**CTK Co., Ltd.**
386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea
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# TEST REPORT For FCC

| | | |
|---|---|---|
| Test Report No. | : | 2007020038 |
| Date of Issue | : | March 16, 2007 |
| FCC ID | : | U5MSPP-R200 |
| Model/Type No. | : | SPP-u200vwxyz |
| Kind of Product | : | Thermal mobile printer |
| Applicant | : | BIXOLON Co., Ltd. |
| Applicant Address | : | A-5F, Digital Empire Bldg., 980-3 Yeongtong-Dong, Yeongtong-Gu, Suwon, Gyeonggi Korea |
| Manufacturer | : | BIXOLON Co., Ltd. |
| Manufacturer Address | : | A-5F, Digital Empire Bldg., 980-3 Yeongtong-Dong, Yeongtong-Gu, Suwon, Gyeonggi Korea |
| Contact Person | : | Chi young Ahn / Assitant Manager |
| Telephone | : | +82-31-218-5555 |
| Received Date | : | Febarury 22, 2007 |
| Test period | : | Start : Febarury 01, 2007 End : March 15, 2007 |
| Test Results | : | ☒ In Compliance ☐ Not in Compliance |

The test results presented in this report relate only to the object tested.

CTK Co., Ltd. is accredited by Korea Laboratory Accreditation Scheme (KOLAS) which signed the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA) for the above test item(s) and test method(s).

*Tested by*

Eun-Won, Lee
Test Engineer
Date: March 16, 2007

*Reviewed by*

Young-Joon, Park
Technical Manager
Date: March 16, 2007

# REPORT REVISION HISTORY

| Date | Revision | Page No |
|---|---|---|
| March 16, 2007 | Issued (2007020038) | All |
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# TABLE OF CONTENTS

# 1.0 General Product Description

| | |
|---|---|
| Equipment model name | : SPP-u200vwxyz |
| Serial number | : Prototype |
| EUT condition | : Pre-production, not damaged |
| Antenna type | : Chip antenna Gain 1.77dBi |
| Frequency Range | : 2402 ~ 2480 MHz |
| RF output power Range | : -6 dBm ~ +4 dBm (Class 2) |
| RF power | : 2.83 dBm - Conducted |
| Number of channels | : 79 |
| Channel Spacing | : 1 MHz |
| Channel Access Protocol | : Frequency Hopping |
| Type of Modulation | : GFSK |
| Power Source | : Internal Lithium-ion Battery(rechargeable battery) - 3.7 Vdc |

## 1.1 Tested Frequency

| | LOW | MID | HIGH |
|---|---|---|---|
| **Frequency (MHz)** | 2402 | 2441 | 2480 |

## 1.2 Model Differences

In the model name of SPP-u200vwxyz

u: means available paper type (<ex>label paper, receipt paper), It can be A-Z or blank.
v: means communication interface, It can be A-Z or blank.
w: means paper cut type,(ex. manual, cutter, peeler) It can be A-Z or blank.
x: means product color, It can be A-Z or blank.
yz: means additional accessory or optional function. It can be A-Z or blank.

## 1.3 Device Modifications

The following modifications were necessary for compliance:

Not applicable

## 1.4 Peripheral Devices

| Device | Manufacturer | Model No. | Serial No. | FCC ID or DoC |
|---|---|---|---|---|
| Personal Computer | Samsung Electronics Co,. Ltd. | DM-V60 | 493J96BLB00311Y | DoC |
| LCD Monitor | TIANJIN SAMSUNG ELCTRONICS DISPLAY | GH17US | N372HVEX225526 | DoC |
| Adaptor | Anam Instruments (Shen Zhen) Co., Ltd. | AP04214-UV | 0312103885AC | - |
| Keyboard (PS/2 type) | Hewlett-Packard Company | 5219 | BN5017686 | DoC |
| Mouse (PS/2 type) | KYE SYSTEMS CORP. | N3 Optical | K045205991 | DoC |

## 1.5 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

## 1.6 Test Facility

The measurement facility is located at 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea.

## 1.7 Laboratory Accreditations and Listings

| Country | Agency | Scope of Accreditation | Logo |
|---|---|---|---|
| USA | **FCC** | 3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements. | 93250 |
| JAPAN | **VCCI** | 10 meter Open Area Test Site and one conducted site. | R-948, C-986 |
| KOREA | **MIC** | EMI (10 meter Open Area Test Site and two conducted sites)<br>EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions) | No. 51, KR0025 |
| International | **KOLAS** | EMC | |
| Europe | **GLAS** | EMC<br>EN 55011, EN 55022, EN 61000-6-3, EN 61000-6-4, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, EN 61000-6-2, EN 50130-4, EN 55024, EN 61204-3, EN 60601-1-2, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11 | TÜV<br>No.13000796-02 |

## 2.0 Summary of tests

| FCC Part Section(s) | Parameter | Limit | Test Condition | Status (note 1) |
|---|---|---|---|---|
| 15.247(a) | Carrier Frequency Separation | > 25 kHz | Conducted | C |
| 15.247(a) | Number of Hopping Frequencies | > 75 hops | | C |
| 15.247(a) | 20 dB Bandwidth | < 1 MHz | | C |
| 15.247 | Dwell Time | < 0.4 seconds | | C |
| 15.247(b) | Transmitter Output Power | < 1Watt | | C |
| 15.247(d) | Conducted Spurious emission | > 20 dBc | | C |
| 15.247(d) | Band Edge | > 20 dBc | | C |
| 15.249 /15.209 | Field Strength of Harmonics | < 54 dBuV (at 3m) | Radiated | C |
| 15.207 /15.107 | AC Conducted Emissions | EN 55022 | Line Conducted | C |

*Note 1*: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

*Note 2*: The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:
- FCC Part 15.247, ANSI C63.4-2003

# 2.1 Transmitter Requirements

## 2.1.1 Carrier Frequency Separation

### Test Location

RF Test Room

### Test Procedures

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function enabled.
After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:
Span = 3 MHz (wide enough to capture the peaks of two adjacent channels)
RBW = 30 kHz (≥ 1% of the span) Sweep = auto
VBW = 30 kHz (≥ RBW) Detector function = peak
Trace = max hold

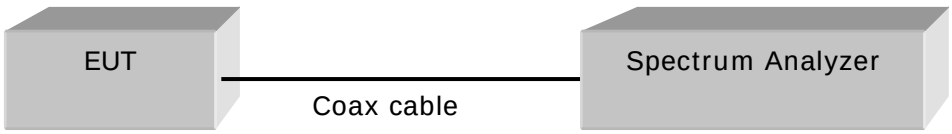



Figure 1 : Measurement setup for the carrier frequency seperation

### Limit

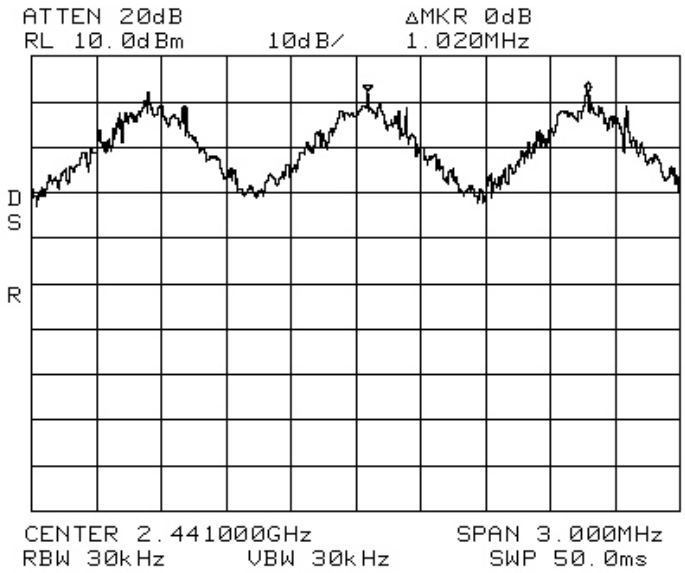
The EUT shall have hopping channel carrier frequencies separated minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

### Test Results

| Carrier Frequency Separation (MHz) | Result |
|---|---|
| 1.020 | Complies |

See next pages for actual measured spectrum plots.

