

(Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501 www.e-ctk.com

# **TEST REPORT**

#### FCC Standards : FCC 47CFR part 15 subpart C Industry Canada Standards :RSS-210 Issue 8 & RSS-GEN Issue 4

| Test Report No.        | :  | CTK-2015-00426                  |                       |
|------------------------|----|---------------------------------|-----------------------|
| Date of Issue          | :  | 2015-04-12                      |                       |
| FCC ID                 | :  | V2R-BT330NC                     |                       |
| Certification Number 1 | C: | 10488A-BT330NC                  |                       |
| Model/Type No.         | :  | BT 330 NC                       |                       |
| Kind of Product        | :  | Wireless Active Noise Cancellin | ng Headphones         |
| Applicant              | :  | Cresyn Co., Ltd.                |                       |
| Applicant Address      | :  | 5 Gangnam-dearo 107-gil, Sec    | ocho-gu, Seoul, Korea |
| Manufacturer           | :  | Cresyn Co., Ltd.                |                       |
| Manufacturer Address   | :  | 5 Gangnam-dearo 107-gil, Sec    | ocho-gu, Seoul, Korea |
| Contact Person         | :  | Yong Min Cho / Research Engir   | neer                  |
| Telephone              | :  | +82-2-2041-2857                 |                       |
| Received Date          | :  | 2015-03-20                      |                       |
| Test period            | :  | Start : 2015-04-05              | End : 2015-04-12      |

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

Tested by

Won-Jae, Hwang Test Engineer Date: 2015-04-12 Reviewed by

Young-Joon, Park Technical Manager Date: 2015-04-12

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Form No.: CTK-RF-EF-Part15 SubpartC(Rev.2)



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## **REPORT REVISION HISTORY**

| Date       | Revision                | Page No |
|------------|-------------------------|---------|
| 2015-04-12 | Issued (CTK-2015-00426) | All     |
|            |                         |         |
|            |                         |         |
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|            |                         |         |
|            |                         |         |

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# 1.0 General Product Description

| Basic Model/Type No.    | BT 330 NC   |
|-------------------------|---|
| Serial number           | Prototype   |
| EUT condition           | Pre-production, not damaged   |
| Antenna type            | PCA antenna Gain 2.8 dBi  |
| Frequency Range         | 2402 MHz - 2480 MHz   |
| RF power                | 0.261 dBm Peak Conducted (GFSK)<br>2.239 dBm Peak Conducted (DQPSK) |
| Number of channels      | 79  |
| Channel Spacing         | 1 MHz   |
| Channel Access Protocol | Frequency Hopping   |
| Type of Modulation      | GFSK(1 Mbps), DQPSK(2 Mbps)   |
| Power Source            | DC 3.7 V (Lithium Ion Rechargeable Battery)                         |

#### **Tested Frequency** 1.1

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

#### **Tested Mode** 1.2

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| Tested Ch      | Modulation<br>Technology | Modulation Type | Packet Type |
|----------------|--------------------------|-----------------|-------------|
| Low, Mid, High | FHSS                     | GFSK            | DH 5        |
| Low, Mid, High | FHSS                     | DQPSK           | 2DH 5       |



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## **1.3 Device Modifications**

The following modifications was applied by the applicant:

Not applicable

## 1.4 Peripheral Devices

| Device            | Manufacturer            | Model No.     | Serial No.  |
|-------------------|-------------------------|---------------|-------------|
| Notebook Computer | TOSHIBA CORPORATION     | PSL48K-00L00K | Z7037769R   |
| AC/DC Adaptor     | DELTA ELECTRONICS, INC. | ADP-75SB AB   | 708W15Y01MK |

## 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 (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.



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# 1.7 Laboratory Accreditations and Listings

| Country       | Agency | Scope of Accreditation   | Logo  |
|---------------|--------|--|---|
| USA           | FCC    | 3 m & 10 m SAC and Conducted Test Site to<br>perform FCC Part 15/18 measurements                                   | <b>FC</b><br>805871   |
| JAPAN         | VCCI   | 3 m & 10 m SAC and Conducted Test Site   | <b>R-948</b> , C-986, T-1843  |
| KOREA         | КСС    | EMI (10 m SAC and Conducted Test Site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS,<br>Magnetic, Dips and Interruptions) | No. 51, KR0025  |
| International | KOLAS  | EMC  | KOLAS<br>RATORY ACCREDITATION<br>KOLAS<br>RATORY<br>TESTING NO.119 BIRT |



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#### 2.0 Summary of tests

| FCC Part<br>Section(s) | Parameter                        | Limit         | Test<br>Condition | Status<br>(note 1) |
|------------------------|----------------------------------|---------------|-------------------|--------------------|
| 15.247(a)              | Carrier Frequency<br>Separation  | > 25 kHz      |                   | С                  |
| 15.247(a)              | Number of Hopping<br>Frequencies | > 15 hops     |                   | С                  |
| 15.247(a)              | 20 dB Bandwidth                  | NA            |                   | С                  |
| 15.247                 | Dwell Time                       | < 0.4 seconds | Conducted         | С                  |
| 15.247(b)              | Transmitter Output Power         | < 0.125 Watts |                   | С                  |
| 15.247(d)              | Conducted Spurious<br>emission   | > 20 dBc      |                   | С                  |
| 15.247(d)              | Band Edge                        | > 20 dBc      |                   | С                  |
| 15.209                 | Field Strength of<br>Harmonics   | 15.209(a)     | Radiated          | С                  |
| 15.207                 | AC Conducted Emissions           | 15.207(a)     | Line Conducted    | С                  |

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 -

The tests were performed according to the method of measurements prescribed in DA 00-705.



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# 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:

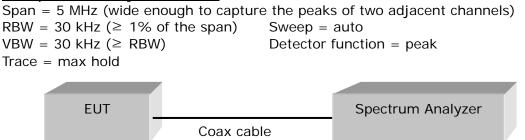


Figure 1 : Measurement setup for the carrier frequency separation

### Limit

§15.247(a)(1) Frequency hopping system operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-third of 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### **Test Results**

#### Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

| Channel | Adjacent Hopping<br>Channel Separation<br>(kHz) | Two-third of 20dB<br>bandwidth<br>(kHz) | Minimum<br>Bandwidth<br>(kHz) | Result   |
|---------|---|---|-------------------------------|----------|
| 2441MHz | 1025  | 563.2                                   | 25                            | Complies |

### Test mode : DQPSK, CFG PKT Packet Type : 30 Packet Size : 679(2DH5)

| Channel | Adjacent Hopping<br>Channel Separation<br>(kHz) | Two-third of 20dB<br>bandwidth<br>(kHz) | Minimum<br>Bandwidth<br>(kHz) | Result   |
|---------|---|---|-------------------------------|----------|
| 2441MHz | 1000  | 835.3                                   | 25                            | Complies |

See next pages for actual measured spectrum plots.



