RF Lighting Devices – Consumer Equipment  
(Electronic Ballast)

**Model/type ref. ;**

BFL2321D-A

**Manufacturer ;**

Sungnam Electronics Co., Ltd.

**Additional information ;**

-Required Authorization : Certification  
-FCC ID. : QJPBFL2321D-A

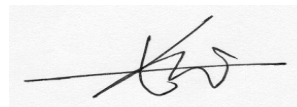
*in full without written approval of the Korea Testing Laboratory.*

**Tested and reported by**



Jeong-Min Kim , Senior Engineer

**Reviewed by**



Hee-Soo Kim , Telecommunication Team  
Manager

# KOREA TESTING LABORATORY

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**□. GENERAL INFORMATION**

1. Applicant's Name and : Sunnam Electronics Co., Ltd.  
Mailing Address 146-8, Sangdaewon-dong, Joongwon-gu, Sunnam-shi,  
Kyounggi-do, 462-807, Korea

2. Manufacturer's Name and : Sunnam Electronics Co., Ltd.  
Mailing Address 146-8, Sangdaewon-dong, Joongwon-gu, Sunnam-shi,  
Kyounggi-do, 462-807, Korea

3. Equipment Descriptions

3.1 Input Voltage : AC 110 V, 60 Hz  
3.2 Oscillation Frequency : 140 kHz  
3.3 Lamp Wattage : 64 W

4. Rules and Regulations : FCC Part 18

5. Measuring Procedure : FCC / OET MP-5 (1986)

6. Date of Measurement

6.1 Conducted Emission : December 04, 2002  
6.2 Radiated Emission : December 04, 2002

**□. CONDUCTED EMISSION MEASUREMENT (Section 18.307)****1. Test Procedure**

The EUT was installed with fluorescent lamp in accordance with the manufacturer's instruction and operated in a manner that is the representative of the typical usage for equipment.

Conducted emission measurements on the EUT were performed by "Conducted Powerline Measurement" procedure as per MP-5. The EUT was set up on a wooden table 0.8 meters height, 1.0 by 1.5 meters in size, placed in the shielded enclosed with a side of wall of which constituted a vertical conducting surface of 2.2 m x 3.1 m in size to maintain 0.4 meters from the rear of EUT

LISN's(Line Impedance Stabilization Network, EMCO, 3825/2, 50 ohm / 50  $\mu$ H) were installed and electrically boned to the conducting ground plane. The EUT was connected to the LISN.

One of two 50 ohm output terminals of the LISN was connected to the EMI Receiver(ROHDE & SCHWARZ, ESI7, 20 Hz to 7 GHz) and the other was terminated in 50 ohms. Measurements were again performed after interchanging such a connection oppositely.

The frequency range from 150 kHz to 30 MHz was examined and the remarkable frequencies were measured with Quasi-peak and Average values using the EMI receiver instrument (ROHDE & SCHWARZ, ESI7, 20 Hz to 7 GHz ; Detector Function ; CISPR Quasi-Peak & Average). The 6 dB bandwidth of the Receiver was set to 9 kHz

The position of connecting cables of the EUT was changed to find the worst case configuration during measurements. The maximum emission level from the EUT occurred in such configuration as shown in the following photograph.

## 2. Photograph for the test configuration



## 3. Sample Calculation

The emission level measured in decibels above one microvolt (dB $\mu$ ) was converted into microvolt ( $\mu$ ) as shown in following sample calculation.