## Carrier Frequency Separation



## 2.1.2 Number of Hopping Frequencies

### Test Location

RF Test Room

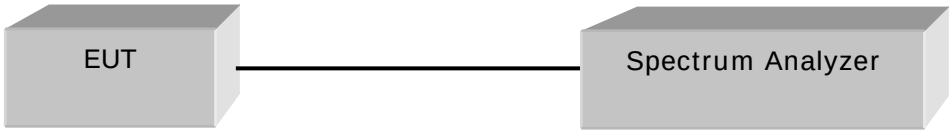
### Test Procedures

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to:

Frequency range 1:Start = 2389.5 MHz, Stop = 2439.5 MHz
2:Start = 2439.5 MHz, Stop = 2489.5 MHz

Span = 50 MHz
RBW = 300 kHz (≥ 1% of the span) Sweep = auto
VBW = 300 kHz (≥ RBW) Detector function = peak
Trace = max hold




### Limit

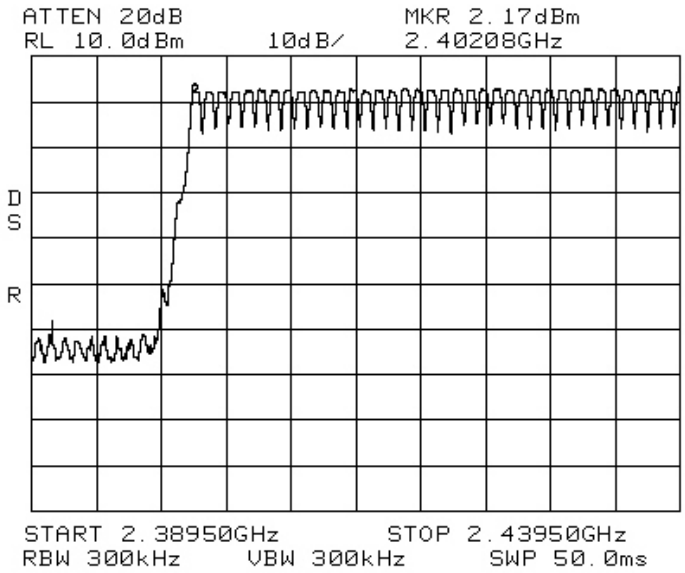
The EUT in the 2400-2483.5 MHz band shall use at least 75 channels.

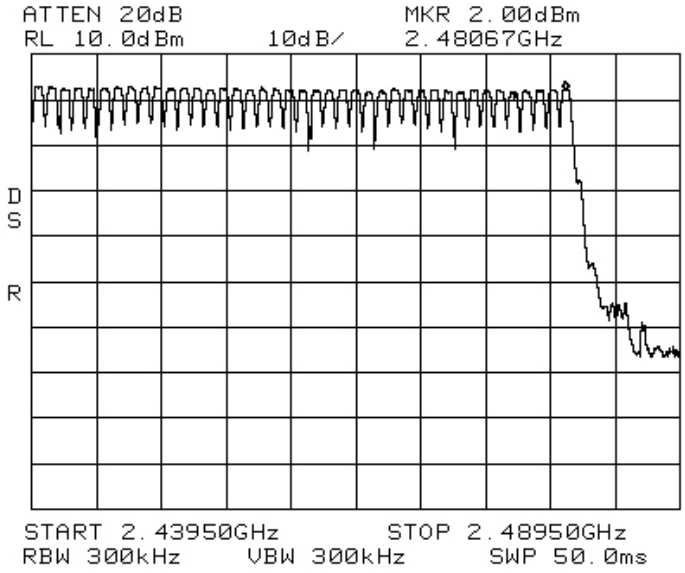
### Test Results

| Total number of Hopping Channels | Result |
|---|---|
| 79 | Complies |

See next pages for actual measured spectrum plots.

## Number of Hopping Frequencies



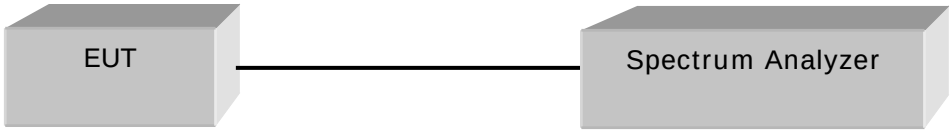
## 2.1.3 20 dB bandwidth

### Test Location
RF Test Room

### Test Procedures

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.
After the trace being stable, Use the marker-to peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

The spectrum analyzer is set to:
Center frequency = the highest, middle and the lowest channels
Span = 2 MHz (approximately 2 or 3 times of the 20 dB bandwidth)
RBW = 30 kHz (≥ 1% of the span) Sweep = auto
VBW = 30 kHz (≥ RBW) Detector function = peak
Trace = max hold




### Limit

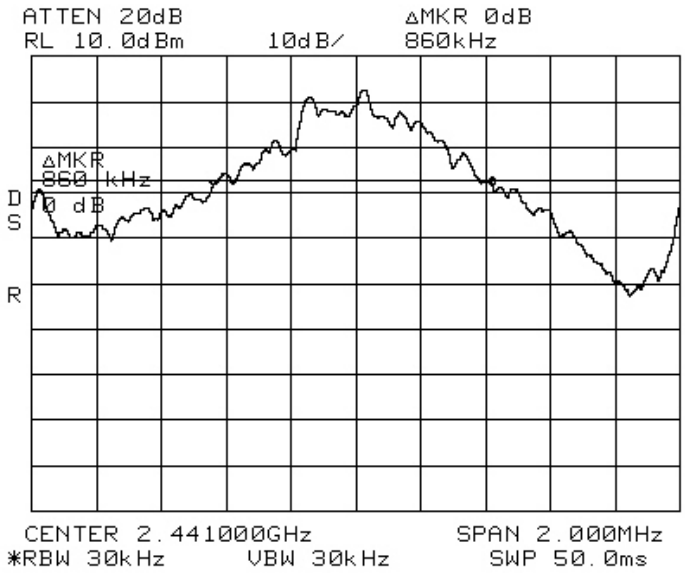
The Transmitter shall have a maximum 20 dB bandwidth of 1 MHz.

### Test Results

| Frequency (MHz) | Channel Number. | Measured Bandwidth (MHz) | Result |
|---|---|---|---|
| 2441 | 0 | 0.860 | Complies |

See next pages for actual measured spectrum plots.(worst case)

## 20 dB Bandwidth



## 2.1.4 Time of Occupancy (Dwell Time)

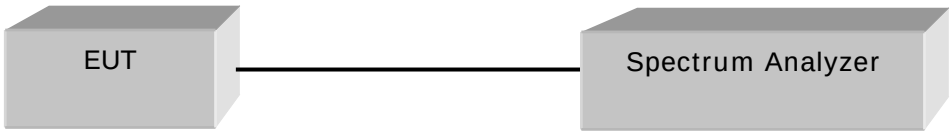
### Test Location

RF Test Room

### Test Procedures

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function enabled.

