

Testing Laboratory



# EMC TEST REPORT

Report No.: 151100278TWN-001 Model No.: SCD620H, SCD630H

Issued Date: Feb. 2, 2016

**Applicant:** Philips Consumer Lifestyle BV

High Tech Campus 37, 5656AE, Eindhoven, The Netherlands

Test Method/ Standard: 47 CFR FCC Part 15.247 & ANSI C63.10 2013

**DA 00-705** 

**Registration No.:** 93910

Test By: Intertek Testing Services Taiwan Ltd.

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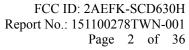
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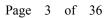
Name Jimmy Yang Title Senior Engineer





## **Revision History**

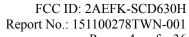
| Report No.       | Issue Date   | Revision Summary |
|------------------|--------------|------------------|
| 151100278TWN-001 | Feb. 2, 2016 | Original report  |





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## **Summary of Tests**

| Test Item                             | Reference         | Results |
|---------------------------------------|-------------------|---------|
| 20dB Bandwidth Test                   | 15.247(a)(1)      | Pass    |
| Carrier Frequency Separation Test     | 15.247(a)(1)      | Pass    |
| Number of Hopping Frequencies Test    | 15.247(a)(1)      | Pass    |
| Time of Occupancy (Dwell Time) Test   | 15.247(a)(1)(iii) | Pass    |
| Maximum Output Power Test             | 15.247(b)         | Pass    |
| RF Antenna Conducted Spurious Test    | 15.247(d)         | Pass    |
| Radiated Spurious Emission Test       | 15.205, 15.209    | Pass    |
| Emission on the Band Edge Test        | 15.247(d)         | Pass    |
| AC Power Line Conducted Emission Test | 15.207            | Pass    |
| Antenna Requirement                   | 15.203            | Pass    |



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#### 1. General Information

#### 1.1 Identification of the EUT

Product: Digital Video Baby Monitor

Model No.: SCD630H

Brand Name: Philips Avent

FCC ID: 2AEFK-SCD630H

Frequency Range: 2408.86MHz~2465.86MHz

Total Hopping Channel No: 20 channels

Frequency of Each Channel: 2405.86+3k MHz,  $k=1\sim20$ 

Type of Modulation: GFSK

Rated Power: 1. DC 5V from adapter

2. DC 3.7V from battery

Power Cord: N/A
Data Cable: N/A

Sample Received: Nov. 12, 2015

Test Date(s): Nov. 19, 2015 ~ Feb. 2, 2016

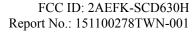
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been under an Intertek certification program.

Note 2: When determining the test conclusion, the Measurement

Uncertainty of test has been considered.



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## 1.2 Adapter information

The EUT will be supplied with a power supply from below list:

| No.     | Brand   | Model no.     | Specification                                  |
|---------|---------|---------------|--|
| Adapter | PHIHONG | PSAC05A-050L6 | I/P:100-240V~, 0.2A ,50-60Hz<br>O/P: 5Vdc , 1A |

The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

#### 1.3 Description of EUT

The customer confirmed the models listed as below were series model to model SCD630H (EUT), the difference between main model and series model are listed as below.

| Trade Name     | Model Number | Different  |  |
|----------------|--------------|--|--|
| Dhiling Assent | SCD630H      | LCD Screen size: 3.5", Battery pack Capacity: 2600 mAh |  |
| Philips Avent  | SCD620H      | LCD Screen size: 2.7", Battery pack Capacity: 2200 mAh |  |

| Modulation mode | Transmit path  |  |
|-----------------|----------------|--|
| Modulation mode | Chain 0 / Main |  |
| GFSK            | V              |  |

Product SW version: V1.10

Product HW version: 110-410190-02

Radio SW version: V1.10

Radio HW version: 110-410172-00

Test SW Version: RF test

## 1.4 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain : 1.3 dBi

Antenna Type : Dipole Antenna

Connector Type : Fixed

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#### 2. Test Specifications

#### 2.1 Test Standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Section §15.205, §15.207, §15.209, §15.247, DA 00-705 and ANSI C63.10:2013.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band was all meet limit requirement, thus we evaluate the EUT pass the specified test.

#### 2.2 Operation Mode

The EUT was supplied with DC 5V from adapter

TX mode operates by pressing button to select different frequency and modulation.

## 2.3 Applied test modes and channels

| Test items                                       | Mode | Channel             | Antenna |
|--|------|---------------------|---------|
| 20 dB Bandwidth                                  |      | Low , Middle , High | Chain0  |
| Maximum peak conducted output power              |      | Low , Middle , High | Chain0  |
| Carrier Frequency Separation                     |      | Low                 | Chain0  |
| Number of Hopping Frequencies                    |      | Normal Operation    | Chain0  |
| Dwell Time                                       | GFSK | Low                 | Chain0  |
| Conducted Spurious                               |      | Low, Middle, High   | Chain0  |
| Radiated spurious Emission<br>30MHz~1GHz         |      | Low , Middle , High | Chain0  |
| Radiated Spurious Emission<br>1GHz~10th Harmonic |      | Low , Middle , High | Chain0  |
| Emission on the Band Edge                        |      | Low, High           | Chain0  |
| AC Power Line Conducted Emission                 |      | Low , Middle , High | Chain0  |

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#### 3. 20dB Bandwidth Test

#### **3.1 Operating Environment**

| Temperature:          | 25      | $^{\circ}\mathbb{C}$ |
|-----------------------|---------|----------------------|
| Relative Humidity:    | 55      | %                    |
| Atmospheric Pressure: | 1008    | hPa                  |
| Test Date:            | Nov. 19 | , 2015               |

## 3.2 Test Setup & Procedure

#### The test procedure was according to FCC measurement guidelines DA 00-705.

The 20dB Bandwidth Test per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set  $\geq 1\%$  of 20dB Bandwidth, the video bandwidth  $\geq$ RBW, and the SPAN may equal to approximately 2 to 3 times the 20dB bandwidth. The test was performed at 3 channels (lowest, middle and highest channel). The maximum 20dB modulation bandwidth is in the following Table.