For example :

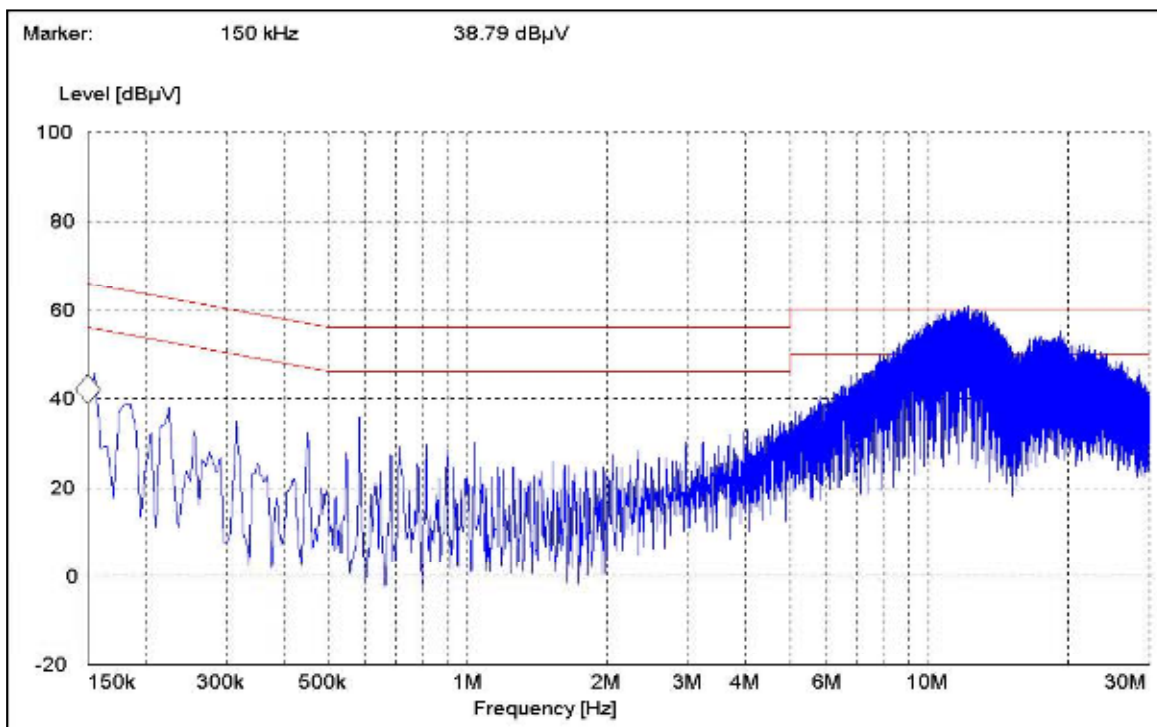
|                      |           |                         |
|----------------------|-----------|-------------------------|
| Measured Value at    | 12.13 MHz | 56.9 dB $\mu$ @ QP-mode |
| + Cable Losses *     |           | 0.0 dB                  |
| -----                |           |                         |
| = Conducted Emission |           | 56.9 dB $\mu$           |
|                      |           | ( = 699.8 $\mu$ )       |

\* In case of RG214/ RF cable 15 Ft, the loss is about 0.17 dB at the frequency of 30 MHz which is negligible.