The spectrum analyzer is set to:
Center frequency = the highest, middle, and the lowest channels
Span = zero
RBW = 1 MHz Trace = max hold
VBW = 1 MHz (≥ RBW) Detector function = peak
Sweep = as necessary to capture the entire dwell time per hopping channel




### Limit

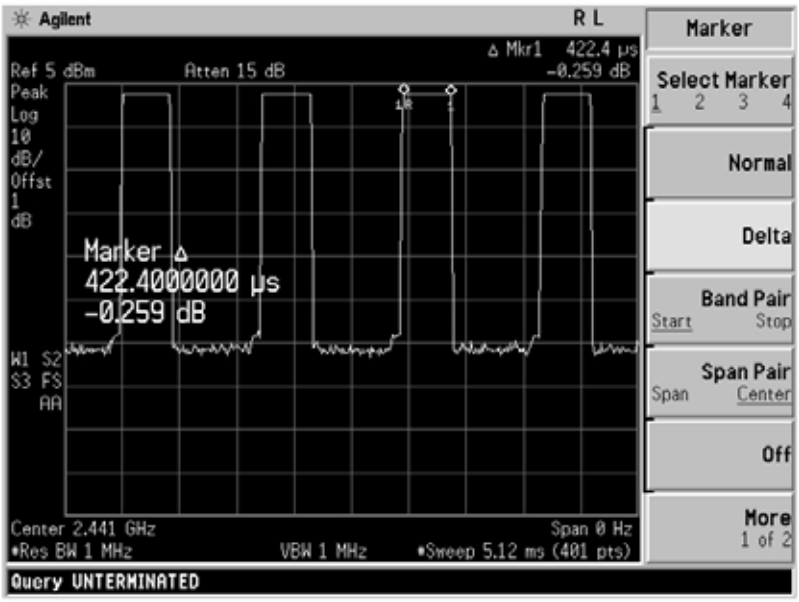
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### Test Results

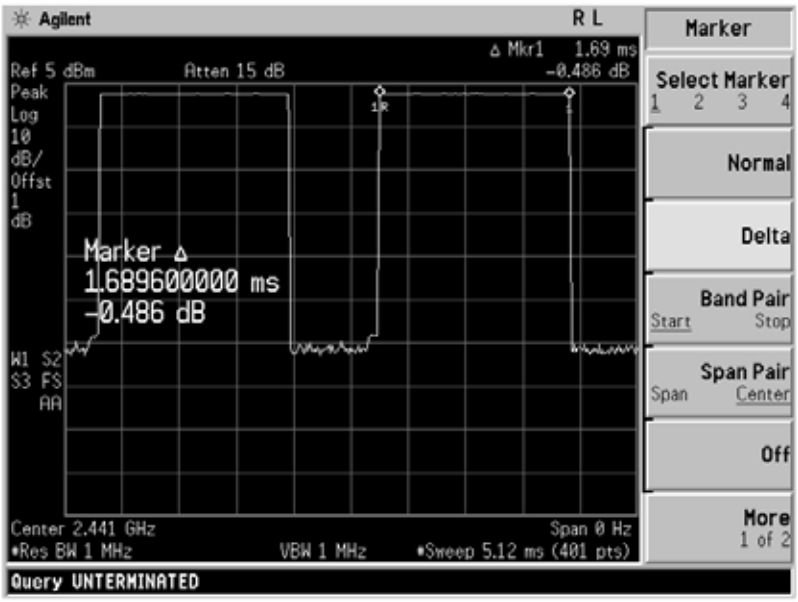
| Channel Number | Channel Frequency (MHz) | Packet Type | Test Results | |
|---|---|---|---|---|
| | | | Dwell Time (ms) | Result |
| 39 | 2441 | DH 1 | 135.21 | Complies |
| | | DH 3 | 272.36 | Complies |
| | | DH 5 | 310.74 | Complies |

See next pages for actual measured spectrum plots.(Worst case)

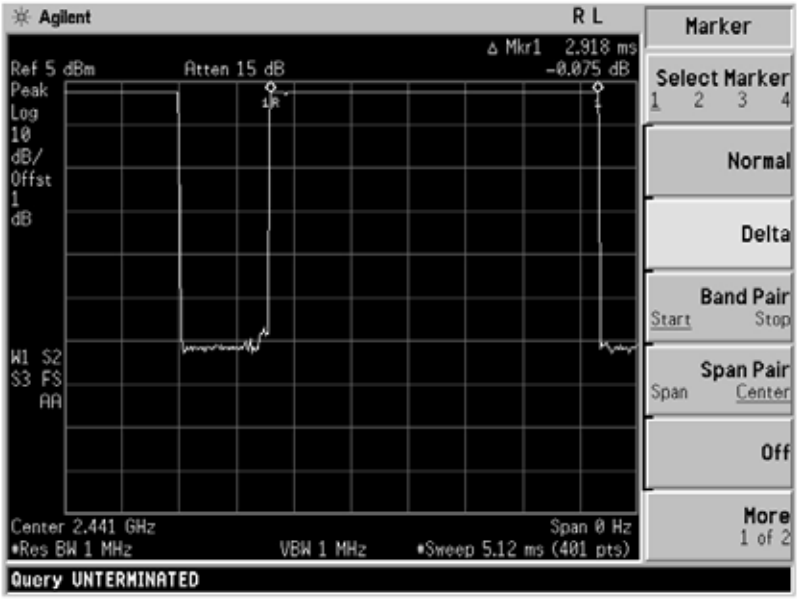
## Time of Occupancy for PACKET Type DH 1



## Time of Occupancy for PACKET Type DH 3



## Time of Occupancy for PACKET Type DH 5



## 2.1.5 Maximum peak Conducted Output Power

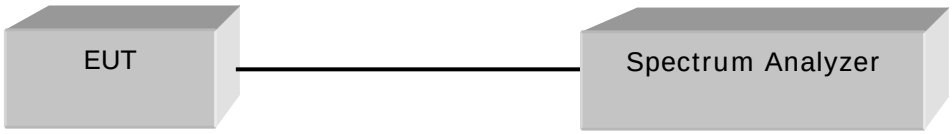
### Test Location

RF Test Room

### Test Procedures

The maximum peak conducted output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function disabled at the highest, middle and the lowest available channels.

The spectrum analyzer is set to:
Center frequency = the highest, middle, and the lowest channels
Span = 5 MHz (approximately 5 times of the 20 dB bandwidth)
RBW = 1 MHz (greater than the 20 dB bandwidth of the emission being measured)
VBW = 1 MHz (≥ RBW) Detector function = peak
Trace = max hold Sweep = auto