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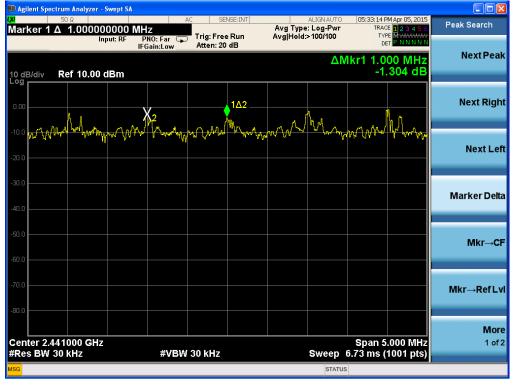
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#### **Carrier Frequency Separation**



#### Data Rate : GFSK

Data Rate : DQPSK



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## 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<br>2: Start = 2439.5 MHz | -  |
|---|--|--|
| Span = 50 MHz<br>RBW = 300 kHz (≥ 1%<br>VBW = 300 kHz (≥ RB<br>Trace = max hold | 1 7  | Sweep = auto<br>Detector function = peak |
| EUT   |  | Spectrum Analyzer                        |

### Limit

§15.247(a)(1)(iii) For frequency hopping system operating in the 2400-2483.5 MHz band shall use at least 15 hopping frequencies.

### **Test Results**

#### Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

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

#### Test mode : DQPSK, CFG PKT Packet Type : 30 Packet Size : 679(2DH5)

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

See next pages for actual measured spectrum plots.

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|                  | 50 Ω            |                     |      | 1-                         | AC   | SE                    | NSE:INT | Αυσ Τι | ALIGNAUTO   |          | PM Apr 05, 2015<br>ACE 1 2 3 4 5 6 | Peak Search      |
|------------------|-----------------|---------------------|------|----------------------------|------|-----------------------|---------|--------|-------------|----------|------------------------------------|------------------|
| arker 1          | Δ 37.000        | nput: RF            | PN   | 1Z<br>0: Fast 0<br>ain:Low |      | rig: Free<br>tten: 30 |         |        | ld:>100/100 | T        |                                    |                  |
| dB/div           | Ref 20.00       | dBm                 | IFG  | ain:Low                    |      | tten. so              | dB      |        | Δ           |          | .00 MHz<br>.005 dB                 | Next Pea         |
| g                |                 |                     |      |                            |      |                       |         |        |             |          |                                    | Next Rig         |
| ).0              |                 |                     |      |                            |      |                       |         |        |             |          | 1Δ2                                | next hig         |
|                  |                 |                     | X2/1 |                            |      |                       |         |        |             |          | YMM                                | Next Le          |
|                  |                 |                     |      |                            |      |                       |         |        |             |          |                                    | Marker De        |
| .0               |                 |                     |      |                            |      |                       |         |        |             |          |                                    | Mkr→0            |
| .0<br>•••//~•••• | annad-raainilag | r v <sup>frit</sup> |      |                            |      |                       |         |        |             |          |                                    | Mkr→RefL         |
|                  |                 |                     |      |                            |      |                       |         |        |             |          |                                    |                  |
| art 2.38         | 3950 GHz        |                     |      |                            |      |                       |         |        |             | Stop 2.4 | 3950 GHz                           | <b>Mo</b><br>1 o |
|                  | 300 kHz         |                     |      | #VB                        | W 30 | 0 kHz                 |         |        | Sweep       | 1.00 ms  | (1001 pts)                         |                  |

#### Number of Hopping Frequencies(GFSK)







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| Marker 1 A 37.100000000 MHz       Trig: Free Run Avg Type: Log-Pwr AvglHold>100/100       Next Run Avg Type: Log-Pwr Avg Type: Log-Pwr Avg Type: Log-Pwr Avg Type: Log-Pwr AvglHold>100/  | l Agilent Spectrum Analy | /zer - Swept SA |                    |                |  |                              |             |
|---|--------------------------|-----------------|--------------------|----------------|--|------------------------------|-------------|
| Line       Line       Line       Line       Next P         0 dB/div       Ref 20.00 dBm       1.274 dB       Next R         100       X2,00,00,00,00,00,00,00,00,00,00,00,00,00   | 50 Ω<br>larker 1 Δ 37.1  |                 | MHz<br>PNO: Fast 😱 | Trig: Free Run | Avg Type: Log-Pwr                      | TRACE 123456<br>TYPE MWWWWWW | Peak Search |
| 10.0       Λοτο  | 0 dB/div Ref 20          | .00 dBm         | IFGain:Low         | Atten: 30 dB   | ΔΙ                                     | Mkr1 37.10 MHz<br>1.274 dB   | Next Peal   |
| 100       1   |                          |                 |                    |                |  | 162                          | Next Righ   |
| Marker D  |                          | Xa              | ᡑ᠕ᡃᡗ᠋ᢩᢣᡧᡗᡧᡘ        | VVVVV          | AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                              | Next Lef    |
| 50.0<br>50.0<br>50.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>70.0<br>7 |                          |                 |                    |                |  |                              | Marker Delt |
| 0.0 Mkr→Re  |                          |                 |                    |                |  |                              | Mkr→C       |
|   | 60.0                     | event 1         |                    |                |  |                              | Mkr→RefL∖   |
| tart 2.38950 GHz Stop 2.43950 GHz<br>Res BW 300 kHz #VBW 300 kHz Sweep 1.00 ms (1001 pts)   | tart 2.38950 GHz         |                 | #\/B\A( -          | 300 kHz        | Sween                                  | Stop 2.43950 GHz             | Mor<br>1 of |

#### Number of Hopping Frequencies(DQPSK)





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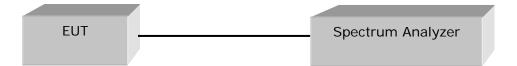
### 2.1.3 20 dB bandwidth

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 channelsSpan = 3 MHz (approximately 2 or 3 times of the 20 dB bandwidth)RBW = 30 kHz ( $\geq$  1% of the span)VBW = 30 kHz ( $\geq$  RBW)VBW = 30 kHz ( $\geq$  RBW)Trace = max hold



### Limit

Limit : N/A



## Test Results (20 dB bandwidth)

#### Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

| Frequency<br>(MHz) | Channel Number. | Measured Bandwidth<br>(MHz) | Result   |
|--------------------|-----------------|-----------------------------|----------|
| 2402               | 0               | 0.687                       | Complies |
| 2441               | 39              | 0.845                       | Complies |
| 2480               | 78              | 0.778                       | Complies |

#### Test mode : DQPSK, CFG PKT Packet Type : 30 Packet Size : 679(2DH5)

| Frequency<br>(MHz) | Channel Number. | Measured Bandwidth<br>(MHz) | Result   |
|--------------------|-----------------|-----------------------------|----------|
| 2402               | 0               | 1.253                       | Complies |
| 2441               | 39              | 1.227                       | Complies |
| 2480               | 78              | 1.227                       | Complies |

#### Test Results (Occupied Bandwidth)

#### Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

| Frequency<br>(MHz) | Channel Number. | Measured Bandwidth<br>(MHz) | Result   |
|--------------------|-----------------|-----------------------------|----------|
| 2402               | 0               | 0.774                       | Complies |
| 2441               | 39              | 0.788                       | Complies |
| 2480               | 78              | 0.780                       | Complies |

#### Test mode : DQPSK, CFG PKT Packet Type : 30 Packet Size : 679(2DH5)

| Frequency<br>(MHz) | Channel Number. | Measured Bandwidth<br>(MHz) | Result   |
|--------------------|-----------------|-----------------------------|----------|
| 2402               | 0               | 1.164                       | Complies |
| 2441               | 39              | 1.162                       | Complies |
| 2480               | 78              | 1.161                       | Complies |

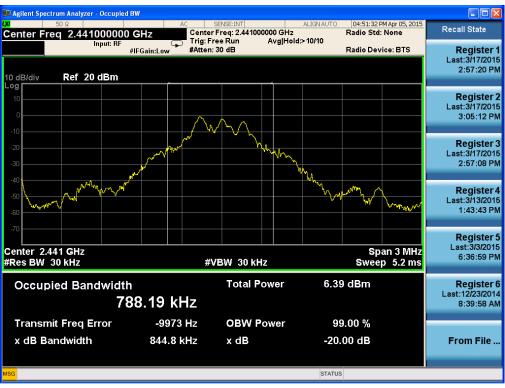
See next pages for actual measured spectrum plots.



