# Deqing Sideli Electrical lamp decoration Co.,Ltd.

## Remote control

Model: TPC109

December 19, 2011

Report No.: 11021467-TX
(This report supersedes NONE)


| Modifications made to the product : None |
|---|

| This Test Report is Issued Under the Authority of: | |
|---|---|
| Deon Dai | Alex Liu |
| **Deon Dai**<br>**Compliance Engineer** | **Alex Liu**<br>**Technical Director** |

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Test result presented in this test report is applicable to the representative sample only.

RF Test Report
TO: FCC 15.231:2011
SIEMIC, INC.
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# Laboratory Introduction

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| Country/Region | Accreditation Body | Scope |
|---|---|---|
| USA | FCC, A2LA | EMC , RF/Wireless , Telecom |
| Canada | IC, A2LA, NIST | EMC, RF/Wireless , Telecom |
| Taiwan | BSMI , NCC , NIST | EMC, RF, Telecom , Safety |
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## Accreditations for Product Certifications

| Country | Accreditation Body | Scope |
|---|---|---|
| USA | FCC TCB, NIST | EMC , RF , Telecom |
| Canada | IC FCB , NIST | EMC , RF , Telecom |
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| Japan | MIC, (RCB 208) | RF , Telecom |
| HongKong | OFTA (US002) | RF , Telecom |

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# CONTENTS

# 1 Executive Summary & EUT information

The purpose of this test programme was to demonstrate compliance of the Deqing Sideli Electrical lamp decoration Co.,Ltd., Remote control , and model: TPC109 against the current Stipulated Standards. The Remote control has demonstrated compliance with the FCC 15.231: 2011.

## EUT Information

| | |
|---|---|
| EUT Description | Remote control |
| Model No | TPC109 |
| Serial No | N/A |
| Input Power | Alkaline battery 23A 12V (1Pcs) |
| Classification Per Stipulated Test Standard | FCC 15.231: 2011 |

# 2 TECHNICAL DETAILS

| | |
|---|---|
| Purpose | Compliance testing of Remote control with stipulated standard |
| Applicant / Client | Deqing Sideli Electrical lamp decoration Co.,Ltd. Leidian Industry area Deqing county Zhejiang Province, China |
| Manufacturer | Deqing Sideli Electrical lamp decoration Co.,Ltd. Leidian Industry area Deqing county Zhejiang Province, China |
| Laboratory performing the tests | SIEMIC Nanjing (China) Laboratories NO.2-1,Longcang Dadao, Yuhua Economic Development Zone, Nanjing, China Tel:+86(25)86730128/86730129 Fax:+86(25)86730127 Email:info@siemic.com |
| Test report reference number | 11021467-TX |
| Date EUT received | November 28, 2011 |
| Standard applied | FCC 15.231: 2011 |
| Dates of test | December 8, 2011 |
| No of Units : | 1# |
| Equipment Category : | DSC |
| Trade Name : | N/A |
| Model : | TPC109 |
| RF Operating Frequency (ies) | TX-433.95MHz |
| Number of Channels : | 1 |
| Modulation : | ASK |
| FCC ID： | A65-TPC109 |

# 3 MODIFICATION

**NONE**

# 4 TEST SUMMARY

The product was tested in accordance with the following specifications.
All testing has been performed according to below product classification:

**Test Results Summary**

| Test Standard | Description | Pass / Fail |
|---|---|---|
| CFR 47 Part 15.231: 2011 | | |
| 15.203 | Antenna Requirement | Pass |
| 15.207 | Conducted Emissions Voltage | N/A |
| 15.231(b) | Fundamental & Radiated Spurious Emission | Pass |
| 15.231(c) | 20dB Bandwidth | Pass |
| 15.231(a)(1) | Deactivation | Pass |
| ANSI C63.4: 2009<br><br>PS: All measurement uncertainties are not taken into consideration for all presented test result.<br><br>Preliminary radiated emission testing has been performed on X, Y, Z axis, only worst case test result is presented in this test report. | | |

# 5 MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

## 5.1 Antenna Requirement

**Requirement(s):** 47 CFR §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna requirement must meet at least one of the following:

a) Antenna must be permanently attached to the device.

b) Antenna must use a unique type of connector to attach to the device.

c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.

The antenna is permanently attached to the device which meets the requirement.