#### 3.3 Measured Data of Modulated Bandwidth Test Results

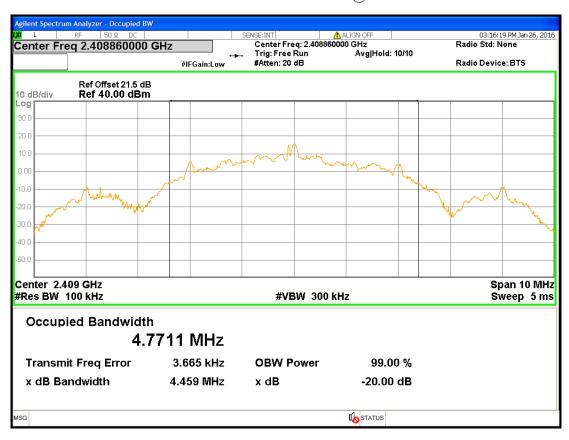
| Mode | Channel | Frequency<br>(MHz) | 20dB Bandwidth Test<br>(MHz) |
|------|---------|--------------------|------------------------------|
|      | Low     | 2408.86            | 4.459                        |
| GFSK | Middle  | 2438.86            | 4.405                        |
|      | High    | 2465.86            | 4.497                        |

Please see the plot below.

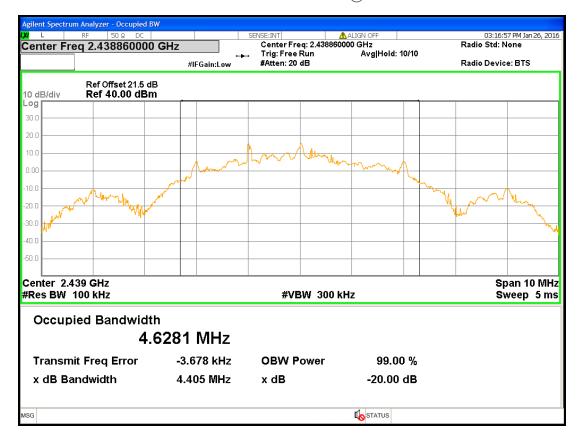




Chain0: 20dB Bandwidth Test @ Ch Low



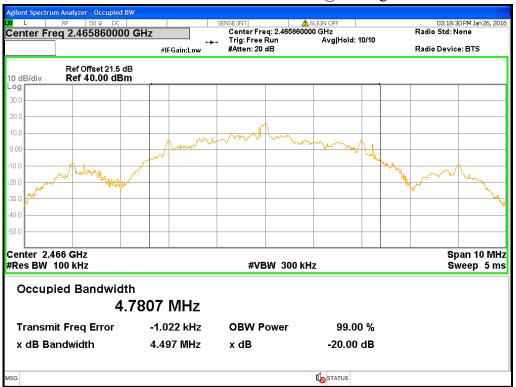
Chain0: 20dB Bandwidth Test @ Ch Middle



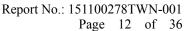




Chain0: 20dB Bandwidth Test @ Ch High



FCC ID: 2AEFK-SCD630H





#### 4. Carrier Frequency Separation Test

#### **4.1 Operating Environment**

| Temperature:          | 25       | $^{\circ}\!\mathbb{C}$ |
|-----------------------|----------|------------------------|
| Relative Humidity:    | 55       | %                      |
| Atmospheric Pressure: | 1008     | hPa                    |
| Test Date:            | Jan. 30, | 2016                   |

#### 4.2 Test Setup & Procedure

#### The test procedure was according to FCC measurement guidelines DA 00-705.

The carrier frequency separation per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at  $\geq$  1% of the span, the video bandwidth  $\geq$  RBW, and the SPAN was wide enough to capture the peaks of two adjacent channels. The carrier frequency separation result is in the following Table.

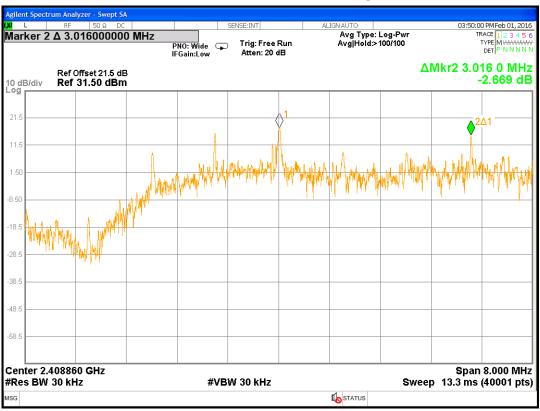
#### 4.3 Measured Data of Carrier Frequency Separation Test Results

| Mode | Channel | Frequency<br>(MHz) | Adjacent channel separation (MHz) | Limit<br>(MHz) |
|------|---------|--------------------|-----------------------------------|----------------|
| GFSK | Low     | 2408.86            | 3.016                             | 2.9727         |
| GFSK | Middle  | 2438.86            | 3.001                             | 2.9367         |
| GFSK | High    | 2465.86            | 3.003                             | 2.9980         |

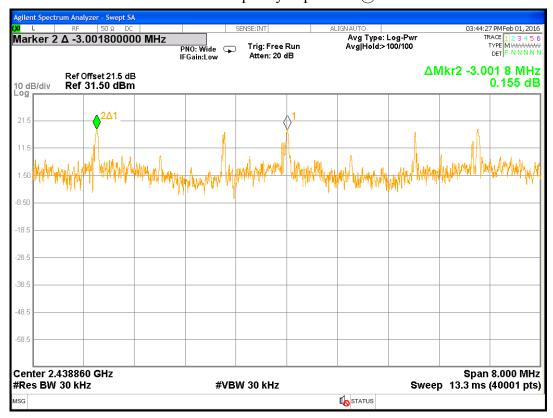
Please see the spectrum plots of worst value below.