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20 dB Bandwidth, Occupied Bandwidth - GFSK

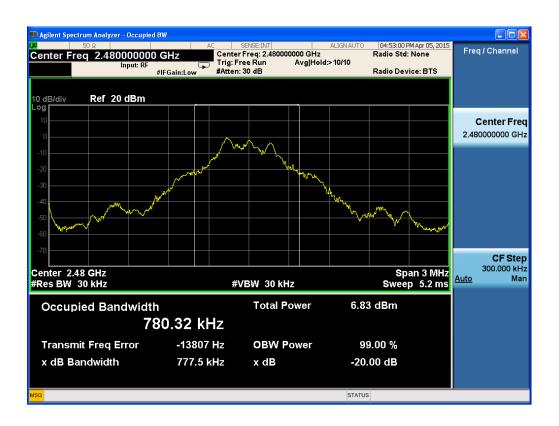






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ctrum Analyzer - Occupied BW 05:20:25 PM Apr 05, 2015 Radio Std: None ALIGN AUTO 
 O GHz
 Center Freq: 2.402000000 GHz
 ALIGNA

 Trig: Free Run
 Avg|Hold>10/10

 #IFGain:Low
 #Atten: 30 dB
 Freq / Channel Center Freq 2.402000000 GHz Input: RF Radio Device: BTS 10 dB/div Ref 20 dBm .og **Center Freq** 2.402000000 GHz mm CF Step 300.000 kHz Center 2.402 GHz #Res BW 30 kHz Span 3 MHz Sweep 5.2 ms <u>Auto</u> Man #VBW 30 kHz **Occupied Bandwidth Total Power** 6.20 dBm 1.1636 MHz **OBW Power Transmit Freq Error** 2.522 kHz 99.00 % 1.253 MHz -20.00 dB x dB Bandwidth x dB STATUS

#### 20 dB Bandwidth, Occupied Bandwidth - DQPSK





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# 2.1.4 Time of Occupancy (Dwell Time)

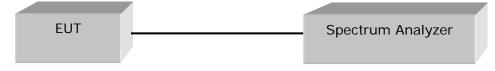
Test Location RF Test Room

#### Test Procedures

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

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- 3. Adjust the center frequency of spectrum analyzer on any frequency be measured and set spectrum analyzer to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- 4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- 5. Repeat above procedures until all frequencies measured were complete.
- 6. The BT 330 NC has 3 type of payload, DH1, DH3, DH5. The hopping rate is 1600 per second.

The spectrum analyzer is set to:



### Limit

§15.247(a)(1)(iii) For frequency hopping system operating in 2400-2483.5 MHz band, 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**

Time of occupancy on the TX channel in 31.6 sec = time domain slot length × hop rate  $\div$  number of hop per channel × 31.6

#### Test mode : GFSK

| Channel            |                      |                    | Test Results  |          |  |  |
|--------------------|----------------------|--------------------|---|----------|--|--|
| Frequency<br>(MHz) | requency Packet Type | Dwell Time<br>(ms) | Time of occupancy on<br>the TX channel in<br>31.6sec (ms) | Result   |  |  |
|                    | DH 1                 | 0.404              | 129.3   | Complies |  |  |
| 2441               | DH 3                 | 1.657              | 265.1   | Complies |  |  |
|                    | DH 5                 | 2.920              | 311.5   | Complies |  |  |

DH1 Dwell time =  $0.404 \text{ ms} \times (1600 \div 2) \div 79 \times 31.6 = 129.3 \text{ ms}$ DH3 Dwell time =  $1.657 \text{ ms} \times (1600 \div 4) \div 79 \times 31.6 = 265.1 \text{ ms}$ DH5 Dwell time =  $2.920 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 311.5 \text{ ms}$ 

#### Test mode : DQPSK

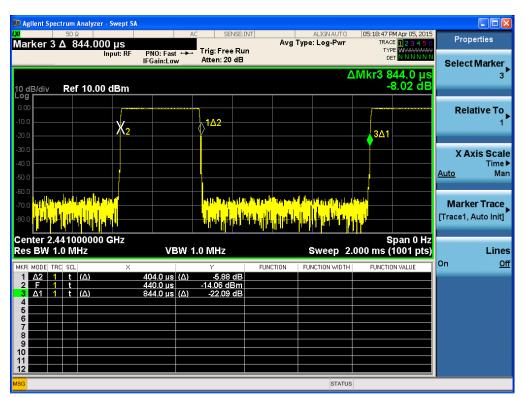
| Channel                        |                    |   | Test Results |          |  |  |
|--------------------------------|--------------------|---|--------------|----------|--|--|
| Frequency Packet Type<br>(MHz) | Dwell Time<br>(ms) | Time of occupancy on<br>the TX channel in<br>31.6sec (ms) | Result       |          |  |  |
|                                | 2DH 1              | 0.429   | 137.3        | Complies |  |  |
| 2441                           | 2DH 3              | 1.672   | 267.5        | Complies |  |  |
|                                | 2DH 5              | 2.940   | 313.6        | Complies |  |  |

2DH1 Dwell time =  $0.429 \text{ ms} \times (1600 \div 2) \div 79 \times 31.6 = 137.3 \text{ ms}$ 2DH3 Dwell time =  $1.672 \text{ ms} \times (1600 \div 4) \div 79 \times 31.6 = 267.5 \text{ ms}$ 2DH5 Dwell time =  $2.940 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 313.6 \text{ ms}$ 

See next pages for actual measured spectrum plots.



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#### Time of Occupancy for PACKET Type DH1(GFSK)

Time of Occupancy for PACKET Type DH3(GFSK)

| larker                       | 50 Ω<br>4 Δ 2     | .09427 ms                                    |  |          | SENSE:IN             |      | Avg ' | ALIGNAUTO<br>Type: Log-Pwr | TRAC<br>TYL   | M Apr 05, 2015<br>E 1 2 3 4 5 6<br>E WWWWWW | Prop                | erties                          |
|------------------------------|-------------------|--|--|----------|----------------------|------|-------|----------------------------|---------------|---|---------------------|---------------------------------|
| 0 dB/div                     | Pof               | 10.00 dBm                                    | IFGain:Low   | At       | en: 20 dB            |      |       | Δ                          | Mkr4 2        | .094 ms<br>2.08 dB                          | Select              | Marker<br>4                     |
|                              | 1                 |  | X2   |          |                      | 1∆2  |       |                            | 4∆1           |   | Rela                | t <b>ive To</b><br>1            |
| 20.0<br>30.0<br>10.0<br>50.0 |                   |  |  |          |                      |      |       |                            |               |   | X Ax<br>Auto        | ( <b>is Sca</b> l<br>Time<br>Ma |
| 80.0<br>70.0<br>80.0         |                   | nd an marting<br>No <sup>-10</sup> an Ionach | e de a Miller d'<br><mark>Li j ( k., pi<sup>l 1</sup> P</mark> |          |                      |      |       |                            | <u> </u>      |   | Marke<br>[Trace1, / | e <b>r Trace</b><br>Auto Init]  |
| es BW                        | 1.0 M             |  |  | V 1.0 M  |                      |      |       | Sweep 7                    | s<br>533 ms ( |   | On                  | Line                            |
| 2 F<br>3 4 Δ1<br>5 5         | 1 t<br>1 t<br>1 t |  | 1.657 ms(,<br>2.501 ms<br>2.094 ms(,                           | <u>)</u> | 7.49 dBm<br>-5.41 dB | FUNI | CTION | FUNCTION WIDTH             | FUNCTIO       | ON VALUE                                    |                     | -                               |
| 6<br>7<br>8<br>9<br>0        |                   |  |  |          |                      |      |       |                            |               |   |                     |                                 |
| 2                            |                   |  |  |          |                      |      |       |                            |               |   |                     |                                 |