## 5.2 Conducted Emissions Voltage

Requirement:

| Frequency of emission (MHz) | Conducted limit (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15–0.5 | 66 to 56* | 56 to 46* |
| 0.5–5 | 56 | 46 |
| 5–30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

**Procedures:**

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR and Average detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is ±3.5dB.
4. Environmental Conditions

| | |
|---|---|
| Temperature | 23°C |
| Relative Humidity | 50% |
| Atmospheric Pressure | 1019mbar |

5. Test date : N/A
   Tested By : Deon Dai

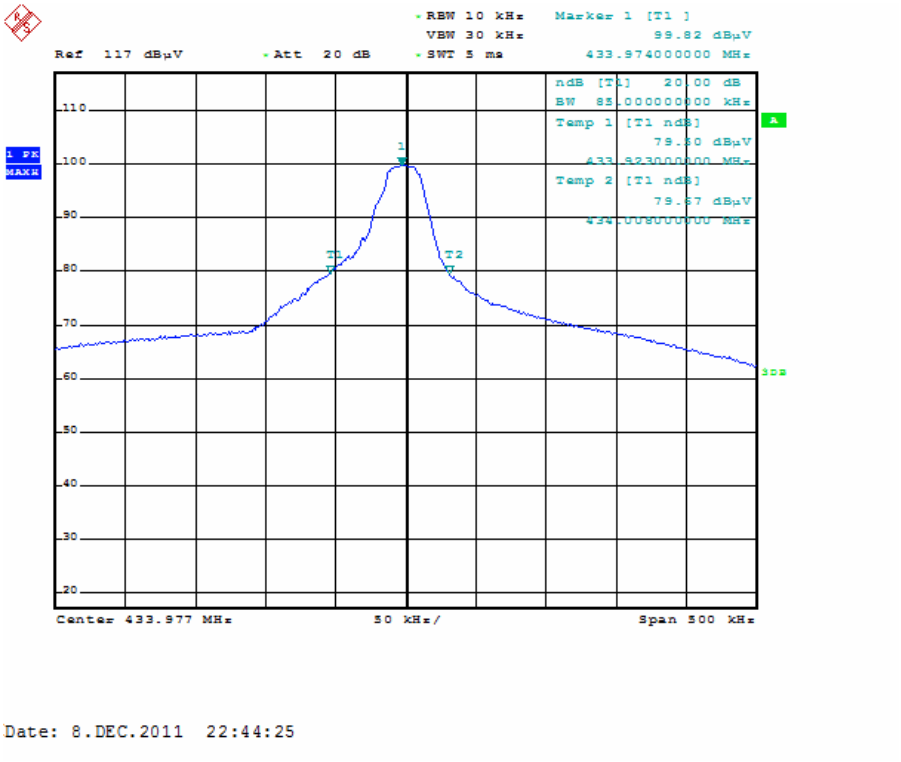
Test result: N/A (Batteries operated)

## 5.3 20dB Occupied Bandwidth

1. 20dB bandwidth was measured by conducted method using a spectrum analyzer.
2. Environmental Conditions
   - Temperature 23°C
   - Relative Humidity 51%
   - Atmospheric Pressure 1009mbar
3. Test Date: December 8, 2011
   Test By: Deon Dai

**Test Result:**

| Fundamental Frequency (MHz) | Measured 20dB Bandwidth (KHz) | FCC 15.231 Limit (KHz) | Result |
|---|---|---|---|
| 433.9 | 85 | 1084.875 | Pass |




**Note: The signal bandwidth was measured and less then 100 KHz RBW so PDCF factor is not required to correct the fundamental signal peak result.**

## 5.4 Radiated Fundamental and Spurious Emission

1. Radiated emissions were measured according to ANSI C63.4. The EUT was set 3 meter away from the measuring antenna. The loop antenna was positioned 1meter above the ground from the center of the loop. The measuring bandwidth was set to 10KHz. All possible modes of operation were investigated. Only the worst case emissions measured, All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Sample Calculation: Corrected Amplitude=Raw Amplitude(dBuV/m)+ACF(dB)+Cable Loss(dB)-Distance Correction Factor.
   Sample Calculation:
   1) Corrected Amplitude= Raw Amplitude(dBuV/m)+ACF(dB)+Cable Loss(dB)-Distance Correction Factor
   2) Average = peak reading + 20log(duty cycle)
4. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz( QP only3m & 10m) is +5.6/-4.5dB(for EUTs<0.5m×0.5m×0.5m).In range of 1-40GHz) is ±3.6dB.
5. Environmental Conditions

| | |
|---|---|
| Temperature | 23°C |
| Relative Humidity | 51% |
| Atmospheric Pressure | 1009mbar |