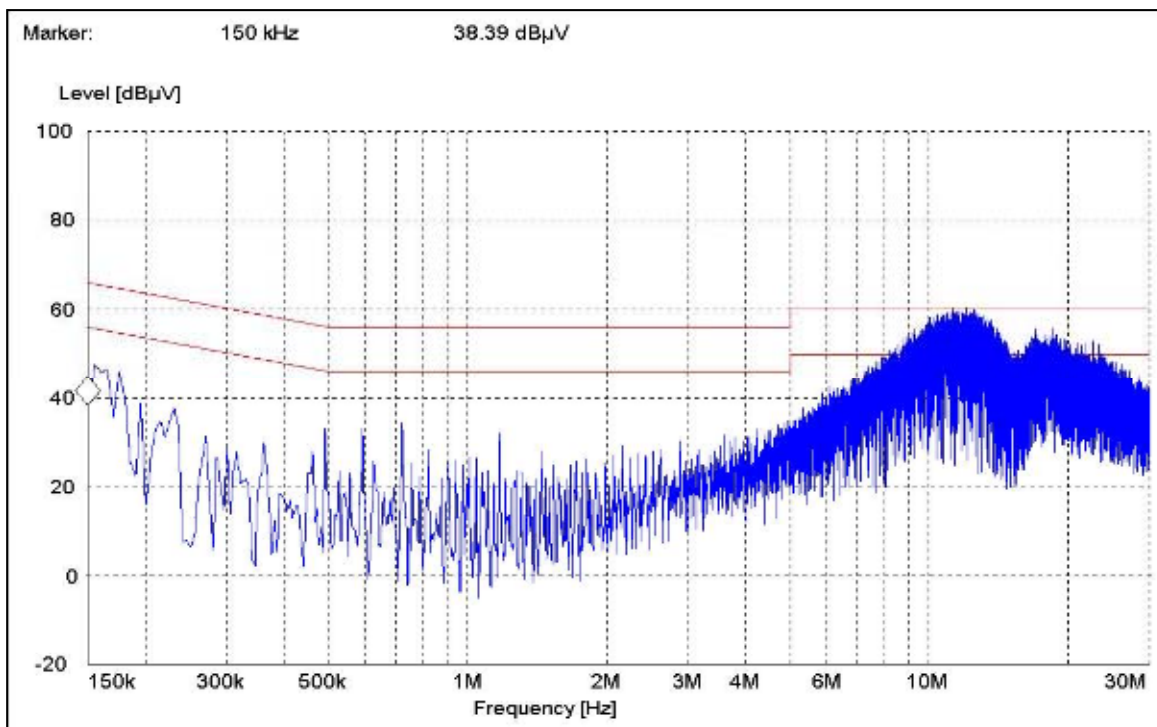
## 4. Measurement Data

- Resolution Bandwidth :   x   CISPR Quasi-Peak (6dB Bandwidth : 9 kHz)  
  x   Average (6dB Bandwidth : 9 kHz)

| Power Lead Tested   | Frequency (MHz) | Emission Level |               | Limit        |               | (*) Margin   |               |
|---|-----------------|----------------|---------------|--------------|---------------|--------------|---------------|
|   |                 | Q-Peak (dB□)   | Average (dB□) | Q-Peak (dB□) | Average (dB□) | Q-Peak (dB□) | Average (dB□) |
| Live to Ground  | 0.150           | 47.8           | 36.1          | 66.0         | 56.0          | - 18.2       | - 19.9        |
|   | 0.180           | 45.1           | 31.5          | 64.5         | 54.5          | - 19.4       | - 23.0        |
|   | 10.770          | 56.8           | 46.5          | 60.0         | 50.0          | - 3.2        | - 3.5         |
|   | 12.130          | 56.9           | 46.5          | 60.0         | 50.0          | - 3.1        | - 3.5         |
|   | 19.170          | 48.4           | 42.4          | 60.0         | 50.0          | - 11.6       | - 7.6         |
|   | -               | -              | -             | -            | -             | -            | -             |
|   |                 |                |               |              |               |              |               |
| Neutral to Ground   | 0.150           | 46.3           | 36.7          | 66.0         | 56.0          | - 19.7       | - 19.3        |
|   | 0.170           | 44.4           | 31.6          | 65.0         | 55.0          | - 20.6       | - 23.4        |
|   | 10.680          | 54.4           | 46.1          | 60.0         | 50.0          | - 5.6        | - 3.9         |
|   | 12.050          | 56.5           | 46.2          | 60.0         | 50.0          | - 3.5        | - 3.8         |
|   | 18.460          | 49.1           | 42.4          | 60.0         | 50.0          | - 10.9       | - 7.6         |
|   | -               | -              | -             | -            | -             | -            | -             |
|   |                 |                |               |              |               |              |               |
| <p>Note : Refer to measured graphs on next page.</p> <p>* Margin(dB) : Emission Level (dB) - Limit (dB)</p> |                 |                |               |              |               |              |               |



(Test mode : Live to Ground)



(Test mode : Neutral to Ground)

**□. RADIATED EMISSION MEASUREMENT (Section 18.305)****1. Test Procedure****1.1 Preliminary Testing for Reference**

Preliminary testing was performed in a KTL absorber-lined room to determine the emission characteristics of the EUT. The EUT was placed on the wooden table which has dimensions of 0.8 meters in height, 1 meter in length and 1.5 meters in width. The EUT was installed with fluorescent lamp in accordance with the manufacturer's instruction and operated in a manner that is the representative of the typical usage for equipment.