Chain0: Carrier Frequency Separation @ Ch Low



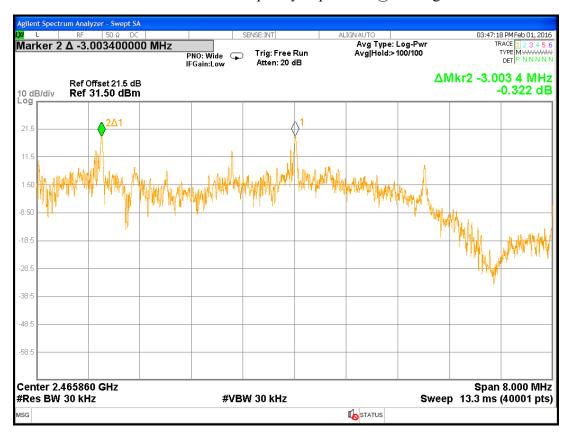
Chain0: Carrier Frequency Separation @ Ch Middle







Chain0: Carrier Frequency Separation @ Ch High







#### 5. Number of Hopping Frequencies Test

#### **5.1 Operating Environment**

| Temperature:          | 24      | $^{\circ}$ C |
|-----------------------|---------|--------------|
| Relative Humidity:    | 55      | %            |
| Atmospheric Pressure: | 1008    | hPa          |
| Test Date:            | Nov. 27 | , 2015       |

#### **5.2 Test Setup & Procedure**

#### The test procedure was according to FCC measurement guidelines DA 00-705.

The number of hopping frequencies per FCC  $\S15.247(a)(1)$  was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at  $\ge 1\%$  of the span, the video bandwidth  $\ge$  RBW, and the SPAN was the frequency band of operation. The carrier frequency separation result is in the following Table.

#### 5.3 Measured Data of Number of Hopping Frequencies Test Results

| Frequency Range (MHz) | Hopping Channels |
|-----------------------|------------------|
| 2408.86~2465.86       | 20               |

Number of Hopping Frequencies @ GFSK mode



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#### **6. Time of Occupancy (Dwell Time)**

#### **6.1 Operating Environment**

| Temperature:          | 25      | $^{\circ}$ C |
|-----------------------|---------|--------------|
| Relative Humidity:    | 55      | %            |
| Atmospheric Pressure: | 1008    | hPa          |
| Test Date:            | Nov. 20 | ), 2015      |

#### **6.2 Test Setup & Procedure**

#### The test procedure was according to FCC measurement guidelines DA 00-705.

The time of occupancy (dwell time) per FCC  $\S15.247(a)(1)$  was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 1MHz, the video bandwidth  $\ge$  RBW, and the zero span function of spectrum analyzer was enable. The EUT has its hopping function enable.

#### 6.3 Measured Data of Maximum Output Power Test Results

The total sweep time is  $0.4 \times 20$  Channels =8 seconds

The number of hops is in the 8 sec. sweep time, we determined to reduce the sweep time to 0.1 sec., count the number of hops and multiply by 80. The total number of hops will be multiplied by the measured time of one pulse.

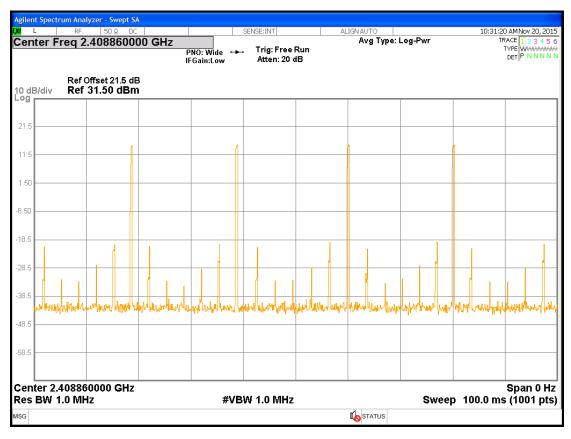
| Mode | Pulse<br>duration<br>(ms) | Number of pulse | measure time (s) | Dwell time (s) | Limit (s) | Pass/Fail |
|------|---------------------------|-----------------|------------------|----------------|-----------|-----------|
| GFSK | 0.386                     | 4               | 0.1              | 0.1235         | 0.4       | Pass      |

Please see the plots below.





Chain0: Dwell Time @ DH1 Ch low





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#### 7. Maximum Output Power Test

## **7.1 Operating Environment**

| Temperature:          | 25       | $^{\circ}\!\mathbb{C}$ |
|-----------------------|----------|------------------------|
| Relative Humidity:    | 55       | %                      |
| Atmospheric Pressure: | 1008     | hPa                    |
| Test Date:            | Nov. 19. | , 2015                 |

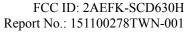
#### 7.2 Test Setup & Procedure

## The test procedure was according to FCC measurement guidelines DA 00-705.

The power output per FCC §15.247(b) was measured on the EUT using a 50 ohm SMA cable connected to peak power meter via power sensor. Power was read directly and cable loss correction (2 dB) was added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel).