Test Report No.: CTK-2015-00426 Date: 2015-04-12

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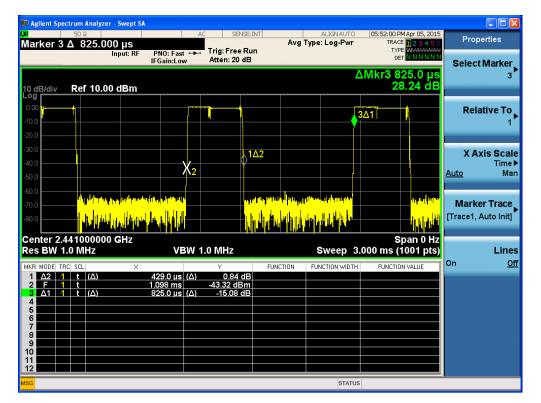
#### alyzer - Swept SA 05:16:03 PM Apr 05, 2015 TRACE 123456 TYPE WWWWWW DET NNNNNN SENSE:INT Properties Avg Type: Log-Pwr Marker 3 Δ 3.34000 ms PNO: Fast Trig: Free Run Atten: 20 dB Input: RF Select Marker ∆Mkr3 3.340 m 3 8.51 dB Ref 10.00 dBm 10 dB/div Log r 3∆1 1Δ2 Relative To X2 1 X Axis Scale Time <u>Auto</u> Man Marker Trace [Trace1, Auto Init] Center 2.44100000 GHz Res BW 1.0 MHz المراز والمرافعة والمعادية المراف والألفان Span 0 Hz Sweep 10.00 ms (1001 pts) VBW 1.0 MHz Lines On <u>Off</u> FUNCTION FUNCTION WIDTH 1 t (Δ) 1 t 1 t (Δ) 2.920 ms (∆) 2.540 ms 3.340 ms (∆) 0.92 dB -9.81 dBm -1.30 dB Δ2 Δ1 12 STATUS

#### Time of Occupancy for PACKET Type DH5(GFSK)



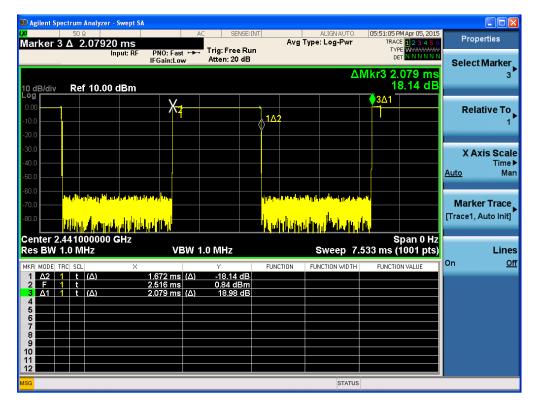
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#### Time of Occupancy for PACKET Type 2DH1(DQPSK)

### Time of Occupancy for PACKET Type 2DH3(DQPSK)



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| 50 Ω  | A AC                                     | SENSE:INT  | ALIGNAUTO   | 05:49:39 PM Apr 05, 2015  |  |
|---|--|--|---|---|--|
| nrker 3 Δ 9.57000 ms                                  | PNO: Fast +++                            | Trig: Free Run   | Avg Type: Log-Pwr   | TRACE 123456<br>TYPE WWWWWWW  | Properties                               |
| dB/div Ref 10.00 dBm                                  | IFGain:Low                               | Atten: 20 dB   | Δ   | Mkr3 9.570 ms<br>4.44 dB  | Select Marke                             |
|   | 1∆2                                      |  |   | <b>≬</b> 3∆1<br>]   | Relative To                              |
| 0<br>0 X2   |  |  |   |   | X Axis Sca<br>Tim<br><u>Auto</u> M       |
|   |  | na ha na san in 1010 na san<br>Majalan, Minta dala ina ata | u kun kun mana da kata ta kata da kata<br>Kata da kata da | n de la d | <b>Marker Trac</b><br>[Trace1, Auto Init |
| nter 2.441000000 GHz<br>s BW 1.0 MHz                  | VBW 1.                                   | 0 MHz  | Sweep 15  | Span 0 Hz<br>5.00 ms (1001 pts)   | Lin                                      |
| A MODE TRC SCL Χ<br>Δ2 1 t (Δ)<br>F 1 t<br>Δ1 1 t (Δ) | 2.940 ms (Δ)<br>1.110 ms<br>9.570 ms (Δ) | Y FU<br>32.01 dB<br>-35.58 dBm<br>-31.14 dB                | NCTION FUNCTION WIDTH   | FUNCTION VALUE  | On <u>(</u>                              |
|   |  |  |   |   |  |
|   |  |  |   |   |  |

#### Time of Occupancy for PACKET Type 2DH5(DQPSK)



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## 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

 EUT
 Spectrum Analyzer



§5.247(b)(1) The Maximum Peak Output Power Measurement is 0.125 Watts for frequency hopping system operating in 2400-2483.5 MHz employing at least 15 Hopping channels.

#### **Test Results**

#### Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

| Frequency<br>(MHz) | Channel No. | Peak output<br>power(dBm) | Peak output<br>power(mW) | Result   |
|--------------------|-------------|---------------------------|--------------------------|----------|
| 2402               | 0           | -0.938                    | 0.806                    | Complies |
| 2441               | 39          | 0.145                     | 1.034                    | Complies |
| 2480               | 78          | 0.261                     | 1.062                    | Complies |

#### Test mode : DQPSK, CFG PKT Packet Type : 30 Packet Size : 679(2DH5)

| Frequency<br>(MHz) | Channel No. | Peak output<br>power(dBm) | Peak output<br>power(mW) | Result   |  |  |  |  |
|--------------------|-------------|---------------------------|--------------------------|----------|--|--|--|--|
| 2402               | 0           | 1.098                     | 1.288                    | Complies |  |  |  |  |
| 2441               | 39          | 2.128                     | 1.632                    | Complies |  |  |  |  |
| 2480               | 78          | 2.239                     | 1.675                    | Complies |  |  |  |  |

See next pages for actual measured spectrum plots.