### Limit

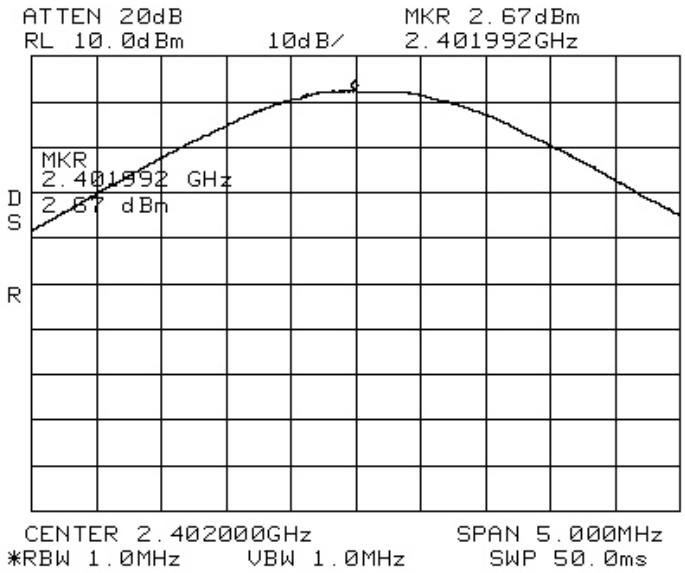
< 1 W

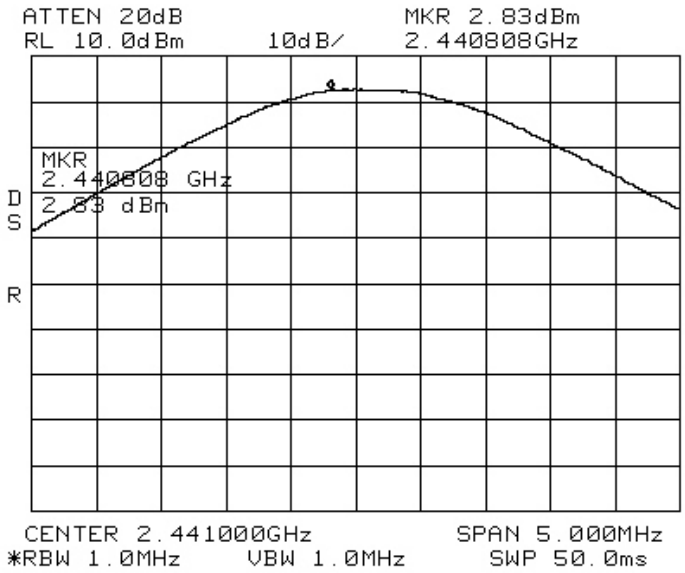
### Test Results

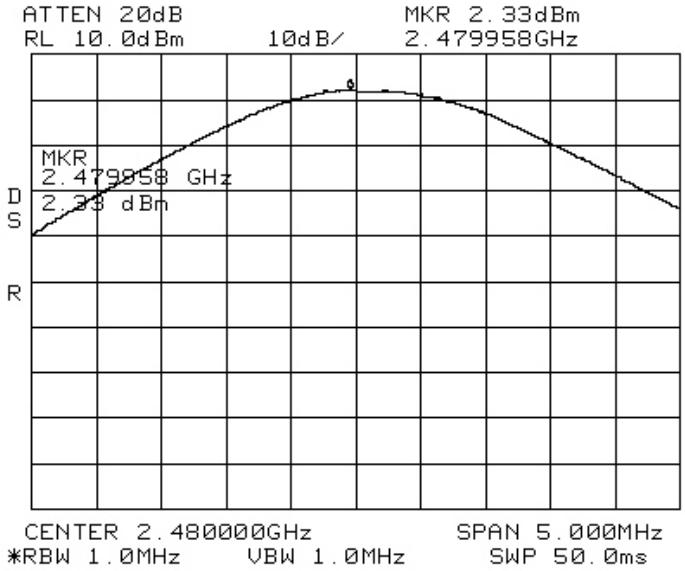
| Frequency (MHz) | Channel No. | Peak output power(dBm) | Peak output power(mW) | Result |
|---|---|---|---|---|
| 2402 | 0 | 2.67 | 1.849 | Complies |
| 2441 | 39 | 2.83 | 1.919 | Complies |
| 2480 | 78 | 2.33 | 1.710 | Complies |

See next pages for actual measured spectrum plots.

## Maximum peak Conducted Output Power





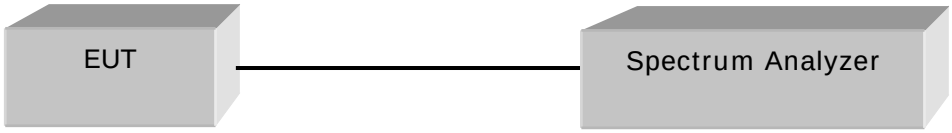
## 2.1.6 Band-edge

### Test Location
RF Test Room

### Test Procedures

The bandwidth at 20 dB down from the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function disabled at the highest, middle and the lowest available channels.

The spectrum analyzer is set to:
Center frequency = the highest, middle, and the lowest channels
RBW = 100 kHz
VBW = 100 kHz (≥ RBW)
Span = 100 MHz
Trace = max hold
Detector function = peak
Sweep = auto



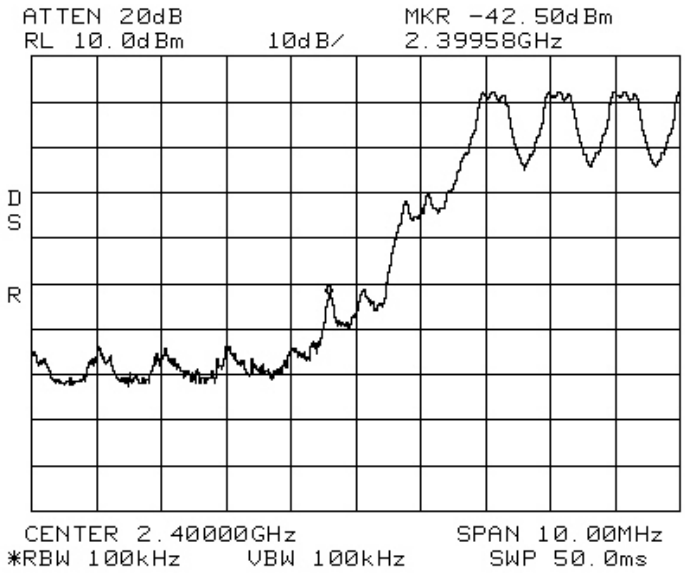

### Limit

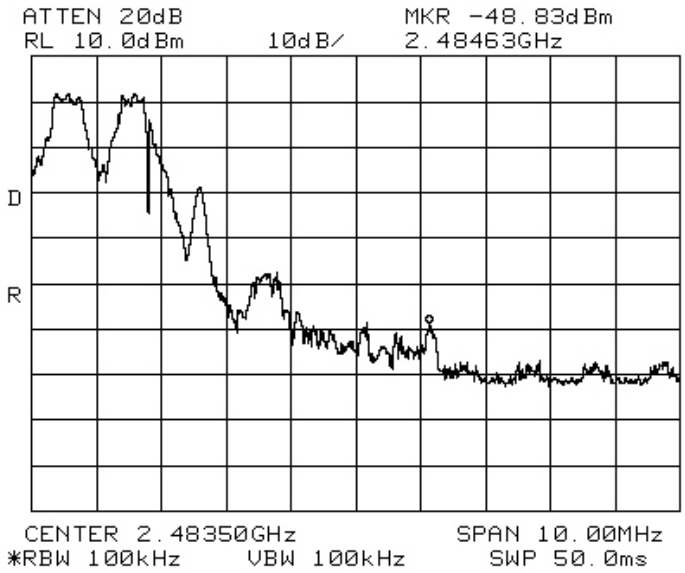
> 20 dBc

### Test Results

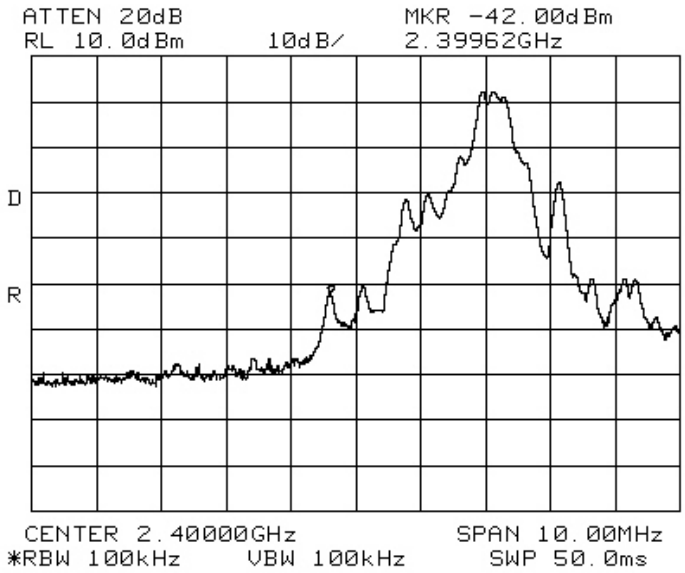
All conducted emission in any 100 kHz bandwidth outside of the spectrum band was at least 20 dB lower than the highest inband spectral density.
Therefore the applying equipment meets the requirement.
See next pages for actual measured spectrum plots.