#### 7.3 Measured Data of Maximum Output Power Test Results

| Mode | Channel | Frequency<br>(MHz) | Maximum<br>power<br>(PK)<br>(dBm) | Maximum<br>power<br>(PK)<br>(mW) | Limit<br>(dBm) | Margin (dB) |
|------|---------|--------------------|-----------------------------------|----------------------------------|----------------|-------------|
|      | Low     | 2408.86            | 17.34                             | 54.20                            | 21             | -3.66       |
| GFSK | Middle  | 2438.86            | 17.40                             | 54.95                            | 21             | -3.60       |
|      | High    | 2465.86            | 17.21                             | 52.60                            | 21             | -3.79       |



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#### 8. RF Antenna Conducted Spurious Test

#### **8.1 Operating Environment**

| Temperature:          | 25       | $^{\circ}\!\mathbb{C}$ |
|-----------------------|----------|------------------------|
| Relative Humidity:    | 55       | %                      |
| Atmospheric Pressure: | 1008     | hPa                    |
| Test Date:            | Nov. 20, | 2015                   |

## 8.2 Test Setup & Procedure

#### The test procedure was according to FCC measurement guidelines DA 00-705.

The measurements were performed from 30MHz to 25GHz RF antenna conducted per FCC 15.247 (c) was measured from the EUT antenna port using a 50ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz.

Harmonics and spurious noise must be at least 20dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

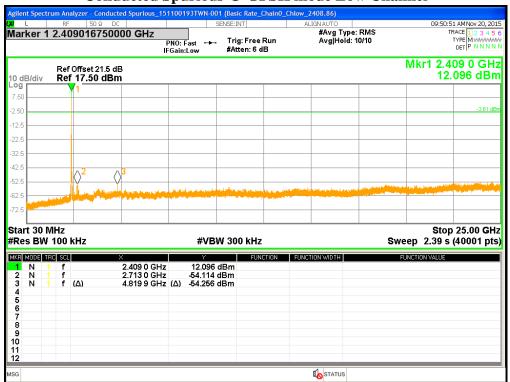


#### 8.3 Measured Data of the Highest RF Antenna Conducted Spurious Test Results

**Conducted Spurious @ GFSK mode Low Channel** 



#### **Conducted Spurious @ GFSK mode Low Channel**



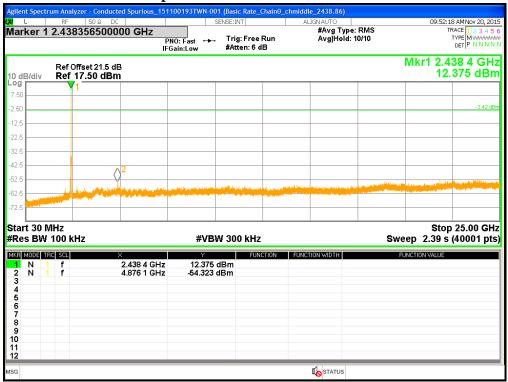


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**Conducted Spurious @ GFSK mode Middle Channel** 



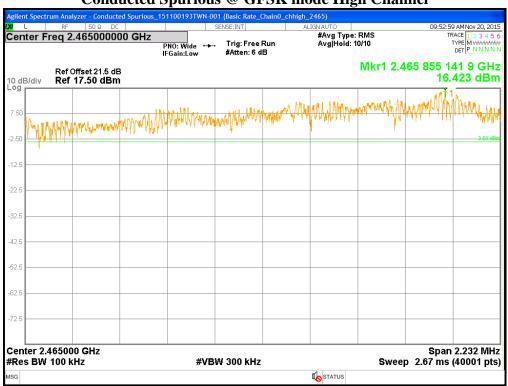
#### Conducted Spurious @ GFSK mode Middle Channel



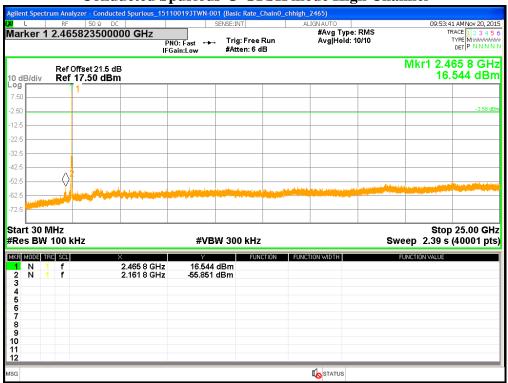


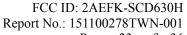
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**Conducted Spurious @ GFSK mode High Channel** 



Conducted Spurious @ GFSK mode High Channel





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#### 9. Radiated Emission Test

#### **9.1 Operating Environment**

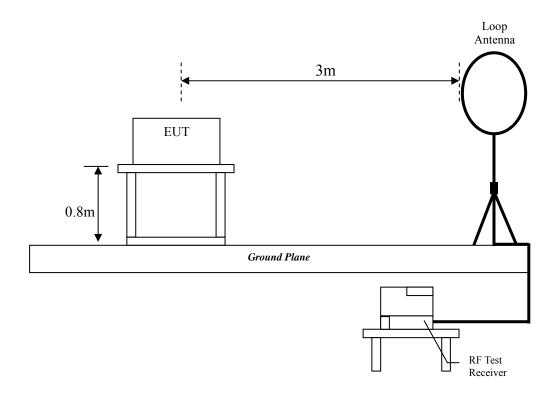
| Temperature:          | 25       | $^{\circ}$ C |
|-----------------------|----------|--------------|
| Relative Humidity:    | 50       | %            |
| Atmospheric Pressure: | 1008     | hPa          |
| Test Date:            | Nov. 24, | 2015         |

## 9.2 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705 and ANSI C63.10:2013.

The Diagram below shows the test setup, which is utilized to make these measurements.