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#### Maximum peak Conducted Output Power - GFSK

|                |  |                 |                                     |                       |                       |            | Swept SA | ctrum Analyzer -   |                            |
|----------------|--|-----------------|-------------------------------------|-----------------------|-----------------------|------------|----------|--|----------------------------|
| Peak Search    | M Apr 05, 2015<br>E 1 2 3 4 5 6<br>E M <del>WWWWW</del><br>F P N N N N N | TRAC            | ALIGNAUTO<br>: Log-Pwr<br>> 100/100 | Avg Type<br>Avg Hold: |                       |            | put: RF  | 50 Ω<br><b>2.4408300</b><br>In   | <mark>x</mark><br>Marker 1 |
| Next Peak      | 30 GHz<br>45 dBm   | 2.440 8<br>0.14 | Mkr1                                |                       |                       |            |          | Ref Offset 0.<br>Ref 20.40   | 10 dB/div                  |
| Next Right     |  |                 |                                     |                       |                       |            |          |  | 10.4                       |
| Next Lef       |  |                 |                                     |                       | <b>↓</b> <sup>1</sup> |            |          |  | ).400                      |
| Next Let       |  |                 |                                     |                       |                       |            |          |  | -9.60                      |
| Marker Delta   |  |                 |                                     |                       |                       |            |          |  | -29.6                      |
| Mkr→CF         | www.ded/my   | - New Mark      |                                     |                       |                       |            |          | and and a second se | -39.6                      |
|                |  |                 |                                     |                       |                       |            |          |  | -49.6                      |
| Mkr→RefLv      |  |                 |                                     |                       |                       |            |          |  | -69.6                      |
| More<br>1 of 2 | .000 MHz<br>1001 pts)  | Span 5          | Sween                               |                       | 1.0 MHz               | #VBW       |          | 141000 GHz   | Center 2.<br>#Res BW       |
|                |  |                 | STATUS                              |                       |                       | # ¥ E) V V |          |  | //SG                       |



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#### Maximum peak Conducted Output Power - DQPSK