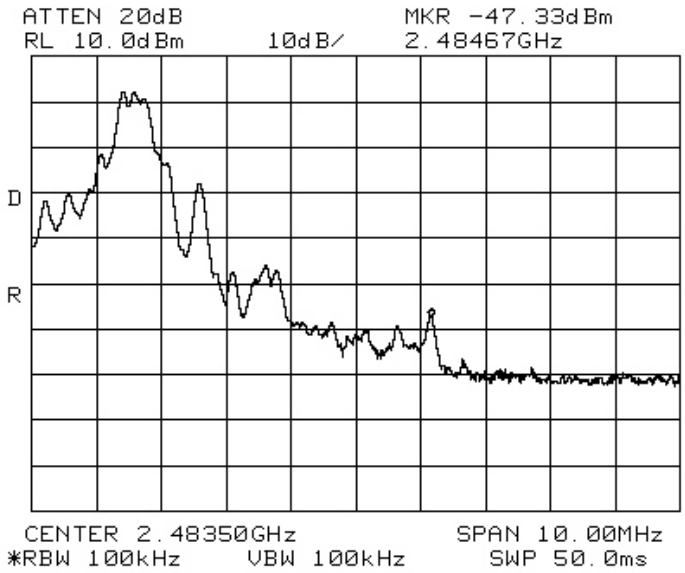
## Band – edge (with Hopping)



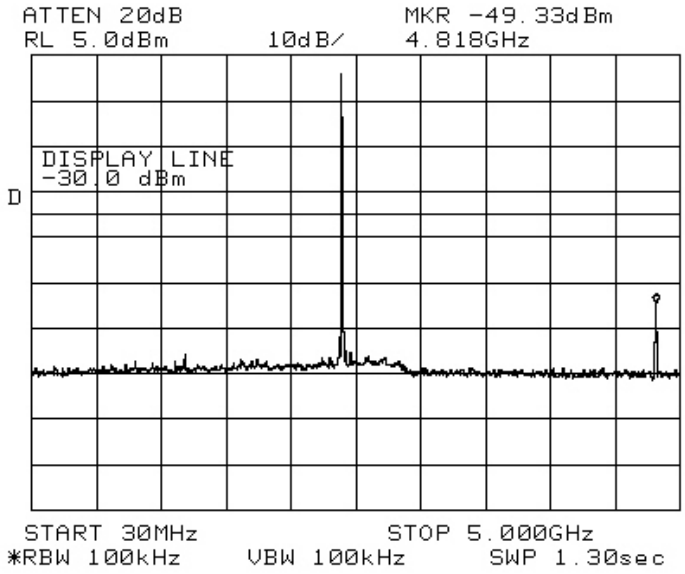



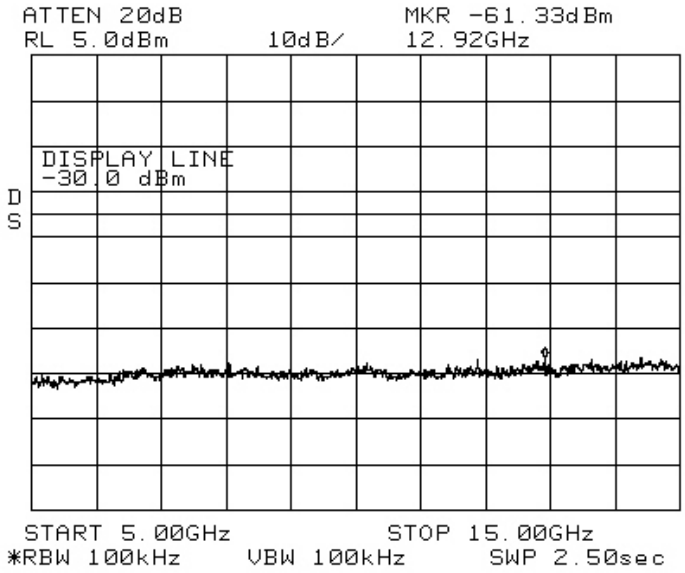
## Band – edge (without Hopping)