6. Test date : December 8, 2011
   Tested By : Deon Dai

**Standard Requirement:**

| Fundamental frequency (MHz) | Field strength of fundamental (microvolts/meter) | Field strength of spurious emissions (microvolts/meter) |
|---|---|---|
| 40.66-40.70 | 2250 | 225 |
| 70-130 | 1250 | 125 |
| 130-174 | 1250 to 3750 | 125 to 375 |
| 174-260 | 3750 | 375 |
| 260-470 | 3750-12500 | 375 to 1250 |
| Above 470 | 12500 | 1250 |

Note: All 3 axes have been investigated. Only worst case is presented in the test report.

**Test Result: Pass**

**Fundamental Measurement @ 433.95MHz @3 Meter FCC 15.231(a)**

| Frequency (MHz) | Reading (dBuV) | turntable Azimuth | Ant. Polarity | Ant. Height(cm) | Factors(dB) | Correct. (dBuV/m) | FCC 15.231(a) Limit (dBuV) | Margin (dB) | Comments |
|---|---|---|---|---|---|---|---|---|---|
| 433.95 | 57.44 | 170.00 | V | 100.00 | -27.53 | 84.97 | 100.8 | -15.83 | Peak |
| 433.95 | / | / | V | / | / | 79.32 | 80.8 | -1.48 | Ave |
| 433.95 | 51.74 | 136.00 | H | 380.00 | -27.09 | 78.83 | 100.8 | -21.97 | Peak |
| 433.95 | / | / | H | / | / | 73.18 | 80.8 | -7.62 | Ave |

**Spurious Emissions (＜1GHz) Measurement @ 3 Meter FCC 15.231(a)**

| Frequency (MHz) | Reading (dBuV) | turntable Azimuth | Ant. Polarity | Ant. Height(cm) | Factors(dB) | Correct. (dBuV/m) | FCC 15.231(a) Limit (dBuV) | Margin (dB) | Comments |
|---|---|---|---|---|---|---|---|---|---|
| 867.8 | 46.76 | 62.20 | V | 100.00 | -16.26 | 63.02 | 80.8 | -17.78 | Peak |
| 867.8 | / | / | V | / | / | 57.37 | 60.8 | -3.43 | Ave |
| 867.8 | 48,02 | 208.20 | H | 200.00 | -15.86 | 63.88 | 80.8 | -16.92 | Peak |
| 867.8 | / | / | H | / | / | 58.23 | 60.8 | -2.57 | Ave |

Notes: 1. Duty cycle is 52.17%, 20log (duty cycle) = -5.65dB correction was used to determine the average level from the peak reading. Average = peak reading + 20log (duty cycle),
Final Average= peak reading-5.65dB

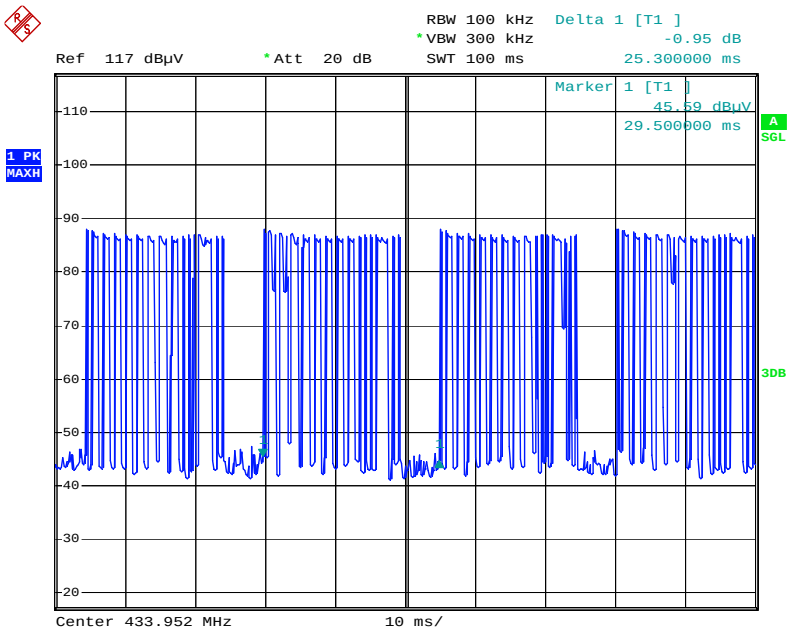
2. All the data measurement of peak values.
3. FCC Limit for Average Measurement=41.6667(433.95)-7083.3333=10997.9312 μ V/m=80.8dB μ V/m
4. Average pulsed signal over one complete pulse train or 100 ms time frame if pulse train exceeds 100 ms
5. Maximum average in 100 ms
6. Calculate duty cycle for pulse train or 100 ms
7. Duty cycle = (t1 + t2 + t3+…tn)/T where tn = pulse width, T = pulse train length or 100 ms