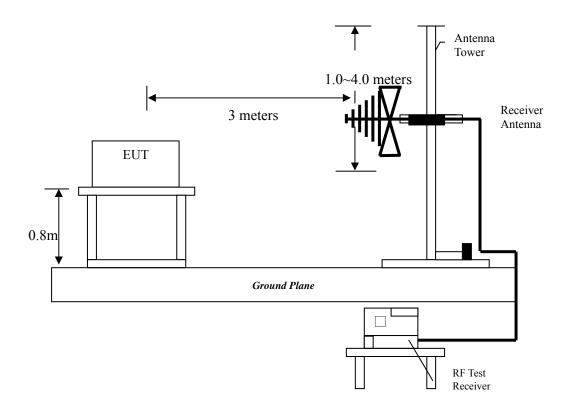
## Radiated emission from 9kHz to 30MHz uses Loop Antenna:



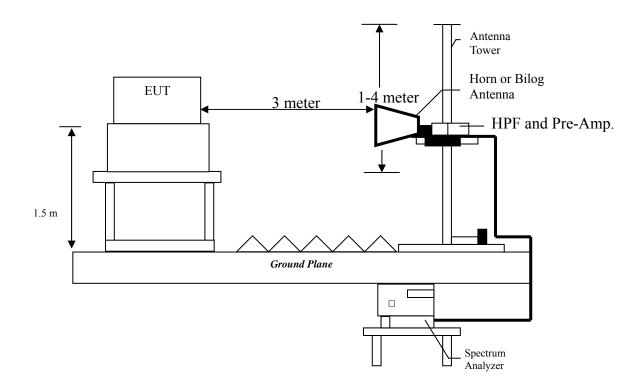
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## Radiated emission from 30MHz to 1GHz uses Bi-log Antenna:



## Radiated emission above 1 GHz uses Horn Antenna:







According to §15.33(a), the spectrum shall be investigated from the lowest radio frequency signal generated in the device, to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Spectrum Analyzer Resolution Bandwidth is 100kHz or greater for frequencies 30MHz to 1GHz, 1MHz – for frequencies above 1GHz.

Configure the EUT according to ANSI C63.10: 2013 The EUT was placed on the top of the turntable 1.5 meter above ground for above 1GHz and placed on the top of the turntable 0.8 meter above ground for below 1GHz. The center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent 3 meter reading using inverse scaling with distance.

#### 9.3 Emission Limits

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

| Frequency<br>(MHz) | Field Strength (microvolts/meter) |
|--------------------|-----------------------------------|
| 0.009~0.490        | 2400/F(kHz)                       |
| 0.490~1.705        | 2400/F(kHz)                       |
| 1.705~30           | 30                                |
| 30-88              | 100                               |
| 88-216             | 150                               |
| 216-960            | 200                               |
| Above 960          | 500                               |

#### Remark:

- 1. In the above table, the tighter limit applies at the band edges.
- 2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

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## 9.4 Radiated Spurious Emission Test Data

## 9.4.1Measurement results: frequency range from 9kHz to 30MHz

| Frequency | Detection value | Factor | Reading | Value         | Limit         | Tolerance |
|-----------|-----------------|--------|---------|---------------|---------------|-----------|
|           |                 |        |         |               | @ 3m          |           |
| (MHz)     |                 | (dB/m) | (dBµV)  | $(dB\mu V/m)$ | $(dB\mu V/m)$ | (dB)      |
| 2.14      | QP              | 21.39  | 31.42   | 52.81         | 69.54         | -16.73    |
| 15.71     | QP              | 22.25  | 17.93   | 40.18         | 69.54         | -29.36    |
| 20.11     | QP              | 22.19  | 13.87   | 36.06         | 69.54         | -33.48    |

## 9.4.2 Measurement Results: Frequencies Equal to or Less than 1 GHz

The test was performed on EUT under GFSK mode. The worst case occurred at GFSK mode at Middle channel

**EUT** : SCD630H

Worst Case : GFSK mode at Middle channel

| Antenna    | Freq.  | Receiver | Corr.  | Reading | Corrected | Limit    | Margin |
|------------|--------|----------|--------|---------|-----------|----------|--------|
| Polarized  |        |          | Factor |         | Level     | @ 3 m    |        |
| (V/H)      | (MHz)  | Detector | (dB/m) | (dBuV)  | (dBuV/m)  | (dBuV/m) | (dB)   |
| Vertical   | 45.52  | QP       | 16.88  | 17.32   | 34.20     | 40.00    | -5.80  |
| Vertical   | 191.02 | QP       | 13.98  | 10.55   | 24.53     | 43.50    | -18.97 |
| Vertical   | 288.02 | QP       | 17.06  | 11.12   | 28.18     | 46.00    | -17.82 |
| Vertical   | 577.08 | QP       | 23.69  | 4.42    | 28.11     | 46.00    | -17.89 |
| Vertical   | 672.14 | QP       | 25.15  | 4.32    | 29.47     | 46.00    | -16.53 |
| Vertical   | 769.14 | QP       | 26.83  | 4.22    | 31.05     | 46.00    | -14.95 |
| Horizontal | 191.02 | QP       | 16.00  | 7.53    | 23.53     | 43.50    | -19.97 |
| Horizontal | 288.02 | QP       | 17.70  | 8.35    | 26.05     | 46.00    | -19.95 |
| Horizontal | 383.08 | QP       | 19.37  | 7.44    | 26.81     | 46.00    | -19.19 |
| Horizontal | 518.88 | QP       | 21.75  | 8.23    | 29.98     | 46.00    | -16.02 |
| Horizontal | 672.14 | QP       | 24.44  | 5.48    | 29.92     | 46.00    | -16.08 |
| Horizontal | 769.14 | QP       | 26.14  | 7.12    | 33.26     | 46.00    | -12.74 |