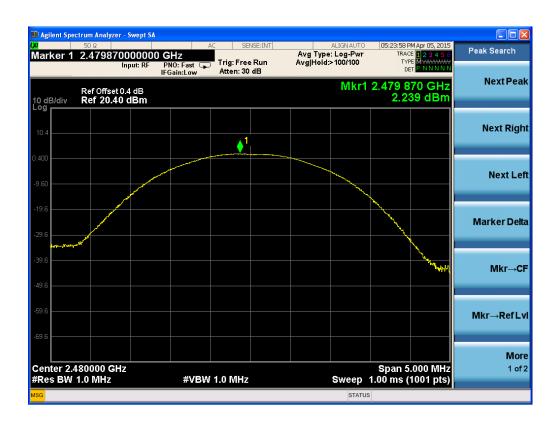




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## 2.1.6 Band-edge

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 channelsRBW = 100 kHzVBW = 100 kHz (\geq RBW)Span = 10 MHzTrace = max holdEUTEUTSpectrum Analyzer
```

#### 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 level of the inband spectral density. Therefore the applying equipment meets the requirement.

See next pages for actual measured spectrum plots.



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Band – edge (with Hopping) - GFSK



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#### Band – edge (without Hopping) - GFSK

| Agilent Spectrum Analyzer - S  σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ | wept SA                              | AC SEI     | NSE:INT | ALIGNAU                            | JTO 05:01:48 PM Apr 05, 2              |   |
|--|--------------------------------------|------------|---------|------------------------------------|--|---|
| Display Line -19.75  | dBm<br>ut: RF PNO: Far<br>IFGain:Low | - · -      | Run A   | Avg Type: Log-P<br>vg Hold:>100/10 | wr TRACE 1234                          | 56 Display<br>NN                        |
| Ref Offset 0.4   | dB<br>I <b>B</b> m                   |            |         | Μ                                  | lkr1 2.479 85 GH<br>0.250 dB           | lz Annotation<br>m                      |
| .400   |                                      |            |         |                                    |  | Title                                   |
| 19.6   |                                      |            |         |                                    | -19.75 c                               | Graticul<br>On O                        |
| 39.6   |                                      |            |         |                                    |  | Display Lin<br>-19.75 dB<br><u>On</u> C |
| 49.6   |                                      | ~~~        |         |                                    |  |   |
| 59.6   |                                      | 1          |         | www.www.                           | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | /₩ System<br>Display<br>Settings        |
| <sup>79.6</sup><br>Center 2.483500 GHz                             |                                      |            |         |                                    | Span 10.00 M                           | Hz                                      |
| Res BW 100 kHz   | #VE                                  | 3W 100 kHz |         | Swee                               | ep 1.27 ms (1001 pt                    | s)                                      |



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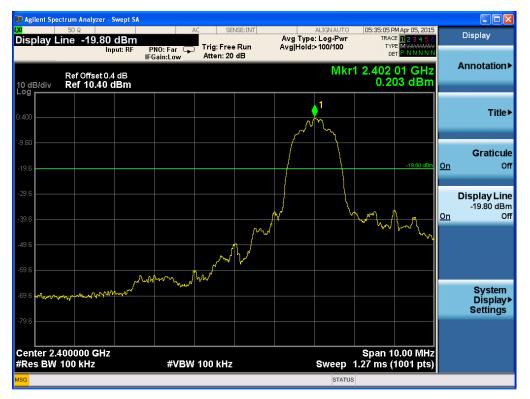


#### Band – edge (with Hopping) - DQPSK





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#### Band – edge (without Hopping) - DQPSK



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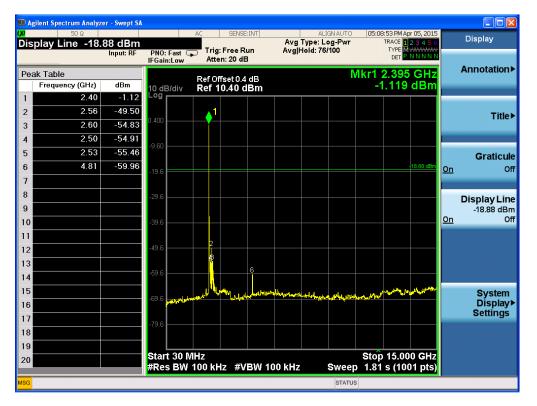
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#### Band – edge (at 20 dB blow) – Low channel Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic (GFSK : Worst-Case)





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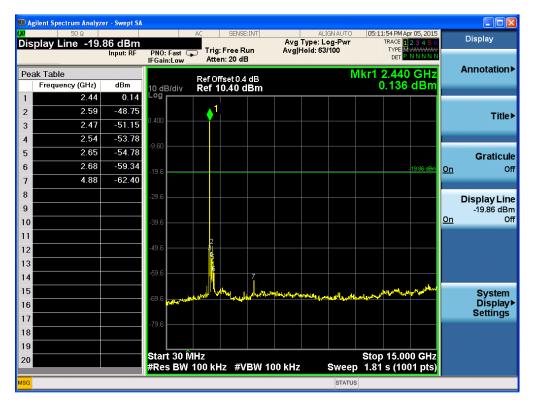
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#### Band – edge (at 20 dB blow) – Mid channel Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic (GFSK : Worst-Case)





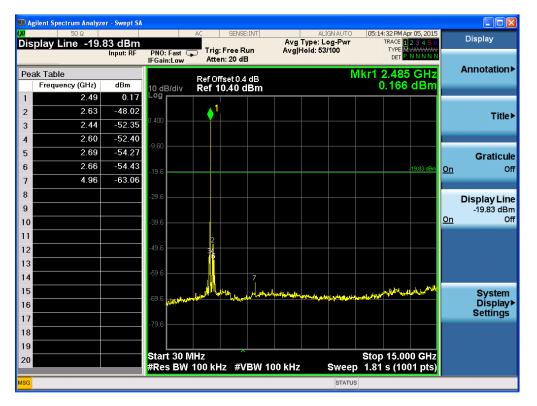
Test Report No.: CTK-2015-00426 Date: 2015-04-12

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#### Band – edge (at 20 dB blow) – High channel Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic (GFSK : Worst-Case)

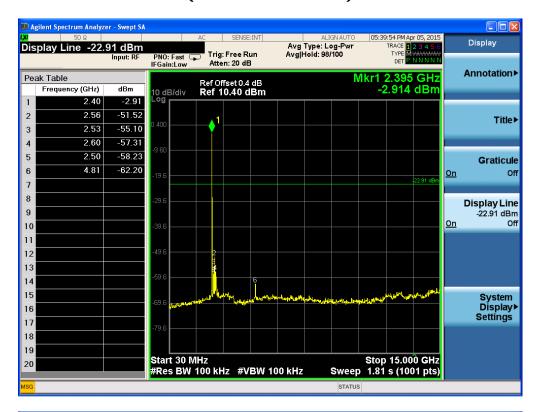




Test Report No.: CTK-2015-00426 Date: 2015-04-12



> Band – edge (at 20 dB blow) – Low channel Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic (DQPSK : Worst-Case)

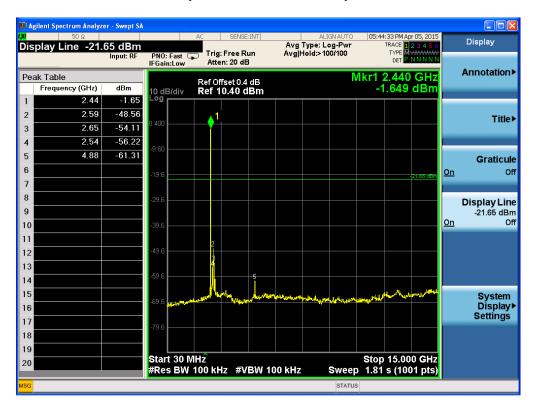




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> Band – edge (at 20 dB blow) – Mid channel Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic (DQPSK : Worst-Case)

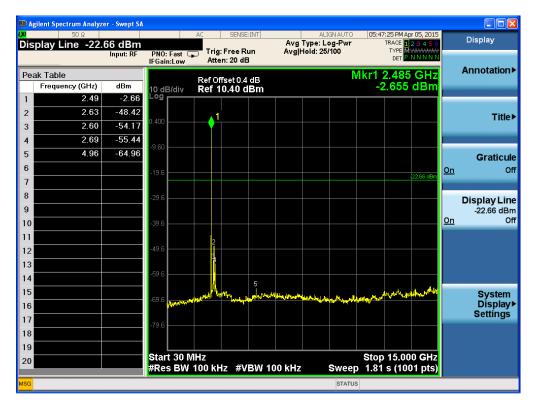




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#### Band – edge (at 20 dB blow) – High channel Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic (DQPSK : Worst-Case)





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# 2.1.7 Field Strength of Emissions

### **Test Location**

 $\boxtimes$  10 m SAC (test distance :  $\square$  10 m,  $\boxtimes$  3 m)  $\boxtimes$  3 m SAC (test distance : 3 m)

# **Test Procedures**

- 1) In the frequency range of 9 kHz to 30 MHz, magnetic field is measured with Loop Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- 2) In the frequency rage above 30 MHz, Bi-Log Test Antenna(30 MHz to 1 GHz) and Horn Test Antenna(above 1 GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.

#### The spectrum analyzer is set to:

Frequency Range = 9 kHz ~ 25 GHz (2.4 GHz  $10^{th}$  harmonic) RBW = 1 MHz for f  $\geq$  1 GHz, 100 kHz for f < 1 GHz, 9 kHz for f < 30 MHz VBW  $\geq$  RBW Sweep = auto

#### Limit

#### - 15.209(a)

| 10.207(0)      |                           |                             |                                  |
|----------------|---------------------------|-----------------------------|----------------------------------|
| Frequency(MHz) | Field Strength<br>uV/m@3m | Field Strength<br>dBuV/m@3m | Deasurement<br>Distance (meters) |
| 0.009-0.490    | 2400/F(kHz)               | -                           | 300                              |
| 0.490-1.705    | 24000/F(kHz)              | -                           | 30                               |
| 1.705-30       | 30                        | -                           | 30                               |
| 30-88          | 100**                     | 40                          | 3                                |
| 88-216         | 150**                     | 43.5                        | 3                                |
| 216-960        | 200**                     | 46                          | 3                                |
| Above 960      | 500                       | 54                          | 3                                |

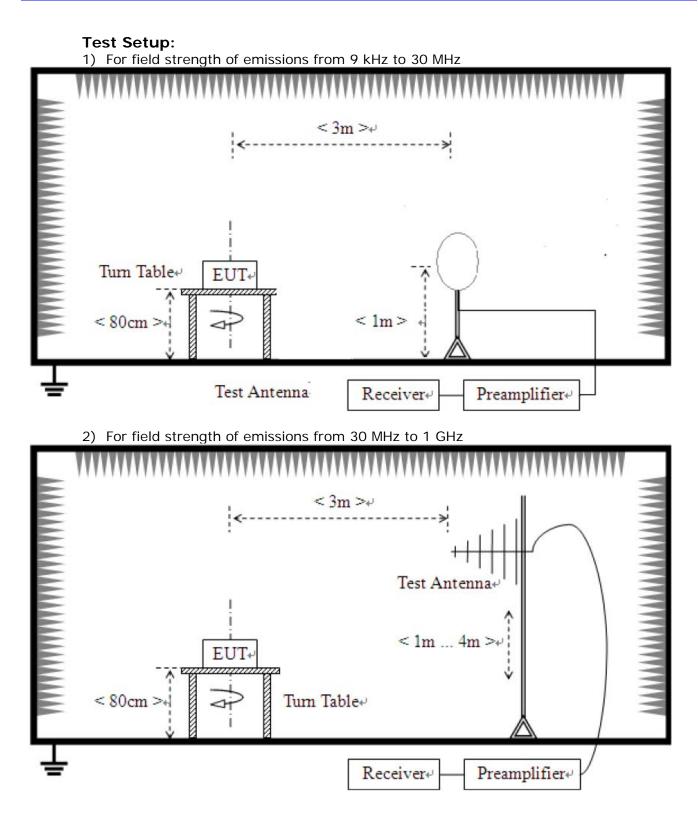
\*\* Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231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

Note :

- 1) For above 1 GHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
- 2) For above 1 GHz, limit field strength of harmonics : 54 dBuV/m@3m (AV) and 74 dBuV/m@3m (PK)