## Spurious Emissions (＞1GHz) Measurement @ 3 Meter FCC 15.231(a)

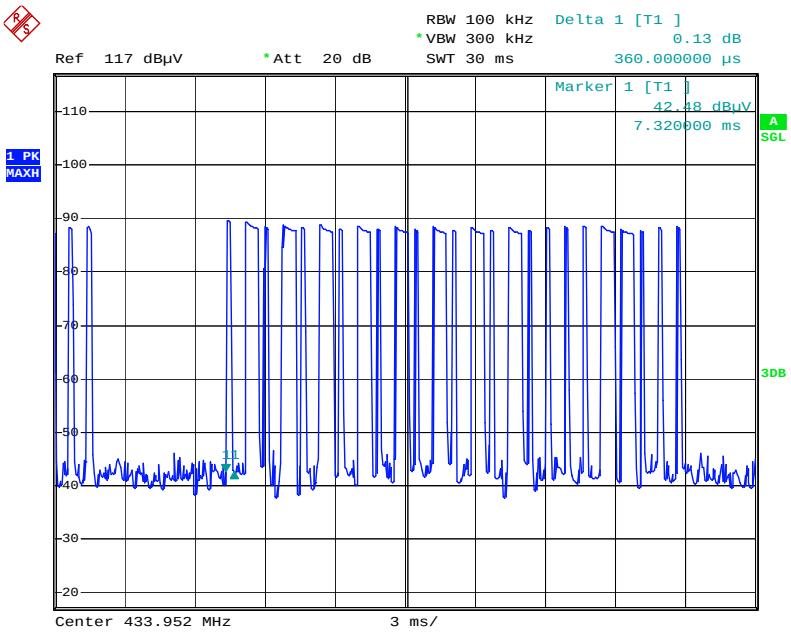
| Frequency | Reading | turntable Azimuth | Ant. Polarity | Ant. Height | Factors | Correct. | FCC 15.231 Limit | Margin | Comments |
|---|---|---|---|---|---|---|---|---|---|
| GHz | (dBuV) | (degree) | H/V | (m) | (dB) | (dBuV/m) | (dBuV) | (dB) | |
| 1.302 | 29.69 | 231 | H | 3.06 | -22.47 | 52.16 | 80.8 | -28.64 | Peak |
| 1.302 | / | / | H | / | / | 46.51 | 60.8 | -14.29 | Avg |
| 1.736 | 26.94 | 244 | H | 3.42 | -24.34 | 51.28 | 80.8 | -29.52 | Peak |
| 1.736 | / | / | H | / | / | 45.63 | 60.8 | -35.17 | Avg |
| 2.170 | 27.94 | 112 | H | 3.56 | -24.38 | 52.32 | 80.8 | -28.48 | Peak |
| 2.170 | / | / | H | / | / | 46.67 | 60.8 | -14.13 | Avg |
| 2.603 | 26.48 | 125 | H | 3.65 | -24.46 | 50.94 | 80.8 | -29.86 | Peak |
| 2.603 | / | / | H | / | / | 45.29 | 60.8 | -15.51 | Avg |
| 3.037 | 24.93 | 251 | H | 3.01 | -24.4 | 49.33 | 80.8 | -31.47 | Peak |
| 3.037 | / | / | H | / | / | 43.68 | 60.8 | -17.12 | Avg |
| 3.471 | 27.64 | 129 | H | 3.35 | -19.79 | 47.43 | 80.8 | -33.37 | Peak |
| 3.471 | / | / | H | / | / | 41.78 | 60.8 | -19.02 | Avg |
| 3.905 | 28.48 | 260 | H | 3.12 | -16.47 | 44.95 | 80.8 | -35.85 | Peak |
| 3.905 | / | / | H | / | / | 39.30 | 60.8 | -21.50 | Avg |
| 4.339 | 28.24 | 120 | H | 3.02 | -15.15 | 43.39 | 80.8 | -37.41 | Peak |
| 4.339 | / | / | H | / | / | 37.41 | 60.8 | -23.39 | Avg |
| 1.302 | 28.39 | 348 | V | 1.16 | -24.47 | 52.86 | 80.8 | -27.94 | Peak |
| 1.302 | / | / | V | / | / | 47.21 | 60.8 | -13.59 | Avg |
| 1.736 | 27.39 | 181 | V | 1.27 | -24.34 | 51.73 | 80.8 | -29.07 | Peak |
| 1.736 | / | / | V | / | / | 46.08 | 60.8 | -14.72 | Avg |
| 2.170 | 23.83 | 210 | V | 1.11 | -24.66 | 48.49 | 80.8 | -32.31 | Peak |
| 2.170 | / | / | V | / | / | 42.84 | 60.8 | -17.96 | Avg |
| 2.603 | 23.07 | 260 | V | 1.31 | -24.46 | 47.53 | 80.8 | -33.27 | Peak |
| 2.603 | / | / | V | / | / | 41.88 | 60.8 | -18.92 | Avg |
| 3.037 | 21.56 | 321 | V | 1.33 | -24.4 | 45.96 | 80.8 | -34.84 | Peak |
| 3.037 | / | / | V | / | / | 40.31 | 60.8 | -20.49 | Avg |
| 3.471 | 23.94 | 225 | V | 1.07 | -19.59 | 43.53 | 80.8 | -35.27 | Peak |
| 3.471 | / | / | V | / | / | 37.88 | 60.8 | -22.92 | Avg |
| 3.905 | 23.66 | 143 | V | 1.02 | -16.47 | 40.13 | 80.8 | -40.67 | Peak |
| 3.905 | / | / | V | / | / | 34.48 | 60.8 | -26.32 | Avg |
| 4.339 | 22.38 | 235 | V | 1.21 | -15.15 | 37.53 | 80.8 | -43.27 | Peak |
| 4.339 | / | / | V | / | / | 31.88 | 60.8 | -28.92 | Avg |