Remark: 1. Corr. Factor = Antenna Factor + Cable Loss

<sup>2.</sup> Corrected Level = Reading + Corr. Factor





## 9.4.3 Measurement Results: Frequency above 1GHz

EUT : SCD630H

|            | Frequency | Spectrum | Ant.  | Preamp. | Correction | Reading | Corrected     | Limit         | Margin |
|------------|-----------|----------|-------|---------|------------|---------|---------------|---------------|--------|
| Mode       |           | Analyzer | Pol.  | Gain    | Factor     |         | Reading       | @ 3 m         |        |
|            | (MHz)     | Detector | (H/V) | (dB)    | (dB/m)     | (dBµV)  | $(dB\mu V/m)$ | $(dB\mu V/m)$ | (dB)   |
|            | 4818      | PK       | V     | 40.11   | -0.06      | 52.85   | 52.79         | 74.00         | -21.21 |
| GFSK       | 7227      | PK       | V     | 38.09   | 8.16       | 40.58   | 48.74         | 74.00         | -25.26 |
| Ch Low     | 4818      | PK       | Н     | 40.11   | -0.06      | 50.40   | 50.34         | 74.00         | -23.66 |
|            | 7227      | PK       | Н     | 38.09   | 8.16       | 38.21   | 46.37         | 74.00         | -27.63 |
|            | 4878      | PK       | V     | 40.00   | 0.14       | 54.84   | 54.98         | 74.00         | -19.02 |
| GFSK<br>Ch | 4878      | AV       | V     | 40.00   | 0.14       | 44.61   | 44.75         | 54.00         | -9.25  |
| Middle     | 7317      | PK       | V     | 38.01   | 8.44       | 41.63   | 50.07         | 74.00         | -23.93 |
| Wilduic    | 4878      | PK       | Н     | 40.00   | 0.14       | 50.56   | 50.70         | 74.00         | -23.30 |
| GFSK       | 4932      | PK       | V     | 39.90   | 0.32       | 50.33   | 50.65         | 74.00         | -23.35 |
| Ch High    | 4932      | PK       | Н     | 39.90   | 0.32       | 47.22   | 47.54         | 74.00         | -26.46 |

#### Remark:

- 1. Correction Factor = Antenna Factor + Cable Loss- Preamp. Gain
- 2. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

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## 10. Emission on the Band Edge §FCC 15.247(d)

Radiated emissions were invested cover the frequency range from 30 MHz to 1000 MHz using a receiver RBW of 120 kHz record QP reading, and the frequency over 1 GHz using a spectrum analyzer RBW of 1 MHz and 10 Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz / 3MHz; RBW / VBW) recorded also on the report.

## **10.1 Operating Environment**

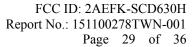
| Temperature:          | 25       | $^{\circ}$ C |
|-----------------------|----------|--------------|
| Relative Humidity:    | 50       | %            |
| Atmospheric Pressure: | 1008     | hPa          |
| Test Date:            | Nov. 24, | , 2015       |

## 10.2 Test Setup & Procedure

Please refer to the section 9.2 of this report.

#### **10.3 Test Results**

|   | Frequency | Spectrum | Ant.  | Correction | Reading | Corrected     | Limit         | Margin |             |
|---|-----------|----------|-------|------------|---------|---------------|---------------|--------|-------------|
| Mode                                    |           | Analyzer | Pol.  | Factor     |         | Reading       | @ 3 m         |        | band        |
|   | (MHz)     | Detector | (H/V) | (dB/m)     | (dBµV)  | $(dB\mu V/m)$ | $(dB\mu V/m)$ | (dB)   | (MHz)       |
|   | 2389.44   | PK       | V     | 33.85      | 36.83   | 70.68         | 74            | -3.32  | 2310~2390   |
| GFSK<br>(Fixed                          | 2389.20   | AV       | V     | 33.85      | 15.95   | 49.80         | 54            | -4.20  | 2310~2390   |
| (Fixed channel)                         | 2483.60   | PK       | V     | 34.30      | 35.66   | 69.96         | 74            | -4.04  | 2483.5~2500 |
| , | 2483.80   | AV       | V     | 34.30      | 16.05   | 50.35         | 54            | -3.65  | 2465.5~2500 |



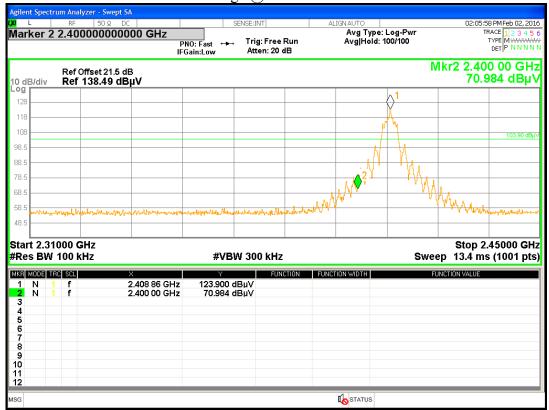


Frequency Spectrum Ant. Correction Reading Corrected Restricted Limit Margin band Mode Analyzer Pol. Factor Reading @ 3 m  $(dB\mu V) (dB\mu V/m) (dB\mu V/m)$ Detector (H/V) (MHz) (MHz) (dB/m)(dB) -9.58 2385.60 V PK 33.83 30.59 64.42 74 2310~2390 **GFSK** 2383.55 AV V 50.71 54 -3.29 33.82 16.89 (Hopping 2491.10 PK V 34.34 26.52 74 60.86 -13.14 mode) 2483.5~2500 2483.50 AV 54 -1.07 V 34.30 18.63 52.93

| Mode            | Frequency<br>(MHz) | Spectrum<br>Analyzer<br>Detector | Reading | Limit<br>(dBµV) |
|-----------------|--------------------|----------------------------------|---------|-----------------|
| GFSK            | 2400.00            | PK                               | 70.98   | 103.90          |
| (Fixed channel) | 2483.50            | PK                               | 59.31   | 103.28          |
| GFSK            | 2400.00            | PK                               | 70.02   | 105.69          |
| (Hopping mode)  | 2483.50            | PK                               | 55.69   | 105.87          |