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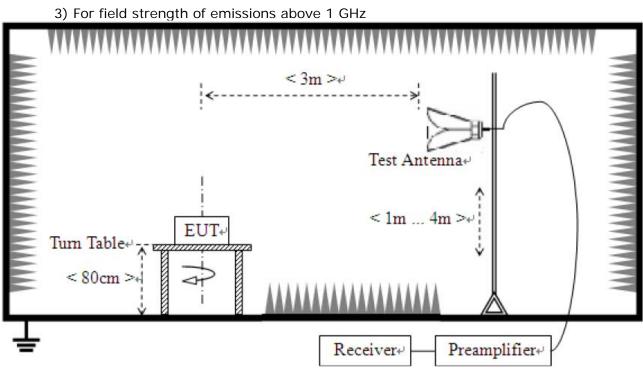




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#### **Test Results** 1) 9 kHz to 30 MHz

#### Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5) Test mode · DOPSK CEG BKT Packet Type · 30 Packet Size · 679(2045)

| Test mode | DUPSK, CFG PKT Packet Type | : SU Packet Size : | 0/9(2005)      |  |
|-----------|----------------------------|--------------------|----------------|--|
| EUT       | Wireless Active Noise      | Measurement Detail |                |  |
|           | Cancelling Headphones      |                    |                |  |
| Model     | BT 330 NC                  | Frequency Range    | 9 kHz – 30 MHz |  |
| Test mode | GFSK, DQPSK                | Detector function  | Quasi-Peak     |  |

The requirements are:

| Complies           |                           |                |          |
|--------------------|---------------------------|----------------|----------|
| Frequency<br>(MHz) | Measured Data<br>(dBuV/m) | Margin<br>(dB) | Remark   |
| -                  | -                         | -              | See note |

#### Note :

The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log (\text{specific distance / test distance}) (dB)$ 



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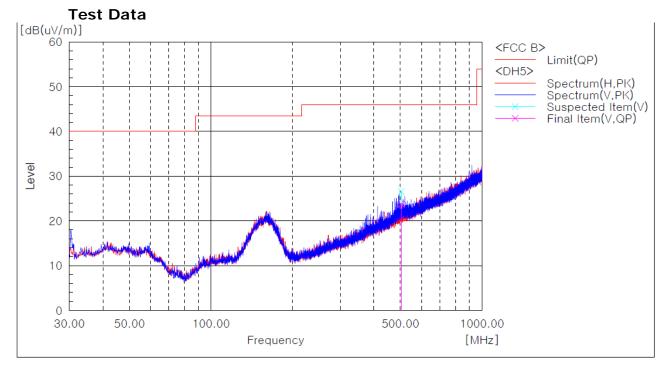
### 2) 30 MHz to 1 GHz

#### Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

| EUT       | Wireless Active Noise<br>Cancelling Headphones | Measurement Detail |                   |  |  |
|-----------|--|--------------------|-------------------|--|--|
| Model     | BT 330 NC                                      | Frequency Range    | Below 1000MHz     |  |  |
| Test mode | GFSK Hopping                                   | Detector function  | Quasi-Peak / Peak |  |  |

The requirements are:

| Complies  |               |        |            |
|-----------|---------------|--------|------------|
| Frequency | Measured Data | Margin | Remark     |
| (MHz)     | (dBuV/m)      | (dB)   | Remark     |
| 504.087   | 23.7          | 22.3   | Quasi-Peak |



Final Result

| No. | Frequency        | (P) | Reading<br>QP    | c.f               | Result<br>QP       | Limit<br>QP        | Margin<br>QP | Height        | Angle          |
|-----|------------------|-----|------------------|-------------------|--------------------|--------------------|--------------|---------------|----------------|
| 1   | [MHz]<br>504.087 | V   | [dB(uV)]<br>26.9 | [dB(1/m)]<br>-3.2 | [dB(uV/m)]<br>23.7 | [dB(uV/m)]<br>46.0 | [dB]<br>22.3 | [cm]<br>100.0 | [deg]<br>200.0 |

#### Remark :

1. The field strength of spurious emission was measured in the following position: EUT standup position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.

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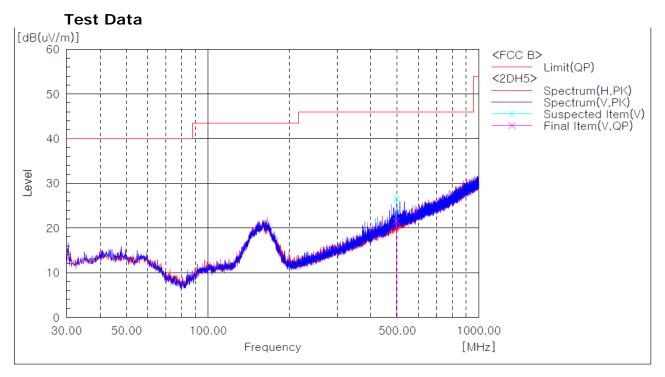
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#### Test mode : DQSK, CFG PKT Packet Type : 30 Packet Size : 679(2DH5)

| EUT       | Wireless Active Noise | Measurement Detail |                   |  |
|-----------|-----------------------|--------------------|-------------------|--|
|           | Cancelling Headphones |                    |                   |  |
| Model     | BT 330 NC             | Frequency Range    | Below 1000MHz     |  |
| Test mode | DQSK Hopping          | Detector function  | Quasi-Peak / Peak |  |

The requirements are:

| Complies           |                           |                |            |
|--------------------|---------------------------|----------------|------------|
| Frequency<br>(MHz) | Measured Data<br>(dBuV/m) | Margin<br>(dB) | Remark     |
| 495.964            | 21.5                      | 24.5           | Quasi-Peak |



Final Result

| No. | Frequency        | (P) | Reading<br>OP | c.f               | Result<br>OP | Limit<br>OP        | Margin<br>OP | Height        | Angle          |
|-----|------------------|-----|---------------|-------------------|--------------|--------------------|--------------|---------------|----------------|
| 1   | [MHz]<br>495.964 | V   |               | [dB(1/m)]<br>-3.4 |              | [dB(uV/m)]<br>46.0 | [dB]<br>24.5 | [cm]<br>100.0 | [deg]<br>235.0 |

#### Remark :

1. The field strength of spurious emission was measured in the following position: EUT standup position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.

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#### 3) above 1 GHz

#### Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

| EUT   | Wireless Active Noise<br>Cancelling Headphones | Measurement Detail |                |
|-------|--|--------------------|----------------|
| Model | PT 220 NC                                      | Frequency Range    | 1-25GHz        |
| woder | BT 330 NC                                      | Detector function  | Average / Peak |
| D     |  |                    |                |

#### Remarks

We have tested three mode (X, Y, Z). The worst mode (Z axis) for final test.

The requirements are:

#### ⊠ Complies

| Frequency<br>(MHz) | Measured Data<br>(dBuV/m) | Margin<br>(dB)     | Remark            |  |
|--------------------|---------------------------|--------------------|-------------------|--|
| No emissions       | were detected at a        | level greater than | 20dB below limit. |  |

#### Test Data

#### Ch.0(Low Channel)

| Frequency | (P) | Reading AV | Reading PK | Factor    | Level<br>AV | Level<br>PK | Limit<br>AV | Limit<br>PK | Margin<br>AV | Margin<br>PK |
|-----------|-----|------------|------------|-----------|-------------|-------------|-------------|-------------|--------------|--------------|
| [MHz]     | ( ) | [dB(uV)]   | [dB(uV)]   | [dB(1/m)] | [dB(uV/m)]  | [dB(uV/m)]  |             | [dB(uV/m)]  | [dB]         | [dB]         |

No emissions were detected at a level greater than 20dB below limit.

#### Ch.39(Mid Channel)

| 1 | Frequency |     | Reading AV | Reading PK | Factor    | Level      | Level      | Limit      | Limit      | Margin | Margin |
|---|-----------|-----|------------|------------|-----------|------------|------------|------------|------------|--------|--------|
|   |           | (P) | _          |            |           | AV         | PK         | AV         | PK         | AV     | PK     |
|   | [MHz]     |     | [dB(uV)]   | [dB(uV)]   | [dB(1/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB]   | [dB]   |
| _ |           |     |            |            |           |            |            |            |            |        |        |