Receiving antenna (Biconical antenna : 30 to 300 MHz or Log-periodic antenna : 200 to 1000 MHz) was placed at the distance of 1 meter from the EUT.

An attempt was made to maximize the emission level with the various configurations of the EUT while rotating the table and varying antenna height.

Emissions level from the EUT with various configurations were examined on a Spectrum Analyzer connected with a RF amplifier and graphed by a plotter.

**1.2 Final Radiated Emission Test at a Absorber-Lined Room**

The final measurement of radiated field strength was carried out in a KTL Absorber-Lined Room that was listed up at FCC.

Based on the test results in preliminary test, measurement was made in same test set up and configuration which produced maximum emission level. Receiving antenna was installed at 3-meter distance from the EUT, and was connected to an EMI receiver or spectrum analyzer with a RF amplifier.

Turntable was rotated through 360 degrees and receiving antenna height was varied from 1 to 4 meters above the ground plane to read maximum emission level.

If necessary, the radiated emission measurements could be performed at a closer distance than specified distance to ensure higher accuracy and their results were extrapolated to the specified distance using an inverse linear distance extrapolation factor (20 dB/decade) as per Section 15.31(f).

The maximum emission level from the EUT occurred in such configuration as shown in the following photograph.



## 2. Photograph for the test configuration



## 3. Sample Calculation

The emission level measured in decibels above one microvolt (dB  $\mu$ ) was converted into microvolt per meter ( $\mu$ /m) as shown in following sample calculation.

For example :

|                                |                 |               |
|--------------------------------|-----------------|---------------|
| Measured Value at              | <u>30.9 MHz</u> | 17.2 dB $\mu$ |
| + Antenna Factor               |                 | 18.5 dB       |
| + Cable Loss                   |                 | 1.0 dB        |
| - Preamplifier                 |                 | 0.0 dB        |
| - Distance Correction Factor * |                 | 20.0 dB       |
| -----                          |                 |               |
| = Radiated Emission            | 16.7            | dB $\mu$ /m   |
|                                | ( = 6.8         | $\mu$ /m )    |

\* Extrapolated from the measured distance to the specified distance by an inverse linear distance extrapolation.

## 4. Measurement Data

- Resolution Bandwidth :   x   CISPR Quasi-Peak (6dB Bandwidth : 120kHz)  
                     Peak (3dB Bandwidth : 100kHz)
- Measurement Distance : 3 Meter

| Frequency<br>(MHz) | *<br>D.M. | *<br>A.P. | Measured<br>Value<br>(dB□) | *<br>A.F.<br>+<br>C.L.<br>(dB) | *<br>A.G.<br>(dB) | *<br>D.C.F.<br>(dB) | Emission<br>Level |       | Limit<br>(□/m) | **<br>Margin<br>(dB) |
|--------------------|-----------|-----------|----------------------------|--------------------------------|-------------------|---------------------|-------------------|-------|----------------|----------------------|
|                    |           |           |                            |                                |                   |                     | (dB□/m)           | (□/m) |                |                      |
| 30.9               | Q         | V         | 17.2                       | 19.5                           | -                 | -20.0               | 16.7              | 6.8   | 10             | - 3.3                |
| 55.5               | Q         | V         | 22.0                       | 11.0                           | -                 | -20.0               | 13.0              | 4.5   | 10             | - 7.0                |
| 59.6               | Q         | V         | 26.4                       | 9.8                            | -                 | -20.0               | 16.2              | 6.5   | 10             | - 3.8                |
| -                  | -         | -         | -                          | -                              | -                 | -                   | -                 | -     | -              | -                    |
|                    |           |           |                            |                                |                   |                     |                   |       |                |                      |
|                    |           |           |                            |                                |                   |                     |                   |       |                |                      |
|                    |           |           |                            |                                |                   |                     |                   |       |                |                      |
|                    |           |           |                            |                                |                   |                     |                   |       |                |                      |