Band Edge @ Fix Low channel

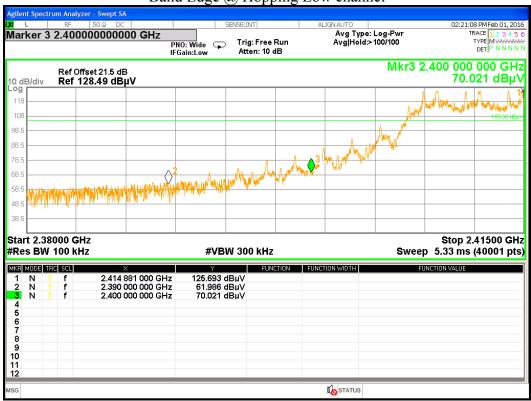


Band Edge @ Fix High channel





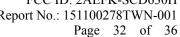
Band Edge @ Hopping Low channel



Band Edge @ Hopping High channel







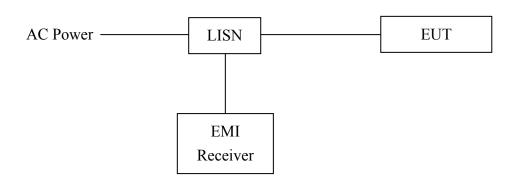


#### 11.1 Operating Environment

Intertek

| Temperature:         | 24       | $^{\circ}\!\mathbb{C}$ |
|----------------------|----------|------------------------|
| Relative Humidity:   | 48       | %                      |
| Atmospheric Pressure | 1008     | hPa                    |
| Test Date:           | Dec. 01, | 2015                   |

#### 11.2 Test Setup & Procedure



#### The test procedure was according to ANSI C63.10:2013.

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm/50uH coupling impedance with 50 ohm termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9 kHz.

The EUT configuration refers to the "Conducted set-up photo.pdf".

#### 11.3 Emission Limit

| Freq.     | Conducted Limit (dBuV) |          |  |  |  |
|-----------|------------------------|----------|--|--|--|
| (MHz)     | Q.P.                   | Ave.     |  |  |  |
| 0.15~0.50 | 66 – 56*               | 56 – 46* |  |  |  |
| 0.50~5.00 | 56                     | 46       |  |  |  |
| 5.00~30.0 | 60                     | 50       |  |  |  |

<sup>\*</sup>Decreases with the logarithm of the frequency.





11.4 Power Line Conducted Emission Test Data

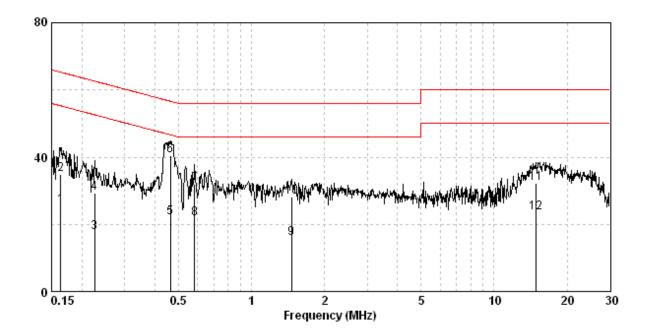
Phase: Live Line
Model No.: SCD630H
Test Condition: TX mode

| Frequency<br>(MHz) | Corr.<br>Factor<br>(dB) | Level<br>Qp<br>(dBuV) | Limit<br>Qp<br>(dBuV) | Level<br>Av<br>(dBu∀) | Limit<br>Av<br>(dBuV) | Over I<br>(di |        |
|--------------------|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------|--------|
| (MAZ)              | (ab)                    | (abay)                | (abay)                | (abar)                | (abar)                | Qр            | ΔV     |
| 0.163              | 9.95                    | 34.88                 | 65.30                 | 25.59                 | 55.30                 | -30.42        | -29.71 |
| 0.226              | 9.95                    | 29.26                 | 62.61                 | 17.58                 | 52.61                 | -33.35        | -35.03 |
| 0.464              | 9.94                    | 40.31                 | 56.63                 | 21.90                 | 46.63                 | -16.31        | -24.72 |
| 0.582              | 9.94                    | 31.83                 | 56.00                 | 21.55                 | 46.00                 | -24.17        | -24.45 |
| 1.464              | 9.96                    | 28.14                 | 56.00                 | 15.79                 | 46.00                 | -27.86        | -30.21 |
| 14.828             | 10.50                   | 32.31                 | 60.00                 | 23.45                 | 50.00                 | -27.69        | -26.55 |

## Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)