Note: Duty cycle is 52.17%, 20log (duty cycle) = -5.65dB correction was used to determine the average level from the peak reading. Average = peak reading + 20log (duty cycle), final Average= peak reading -5.65dB

Pulse Duty Cycle:
Wide Pulse: N/A
Middle Pulse: 0.78ms
Narrow Pulse: 0.36ms
Duty cycle= (0.36*15+0.78*10)/25.3*100% =52.17%
Average Duty Factor: 20*log (Duty Cycle) = -5.65dB




Date: 8.DEC.2011 22:05:30

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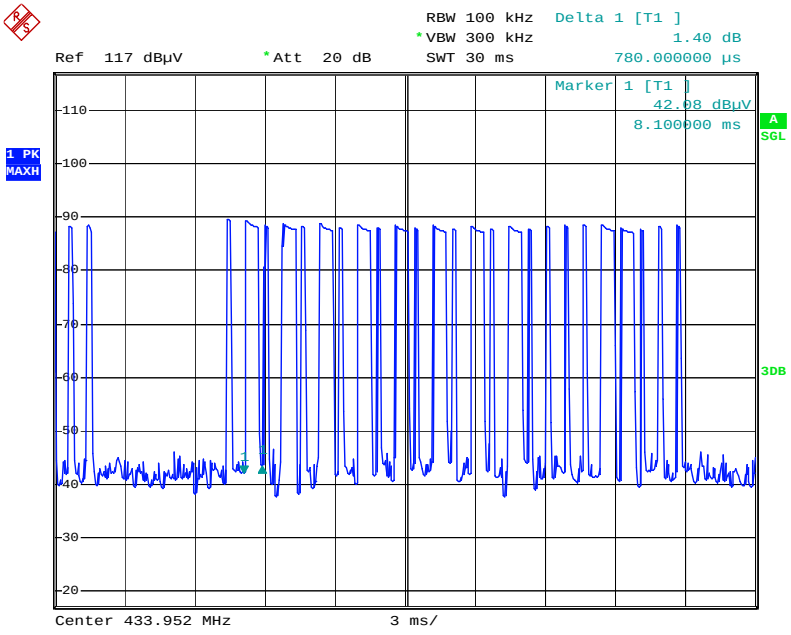