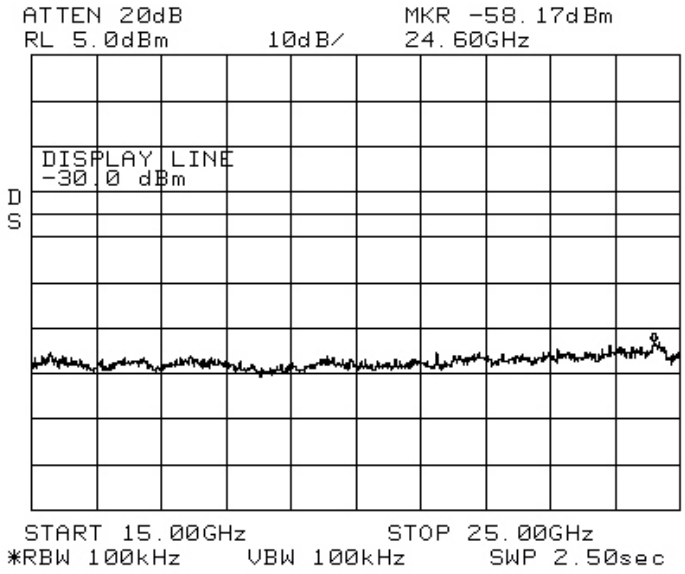



**Band – edge (at 20 dB blow) – Low channel**
**Frequency Range = 30 MHz ~ 10th harmonic**

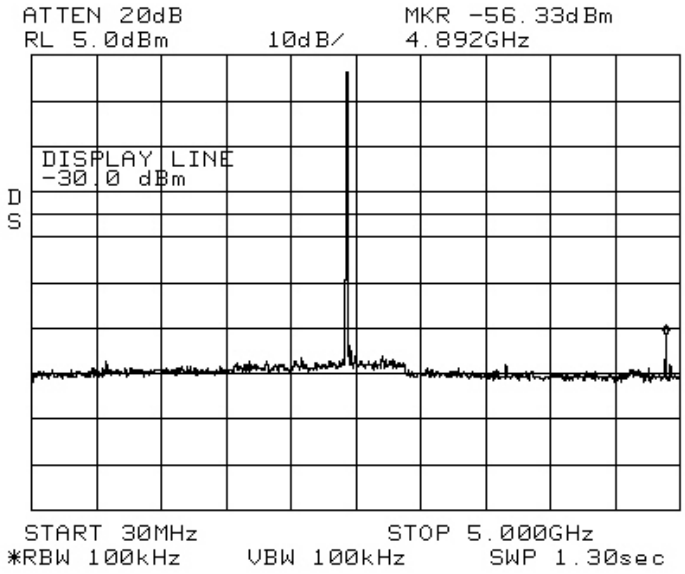


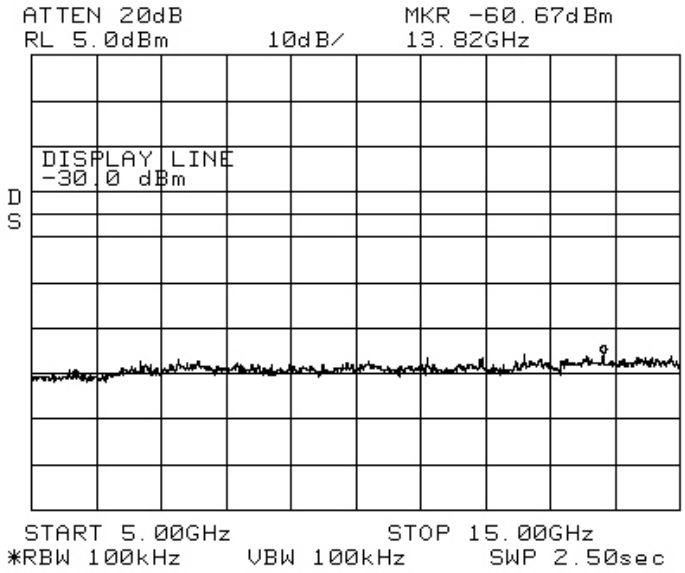



**Band – edge (at 20 dB blow) – Low channel**
**Frequency Range = 30 MHz ~ 10th harmonic**

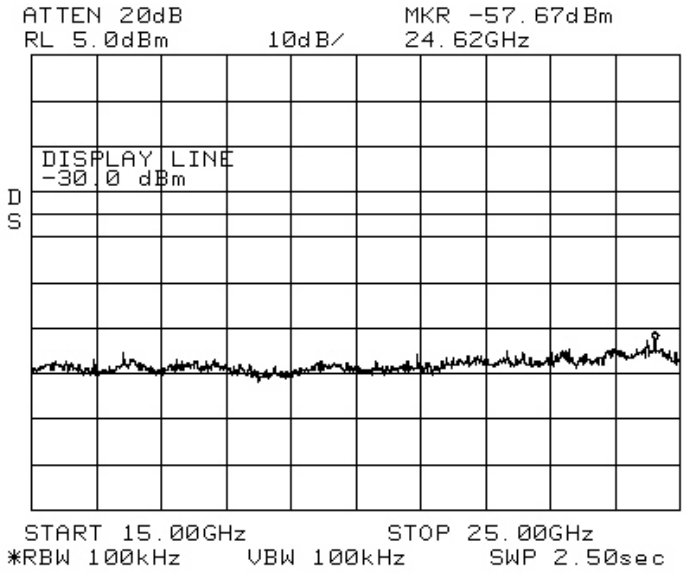


**Band – edge (at 20 dB blow) – Mid channel**
**Frequency Range = 30 MHz ~ 10th harmonic**

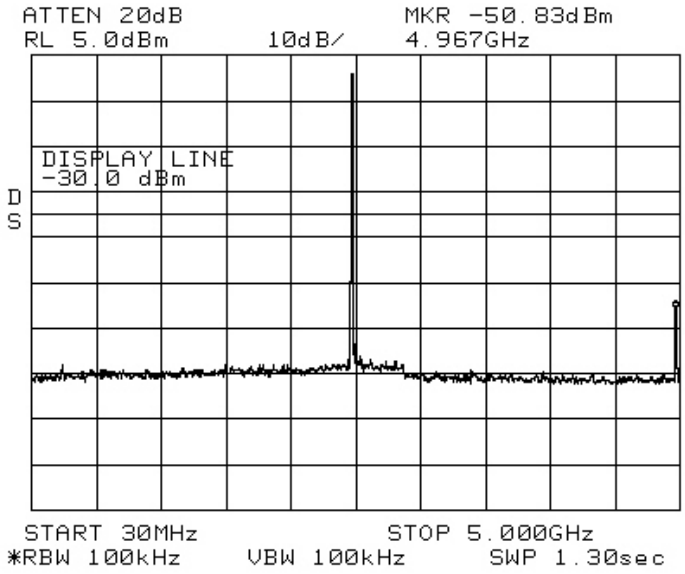


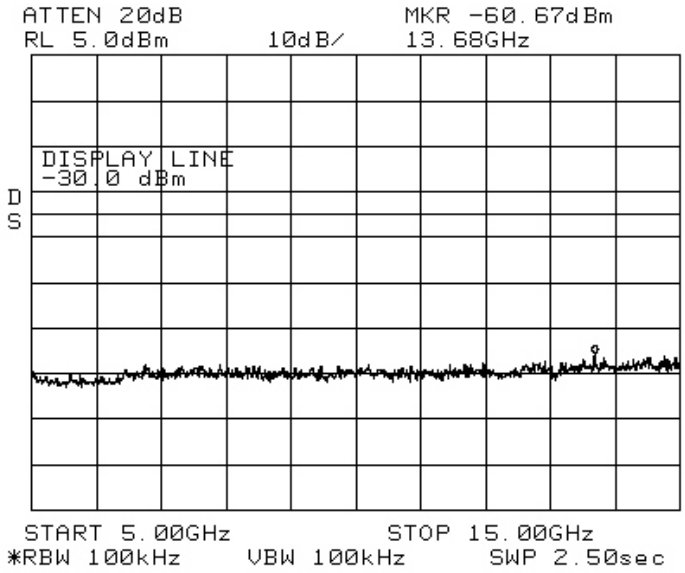



**Band – edge (at 20 dB blow) – Mid channel**
**Frequency Range = 30 MHz ~ 10th harmonic**

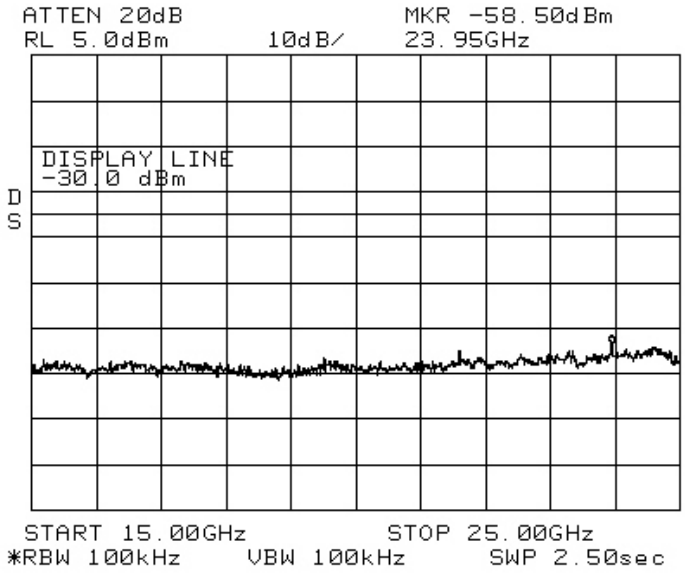


**Band – edge (at 20 dB blow) – High channel**
**Frequency Range = 30 MHz ~ 10th harmonic**



**Band – edge (at 20 dB blow) – High channel**
**Frequency Range = 30 MHz ~ 10th harmonic**



## 2.1.7 Field Strength of Emissions

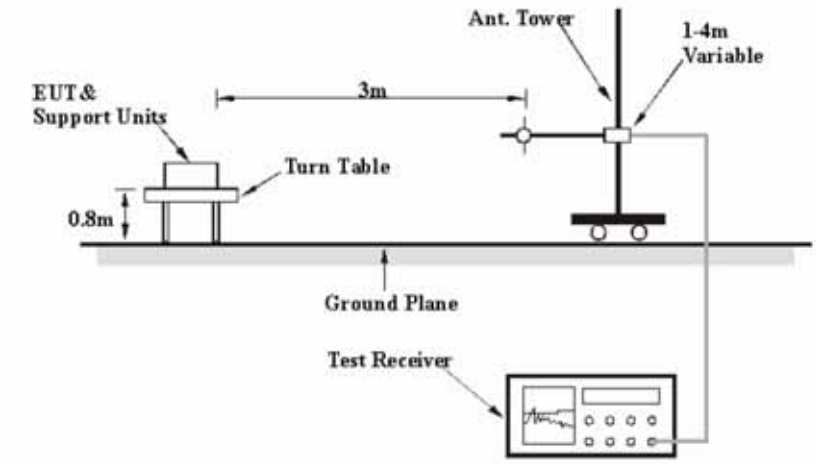
### Test Location

☒ Testing was performed at a test distance of 3 meter Open Area Test Site

### Test Procedures

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity. The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