Note

\* D.M. : Detect Mode (P : Peak, Q : Quasi-Peak, A : Average)  
A.P. : Antenna Polarization (H : Horizontal, V : Vertical)  
A.F. : Antenna Factor  
C.L. : Cable Loss  
A.G. : Amplifier Gain  
D.C.F. : Distance Correction Factor  
< : Less than

\*\* Margin (dB) = Emission Level (dB) - Limit (dB)

**□. TEST EQUIPMENT USED FOR MEASUREMENTS**

| <u>Equipment</u>                                       | <u>Model No.</u> | <u>Manufacturer</u> | <u>Serial No.</u> | <u>Effective Cal. Duration</u> |
|--|------------------|---------------------|-------------------|--------------------------------|
| [x] EMI Receiver<br>(20 MHz-1 GHz)                     | ESVS30           | R & S               | 830516/002        | 06/13/02-06/13/03              |
| [x] EMI Receiver<br>(20 Hz-7 GHz)                      | ESI              | R & S               | 835571/004        | 09/05/02-09/05/03              |
| [x] Spectrum Analyzer<br>(9 kHz-26.5 GHz)              | 8563A            | H. P.               | 3222A02069        | 03/27/02-03/27/03              |
| [x] Spectrum Analyzer<br>(100 Hz-22 GHz)               | 8566B            | H. P.               | 3014A07057        | 05/26/02-05/26/03              |
| [x] Quasi-Peak Adapter<br>(10 kHz-1 GHz)               | 85650A           | H. P.               | 3107A01511        | 05/26/02-05/26/03              |
| [x] RF-Preselector<br>(20 Hz-2 GHz)                    | 85685A           | H. P.               | 3010A01181        | 05/26/02-05/26/03              |
| [x] Test Receiver<br>(9 kHz-30 MHz)                    | ESH3             | R & S               | 860905/001        | 06/13/02-06/13/03              |
| [x] Pre-Amplifier<br>(0.1-3000 MHz, 30 dB)             | 8347A            | H. P.               | 2834A00543        | 05/26/02-05/26/03              |
| [x] Pre-Amplifier<br>(1-26.5 GHz, 35 dB)               | 8449B            | H. P.               | 3008A00302        | 05/26/02-05/26/03              |
| [x] LISN(50 $\Omega$ , 50 $\mu$ H)<br>(10 kHz-100 MHz) | 3825/2           | EMCO                | 9010-1710         | 05/26/02-05/26/03              |
| [x] Plotter  | 7470A            | H. P.               | 3104A21292        | -                              |
| [ ] Tuned Dipole Ant.<br>(30 MHz-300 MHz)              | VHA 9103         | Schwarzbeck         | -                 | *                              |
| [ ] Tuned Dipole Ant.<br>(300 MHz-1 GHz)               | UHA 9105         | Schwarzbeck         | -                 | *                              |
| [x] Biconical Ant.<br>(30 MHz-300 MHz)                 | BBA 9106         | Schwarzbeck         | -                 | *                              |
| [x] Log Periodic Ant.<br>(200 MHz-1 GHz)               | 3146             | EMCO                | -                 | *                              |
| [ ] Horn Ant.<br>(1 GHz-18 GHz)                        | 3115             | EMCO                | -                 | *                              |
| [ ] Active Loop Ant.<br>(9 kHz-30 MHz)                 | 6502             | EMCO                | 2532              | *                              |
| [ ] DC Power Supply                                    | 6260B            | H.P.                | 1145A04822        | -                              |
| [x] Shielded Room<br>(5.0 m x 4.5 m)                   | -                | SIN-MYUNG           | -                 | -                              |

\* Each set of antennas has been calibrated to ensure correlation with ANSI C63.5 standard. The calibration of antennas is traceable to Korea Standard Research Institute(KSRI).