Date: 8.DEC.2011 22:11:00

# 5.5 Deactivation

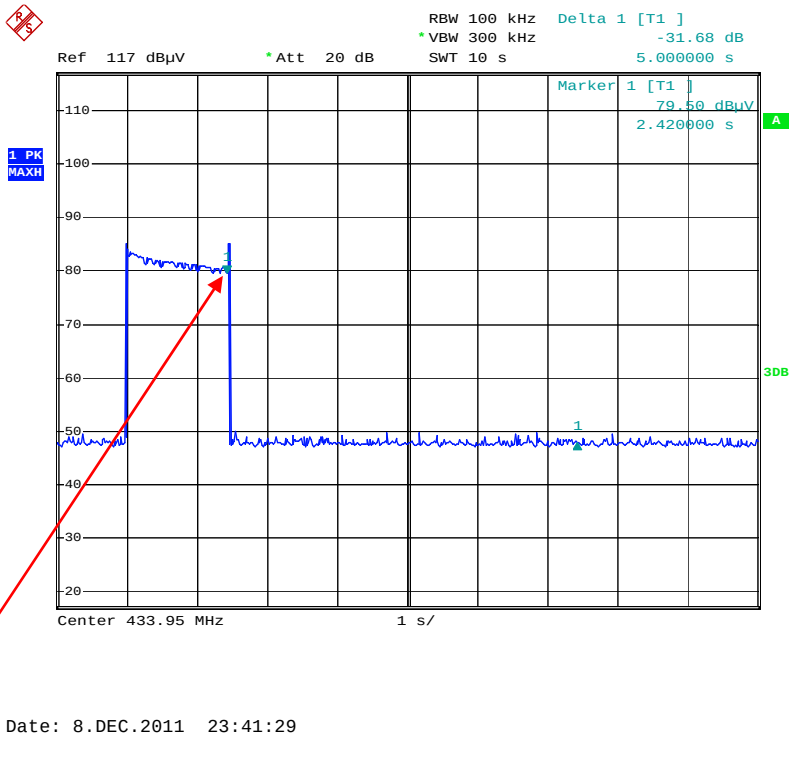
1. Deactivation was measured by conducted method using a spectrum analyzer.
2. Environmental Conditions

| | |
|---|---|
| Temperature | 23°C |
| Relative Humidity | 51% |
| Atmospheric Pressure | 1009mbar |

3. Test Data: December 8, 2011
   Test By: Deon Dai

Standard requirement: 47 CFR §15.231 (a)(1)
Release Time ＜5 seconds

Test Result: Pass




**Note: switch off.**

# Annex A. TEST INSTRUMENT & METHOD

## Annex A.i. TEST INSTRUMENTATION & GENERAL PROCEDURES

| Instrument | Manufacturer | Model | CAL Due Date |
|---|---|---|---|
| Spectrum Analyzer | HP | 8563 E | 2012.05.26 |
| EMI Receiver | Rohde & Schwarz | ESPI 3 | 2012.05.26 |
| Antenna (30MHz~2GHz) | Sunol Sciences | JB1 | 2012.10.04 |
| Horn Antenna (1~18GHz) | A-INFOMW | JXTXLB-10180 | 2012.10.04 |
| Horn Antenna (1~18GHz) | N/A | N/A | 2012.10.04 |
| Pre-Amplifier(0.01 ~ 1.3GHz) | HP | 8447F | 2012.05.26 |
| Pre-Amplifier(0.1 ~ 18GHz) | MITEQ | AMF-7D-00101800-30-10P | 2012.05.26 |

# Annex A.ii. CONDUCTED EMISSIONS TEST DESCRIPTION

**Test Set-up**

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B.

2. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.

3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.

4. All other supporting equipments were powered separately from another main supply.

**Test Method**

1. The EUT was switched on and allowed to warm up to its normal operating condition.

2. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.

3. High peaks, relative to the limit line, were then selected.

4. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 KHz. For FCC tests, only Quasi-peak measurements were made; while for CISPR/EN tests, both Quasi-peak and Average measurements were made.