The spectrum analyzer is set to:
Center frequency = the worst channel
Frequency Range =30 MHz ~ 10th harmonic
RBW = 120 kHz (30 MHz ~ 1 GHz) VBW ≥ RBW
= 1 MHz (1 GHz ~ 10th harmonic)
Span = 100 MHz Detector function = Quasi-peak
Trace = max hold




### Limit

- **15.209(a)**

| Frequency(MHz) | Field Strength uV/m@3m | Field Strength dBuV/m@3m |
|---|---|---|
| 30-88 | 100** | 40 |
| 88-216 | 150** | 43.5 |
| 216-960 | 200** | 46 |
| Above 960 | 500 | 54 |

** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

## Test Results

| EUT | Thermal mobile printer | Measurement Detail | |
|---|---|---|---|
| Model | SPP-R200 | Frequency Range | Below 1000MHz |
| Channel | Channel 0 | Detector function | Quasi-Peak |

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|
| 864.10 | 37.5 | 8.5 | Quasi-Peak |

## Test Data

| Frequency [MHz] | Reading [dBuV/m] | Pol. | Height [m] | Correction Factor | | | Limits [dBuV/m] | Result [dBuV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Antenna | Amp. Gain | Cable | | | |
| 556.25 | 15.0 | H | 1.0 | 16.4 | | 3.8 | 46.0 | 35.2 | 10.8 |
| 592.61 | 15.1 | H | 4.0 | 16.9 | | 4.0 | 46.0 | 36.0 | 10.0 |
| 636.15 | 13.6 | H | 4.0 | 17.7 | | 4.1 | 46.0 | 35.4 | 10.6 |
| 805.16 | 10.8 | V | 1.8 | 19.8 | | 4.9 | 46.0 | 35.5 | 10.6 |
| 847.00 | 11.4 | V | 2.0 | 20.2 | | 4.9 | 46.0 | 36.5 | 9.5 |
| 864.10 | 12.1 | V | 2.0 | 20.5 | | 4.9 | 46.0 | 37.5 | 8.5 |

## Test Results

| EUT | Thermal mobile printer | Measurement Detail | |
|---|---|---|---|
| Model | SPP-R200 | Frequency Range | 1-25GHz |
| Channel | Channel 0 | Detector function | Peak |

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|
| 2483.62 | 42.9 | 11.1 | Peak |

## Test Data

| Frequency [MHz] | Reading [dBuV/m] | Pol. | Height [m] | Correction Factor | | | Limits [dBuV/m] | Result [dBuV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Antenna | Amp. Gain | Cable | | | |
| 1880.60 | 43.4 | V | 1.0 | 25.4 | 35.6 | 6.6 | 54.0 | 39.8 | 14.2 |
| 2376.50 | 40.8 | V | 1.0 | 28.2 | 35.3 | 7.4 | 54.0 | 41.1 | 12.9 |
| 4804.20 | 31.0 | V | 1.0 | 32.7 | 34.9 | 11.4 | 54.0 | 40.2 | 13.8 |
| 7370.10 | 24.9 | V | 1.0 | 37.7 | 34.8 | 14.3 | 54.0 | 42.1 | 11.9 |
| 9610.40 | 19.9 | V | 1.1 | 38.4 | 35.4 | 16.9 | 54.0 | 39.8 | 14.2 |

* No emissions were detected at a level greater than 10dB below limit

## Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

| Frequency [MHz] | Reading [dBuV/m] | Pol. | Height [m] | Correction Factor | | | Limits [dBuV/m] | Result [dBuV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Antenna | Amp. Gain | Cable | | | |
| 2376.80 | 39.5 | V | 1.0 | 28.2 | 35.3 | 7.4 | 54.0 | 39.8 | 14.2 |
| 2483.62 | 42.6 | V | 1.0 | 28.2 | 35.3 | 7.4 | 54.0 | 42.9 | 11.1 |

## 2.1.8 AC Conducted Emissions

### Test Location
Shielded Room

### Frequency Range of Measurement
150 kHz to 30 MHz

### Instrument Settings
IF Band Width: 9 kHz

### Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.
Amplitude measurements were performed with a quasi-peak detector and an average detector.

### Limit

- **15.207(a)**

| Frequency (MHz) | Conducted Limit (dBuV) | |
|---|---|---|
| | 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.

### Test Results
The requirements are:

☒ Complies

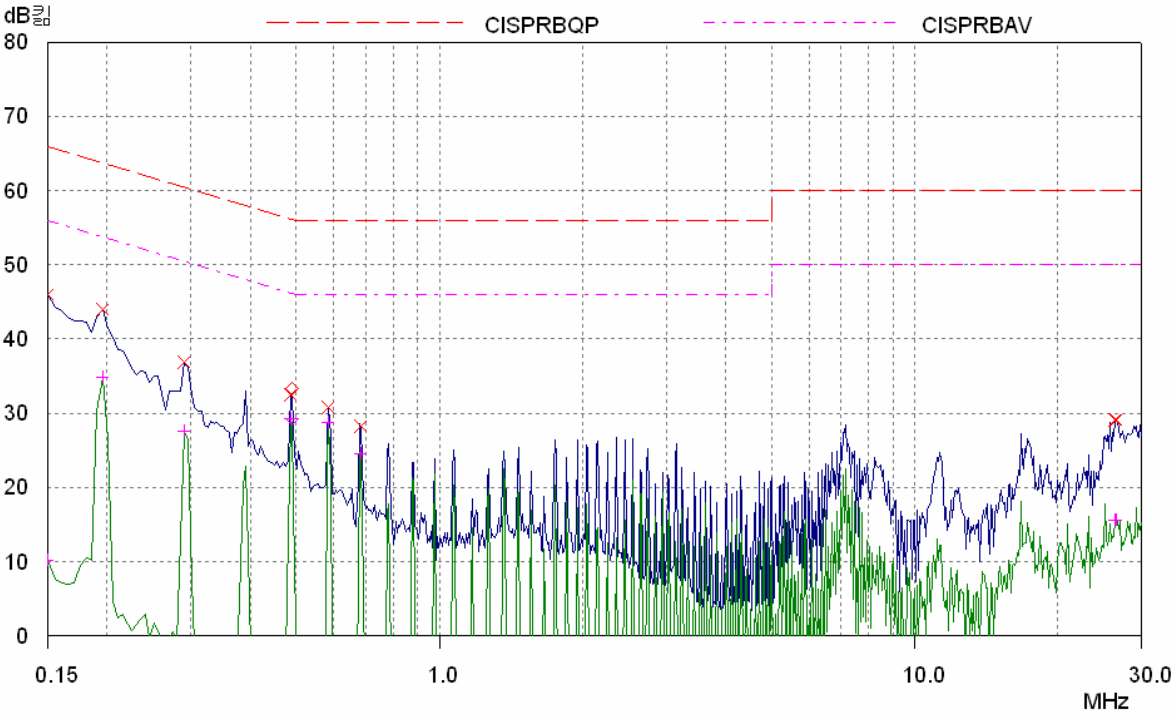
| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|
| 0.20 | 37.9 | 15.7 | Average |