2. Over Limit (dBuV) – Limit (dBuV) – Limit (dBuV)





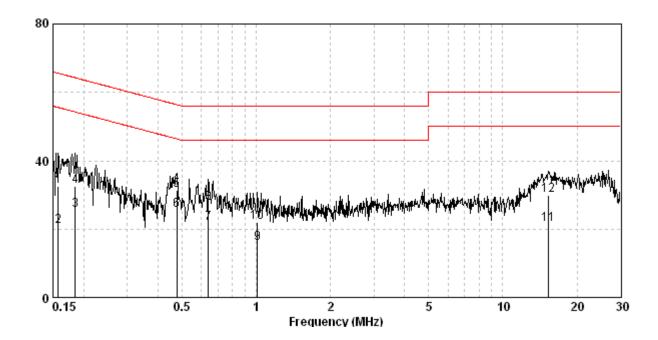


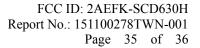
Phase: Neutral Line
Model No.: SCD630H
Test Condition: TX mode

| Frequency<br>(MHz) | Corr.<br>Factor<br>(dB) | Level<br>Qp<br>(dBuV) | Limit<br>Qp<br>(dBuV) | Level<br>Av<br>(dBuV) | Limit<br>Av<br>(dBuV) | Over I<br>(dl<br>Qp |        |
|--------------------|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------|--------|
| 0.157              | 9.94                    | 32.48                 | 65.60                 | 20.84                 | 55.60                 | -33.13              | -34.77 |
| 0.184              | 9.93                    | 32.57                 | 64.28                 | 25.37                 | 54.28                 | -31.71              | -28.91 |
| 0.476              | 9.93                    | 31.23                 | 56.41                 | 25.42                 | 46.41                 | -25.18              | -20.99 |
| 0.641              | 9.93                    | 27.57                 | 56.00                 | 21.69                 | 46.00                 | -28.43              | -24.31 |
| 1.010              | 9.93                    | 21.95                 | 56.00                 | 15.85                 | 46.00                 | -34.05              | -30.15 |
| 15.307             | 10.55                   | 29.75                 | 60.00                 | 21.44                 | 50.00                 | -30.25              | -28.56 |

## Remark:

- 1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
- 2. Over Limit (dB) = Level (dBuV) Limit (dBuV)

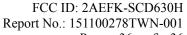




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Appendix A: Test equipment list

| Equipment                            | Brand                          | Model No.              | Serial No.    | Calibration<br>Date | Next<br>Calibration<br>Date |
|--------------------------------------|--------------------------------|------------------------|---------------|---------------------|-----------------------------|
| ESCI EMI Test<br>Receiver            | Rohde & Schwarz                | ESCI                   | 100018        | 2015/12/02          | 2016/11/30                  |
| Spectrum Analyzer                    | Rohde & Schwarz                | FSP30                  | 100137        | 2015/08/18          | 2016/08/16                  |
| Horn Antenna (1-18G)                 | Schwarzbeck                    | BBHA 9120 D            | 9120D-456     | 2014/08/29          | 2017/08/27                  |
| Horn Antenna<br>(14-42G)             | SHWARZBECK                     | BBHA 9170              | BBHA9170159   | 2014/09/16          | 2017/09/14                  |
| Broadband Antenna                    | Schwarzbeck                    | VULB 9168              | 9168-172      | 2013/08/08          | 2016/08/06                  |
| Power Meter                          | Anritsu                        | ML2495A                | 0844001       | 2015/11/11          | 2016/11/09                  |
| Power Senor                          | Anritsu                        | MA2411B                | 0738452       | 2015/11/11          | 2016/11/09                  |
| Two-Line V-Network                   | Rohde & Schwarz                | ESH3-Z5                | 838979/014    | 2015/10/07          | 2016/10/05                  |
| Signal Analyzer                      | Agilent                        | N9030A                 | MY51380492    | 2015/09/21          | 2016/09/19                  |
| Active Loop Antenna                  | SCHWARZBECK<br>MESS-ELEKTRONIC | FMZB1519               | 1519-067      | 2015/04/30          | 2016/04/28                  |
| EMI Test Receiver                    | Rohde & Schwarz                | ESR-7                  | 101232        | 2015/12/02          | 2016/11/30                  |
| High Pass Filter (3~18G)             | Wainwright                     | WHKX3.0/18G-12SS       | N/A           | 2015/06/06          | 2016/06/04                  |
| CON-1 Cable                          | SUHNER                         | BNC / RG-58            | 1521946       | 2015/05/09          | 2016/05/07                  |
| Pre-Amplifier(1-26.5G)               | EMC Co.                        | EMC12635SE             | 980205        | 2015/10/07          | 2016/10/05                  |
| 966-2(A) Cable                       | SUHNER                         | SMA / EX 100           | N/A           | 2015/05/06          | 2016/05/04                  |
| 966-2(B) Cable                       | JUNFLON                        | SMA /<br>J12J100880-00 | AUG-26-08-002 | 2015/05/09          | 2016/05/07                  |
| RF Cable                             | SUHNER                         | SUCOFLEX 102           | CB0006        | 2015/05/06          | 2016/05/04                  |
| 966-2_3m<br>Semi-Anechoic<br>Chamber | 966_2                          | CEM-966_2              | N/A           | 2015/02/24          | 2016/02/23                  |
| Bra                                  | nd                             | Test Software          |               | Version             |                             |
| АΓ                                   | )T                             | Radiated test          | system        | 7.5                 | .14                         |
| Auc                                  | lix                            | e3                     |               | 4.2004              | -1-12k                      |



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## **Appendix B: Measurement Uncertainty**

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

| Item   | Uncertainty |
|--|-------------|
| Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m  | 5.15 dB     |
| Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m  | 5.23 dB     |
| Vertically polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m  | 4.19 dB     |
| Horizontally polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m  | 4.3 dB      |
| Vertically polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m   | 4.19 dB     |
| Horizontally polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m                                       | 4.3 dB      |
| Conducted Output power   | 0.86 dB     |
| Radiated electromagnetic disturbances in the frequency range from 9kHz to 30MHz  | 2.92 dB     |
| Conducted disturbance measurements at a mains port from 9 kHz to 30 MHz using a 50 $\Omega$ /50 $\mu$ H +5 $\Omega$ artificial mains network (AMN) | 2.5 dB      |