5. Steps 2 to 4 were then repeated for the LIVE line (for AC mains) or DC line (for DC power).

## Sample Calculation Example

At 20 MHz limit = 250 μV = 47.96 dBμV

Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.20 dB

Q-P reading obtained directly from EMI Receiver = 40.00 dBμV
(Calibrated for system losses)

Therefore, Q-P margin = 47.96 – 40.00 = 7.96 i.e. **7.96 dB below limit**

# Annex A. iii. RADIATED EMISSIONS TEST DESCRIPTION

## EUT Characterisation

EUT characterisation, over the frequency range from 30MHz to 10th Harmonic, was done in order to minimise radiated emissions testing time while still maintaining high confidence in the test results.

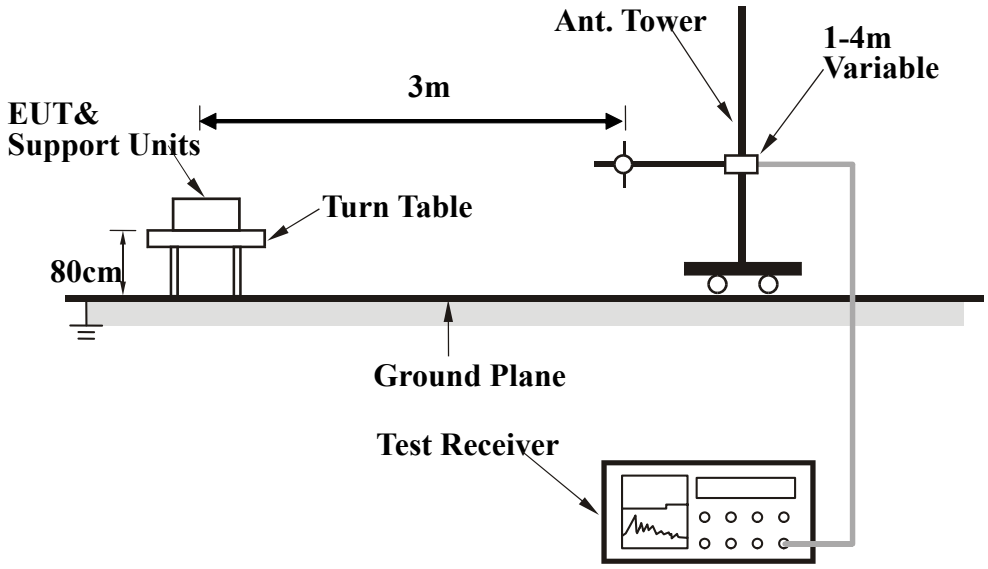
The EUT was placed in the chamber, at a height of about 0.8m on a turntable. Its radiated emissions frequency profile was observed, using a spectrum analyzer /receiver with the appropriate broadband antenna placed 3m away from the EUT. Radiated emissions from the EUT were maximised by rotating the turntable manually, changing the antenna polarisation and manipulating the EUT cables while observing the frequency profile on the spectrum analyzer / receiver. Frequency points at which maximum emissions occurred, clock frequencies and operating frequencies were then noted for the formal radiated emissions test at the Open Area Test Site (OATS).

### Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table.

2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.

3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.



## Test Method

The following procedure was performed to determine the maximum emission axis of EUT:
1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antenna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. So, the axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.

Final Radiated Emission Measurement
1. Setup the configuration according to figure 1. Turn on EUT and make sure that it is in normal function.

2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.

3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.

4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ◦ to 360 ◦ with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading.

5. Repeat step 4 until all frequencies need to be measured were complete.

6. Repeat step 5 with search antenna in vertical polarized orientations.

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

| Frequency Band (MHz) | Function | Resolution bandwidth | Video Bandwidth |
|---|---|---|---|
| 30 to 1000 | Peak | 100 kHz | 100 kHz |
| Above 1000 | Peak | 1 MHz | 1 MHz |
| | Average | 1 MHz | 10 Hz |

## Sample Calculation Example

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

Peak = Reading + Corrected Factor

where
Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)
And the average value is

Average = Peak Value + Duty Factor or
Set RBW = 1MHz, VBW = 10Hz.

Note:
If the measured frequencies are fall in the restricted frequency band, the limit employed must be quasi peak value when frequencies are below or equal to 1 GHz. And the measuring instrument is set to quasi peak detector function.