## Test Data

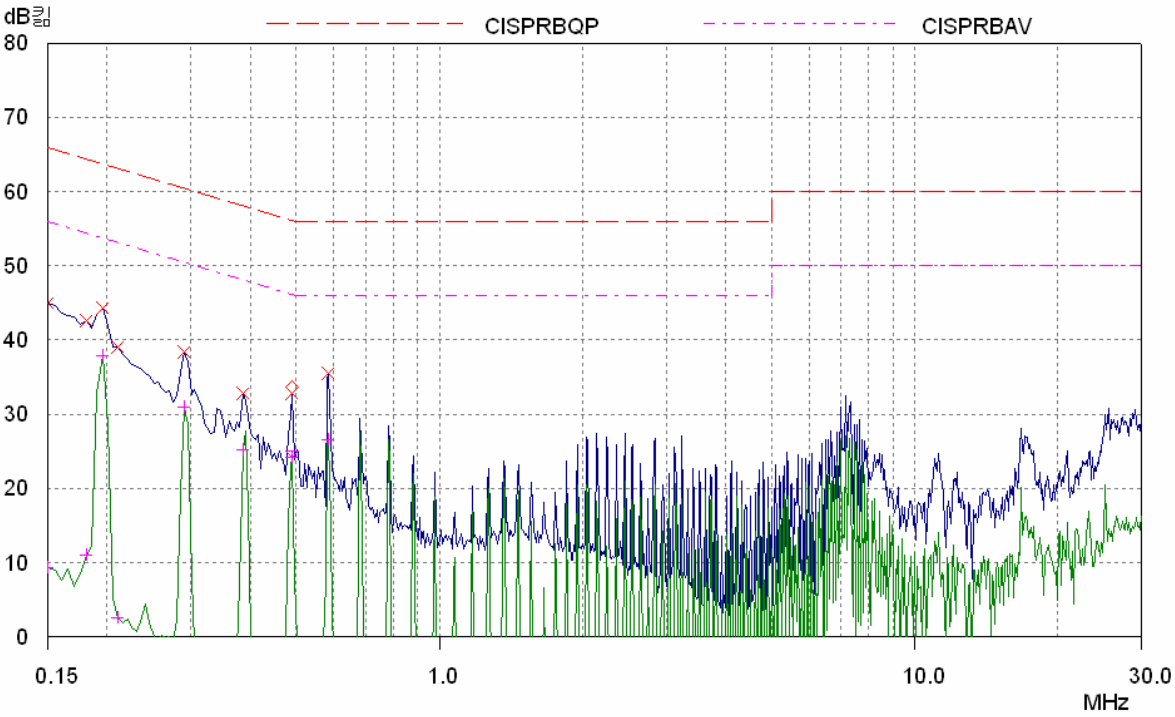
| Frequency | Correction Factor | | Line | Quasi-peak | | | | Average | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Limit | Reading | Result | Margin | Limit | Reading | Result | Margin |
| [MHz] | LISN | Cable | | [dBuV] | [dBuV] | [dBuV] | [dB] | [dBuV] | [dBuV] | [dBuV] | [dB] |
| 0.15 | 0.1 | 0.2 | H | 66.0 | 45.7 | 46.0 | 20.0 | 56.0 | 9.8 | 10.1 | 45.9 |
| 0.20 | 0.1 | 0.2 | N | 63.6 | 44.0 | 44.3 | 19.3 | 53.6 | 37.6 | 37.9 | 15.7 |
| 0.29 | 0.1 | 0.2 | N | 60.5 | 38.0 | 38.3 | 22.2 | 50.5 | 30.7 | 31.0 | 19.5 |
| 0.49 | 0.1 | 0.2 | N | 56.2 | 32.5 | 32.8 | 23.4 | 46.2 | 24.0 | 24.3 | 21.9 |
| 0.59 | 0.1 | 0.2 | N | 56.0 | 35.2 | 35.5 | 20.5 | 46.0 | 26.3 | 26.6 | 19.4 |
| 0.69 | 0.1 | 0.2 | H | 56.0 | 27.9 | 28.2 | 27.8 | 46.0 | 24.3 | 24.6 | 21.4 |

H: HOT, N: NEUTRAL

**[Hot]**




**[Neutral]**



# APPENDIX A – Test Equipment Used For Tests

| | Name of Equipment | Manufacturer | Model No. | Serial No. | Due Date |
|---|---|---|---|---|---|
| 1 | Spectrum Analyzer | Agilent | 8564E | 3551A0041 | 2007-11-03 |
| 2 | EMI Test Receiver | Rohde & Schwarz | ESVS30 | 826638/008 | 2007-04-25 |
| 3 | ULTRA Broadband Antenna | Rohde & Schwarz | HL562 | 361324/014 | 2007-06-12 |
| 4 | Biconical Antenna | EMCO | 3110 | 9202-1510 | 2007-04-25 |
| 5 | Log-periodic Antenna | EMCO | 3146 | 9607-4567 | 2007-04-25 |
| 6 | Field Strength Meter | Rohde & Schwarz | ESHS30 | 828144/002 | 2008-02-15 |
| 7 | LISN | EMCO | 3825/2 | 9607-2575 | 2007-09-01 |
| 8 | LISN | EMCO | 3825/2 | 9409-2246 | 2007-09-01 |
| 9 | Field Strength Meter | Rohde & Schwarz | ESHS30 | 862024/001 | 2008-03-07 |
| 10 | System Power Supply | HP | 6032A | 3440A-10521 | 2007-07-06 |
| 11 | EPM Series Power Meter | HP | E4418A | GB38272734 | 2007-11-03 |
| 12 | Power Sensor | HP | 8481A | 331BA92056 | 2007-11-01 |
| 13 | Power Sensor | HP | 8482B | 331BA05406 | 2007-10-27 |
| 14 | Audio Analyzer | HP | 8903B | 2747A03432 | 2007-11-03 |
| 15 | ESG-D Series Signal Generator | Agilent | E4432B | US40054094 | 2007-11-03 |
| 16 | Modulation Analyzer | HP | 8901B | 3438A05228 | 2007-11-06 |
| 17 | Attenuator | HP | 8494A | 3308A33351 | 2007-10-27 |
| 18 | Attenuator | HP | 8496A | 3308A15142 | 2007-10-27 |
| 19 | Temp&Humi Chamber | Kunpoong | KP-1000 | 2002KP050041 | 2008-01-15 |
| 20 | EMC Analyzer | Agilent | E7403A | MY42000054 | 2007-10-18 |
| 22 | Horn Antenna | ETS-Lindgren | 3115 | 00078894 | 2008-11-29 |
| 23 | Horn Antenna | ETS-Lindgren | 3116 | 00062504 | 2008-11-27 |
| 24 | OPT H64 AMPLIFIER | HP | 8447F | 3113A06814 | 2008-03-03 |
| 25 | PREAMPLIFIER | Agilent | 8449B | 3008A02307 | 2007-11-20 |