# Annex B. TEST SETUP AND SUPPORTING EQUIPMENT

## EUT TEST CONDITIONS

## Annex B. i. SUPPORTING EQUIPMENT DESCRIPTION

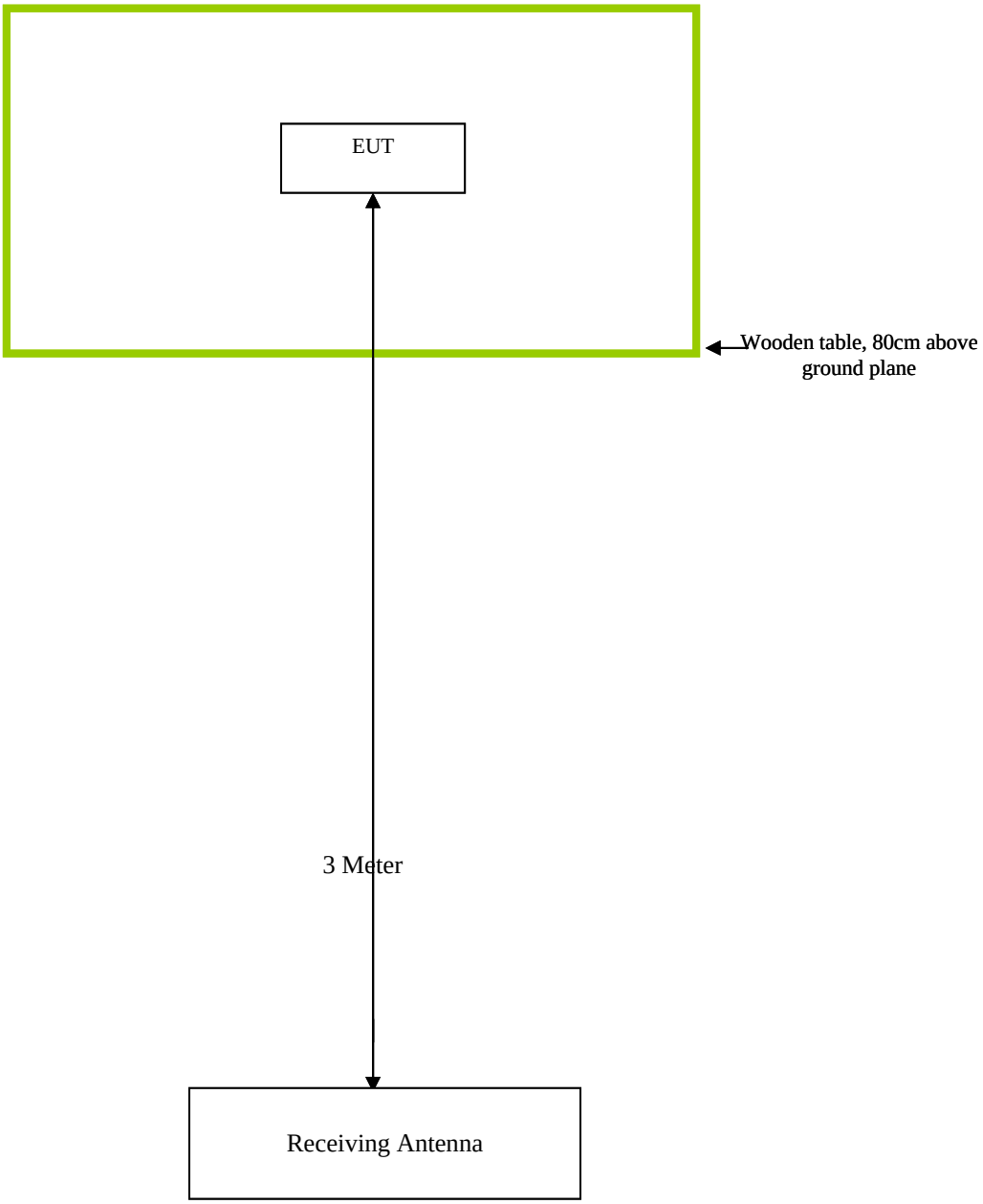
The following is a description of supporting equipment and details of cables used with the EUT.

| Equipment Description (Including Brand Name) | Model & Serial Number | Cable Description (List Length, Type & Purpose) |
|---|---|---|
| N/A | N/A | N/A |

## Block Configuration Diagram for Conducted Emission

**N/A**

## Block Configuration Diagram for Radiated Emission



## Annex B.ii. EUT OPERATING CONDITIONS

The following is the description of how the EUT is exercised during testing.

| Test | Description Of Operation |
|---|---|
| **Emissions Testing** | TX mode is continuous transmitting with full power. |

# Annex C. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PART LIST

**Please see attachment**