No emissions were detected at a level greater than 20dB below limit.

#### Ch.78(High Channel)

| Frequency | (P) | Reading AV | Reading PK | Factor    | Level<br>AV | Level<br>PK | Limit<br>AV | Limit<br>PK | Margin<br>AV | Margin<br>PK |
|-----------|-----|------------|------------|-----------|-------------|-------------|-------------|-------------|--------------|--------------|
| [MHz]     | . , | [dB(uV)]   | [dB(uV)]   | [dB(1/m)] | [dB(uV/m)]  | [dB(uV/m)]  | [dB(uV/m)]  | [dB(uV/m)]  | [dB]         | [dB]         |

No emissions were detected at a level greater than 20dB below limit.

#### Restricted band edge test data

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

| Frequency |     | Reading AV | Reading PK | Factor    | Level      | Level      | Limit      | Limit      | Margin | Margin |
|-----------|-----|------------|------------|-----------|------------|------------|------------|------------|--------|--------|
|           | (P) |            |            |           | AV         | PK         | AV         | PK         | AV     | PK     |
| [MHz]     |     | [dB(uV)]   | [dB(uV)]   | [dB(1/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB]   | [dB]   |

No emissions were detected at a level greater than 20dB below limit.

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#### Test mode : DQPSK, CFG PKT Packet Type : 30 Packet Size : 679(2DH5)

| EUT   | Wireless Active Noise<br>Cancelling Headphones | Measurement Detail |                |
|-------|--|--------------------|----------------|
| Model | BT 330 NC                                      | Frequency Range    | 1-25GHz        |
| woder | BI 330 NC                                      | Detector function  | Average / Peak |

#### Remarks

We have tested three mode (X, Y, Z). The worst mode (Z axis) for final test.

The requirements are:

|  | 🔀 Complies |               |        |          |  |  |
|--|------------|---------------|--------|----------|--|--|
|  | Frequency  | Measured Data | Margin | Remark   |  |  |
|  | (MHz)      | (dBuV/m)      | (dB)   | Reitidik |  |  |
| No emissions were detected at a level greater than 20dB below limit. |            |               |        |          |  |  |

### Test Data

#### Ch.0(Low Channel)

| Frequency | (P) | Reading AV | Reading PK | Factor    | Level<br>AV | Level<br>PK | Limit<br>AV | Limit<br>PK | Margin<br>AV | Margin<br>PK |
|-----------|-----|------------|------------|-----------|-------------|-------------|-------------|-------------|--------------|--------------|
| [MHz]     | (1) | [dB(uV)]   | [dB(uV)]   | [dB(1/m)] |             | [dB(uV/m)]  |             |             |              | [dB]         |

No emissions were detected at a level greater than 20dB below limit.

#### Ch.39(Mid Channel)

| Frequency | (P) | Reading AV | Reading PK | Factor    | Level<br>AV | Level<br>PK | Limit<br>AV | Limit<br>PK | Margin<br>AV | Margin<br>PK |
|-----------|-----|------------|------------|-----------|-------------|-------------|-------------|-------------|--------------|--------------|
| [MHz]     | ( ) | [dB(uV)]   | [dB(uV)]   | [dB(1/m)] |             | [dB(uV/m)]  | [dB(uV/m)]  |             | [dB]         | [dB]         |

No emissions were detected at a level greater than 20dB below limit.

#### Ch.78(High Channel)

| Frequency | (P) | Reading AV | Reading PK | Factor    | Level<br>AV | Level<br>PK | Limit<br>AV | Limit<br>PK | Margin<br>AV | Margin<br>PK |
|-----------|-----|------------|------------|-----------|-------------|-------------|-------------|-------------|--------------|--------------|
| [MHz]     |     | [dB(uV)]   | [dB(uV)]   | [dB(1/m)] | [dB(uV/m)]  | [dB(uV/m)]  | [dB(uV/m)]  | [dB(uV/m)]  | [dB]         | [dB]         |

No emissions were detected at a level greater than 20dB below limit.

#### Restricted band edge test data

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

| Frequency | (P) | Reading AV | Reading PK | Factor    | Level<br>AV | Level<br>PK | Limit<br>AV | Limit<br>PK | Margin<br>AV | Margin<br>PK |
|-----------|-----|------------|------------|-----------|-------------|-------------|-------------|-------------|--------------|--------------|
| [MHz]     | (1) | [dB(uV)]   | [dB(uV)]   | [dB(1/m)] |             | [dB(uV/m)]  |             |             |              | [dB]         |

No emissions were detected at a level greater than 20dB below limit.

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# Test Results 1) 9 kHz to 30 MHz

#### Test mode : Receiver

| EUT       | Wireless Active Noise | Measurement Detail |                |
|-----------|-----------------------|--------------------|----------------|
|           | Cancelling Headphones |                    |                |
| Model     | BT 330 NC             | Frequency Range    | 9 kHz – 30 MHz |
| Test mode | Receiver              | Detector function  | Quasi-Peak     |

The requirements are:

 $\boxtimes$  Complies

| Frequency<br>(MHz) | Measured Data<br>(dBuV/m) | Margin<br>(dB) | Remark   |
|--------------------|---------------------------|----------------|----------|
| -                  | -                         | -              | See note |

#### Note :

The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB)



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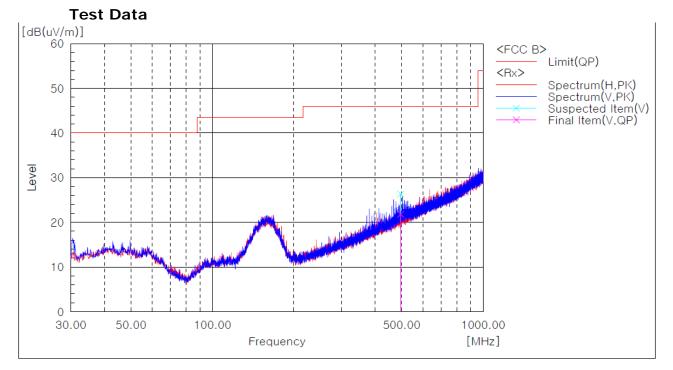
# 2) 30 MHz to 1 GHz

#### Test mode : Receiver

| EUT       | Wireless Active Noise<br>Cancelling Headphones | Measurement Detail |                   |
|-----------|--|--------------------|-------------------|
| Model     | BT 330 NC                                      | Frequency Range    | Below 1000MHz     |
| Test mode | Receiver                                       | Detector function  | Quasi-Peak / Peak |

The requirements are:

| Complies  |               |        |            |
|-----------|---------------|--------|------------|
| Frequency | Measured Data | Margin | Remark     |
| (MHz)     | (dBuV/m)      | (dB)   | Reitidik   |
| 495.964   | 21.8          | 24.2   | Quasi-Peak |



Final Result

| No. | Frequency        | (P) | Reading<br>OP    | c.f               | Result<br>OP       | Limit              | Margin<br>OP | Height        | Angle          |
|-----|------------------|-----|------------------|-------------------|--------------------|--------------------|--------------|---------------|----------------|
| 1   | [MHz]<br>495.964 | V   | [dB(uV)]<br>25.2 | [dB(1/m)]<br>-3.4 | [dB(uV/m)]<br>21.8 | [dB(uV/m)]<br>46.0 | [dB]<br>24.2 | [cm]<br>100.0 | [deg]<br>237.0 |

#### Remark :

1. The field strength of spurious emission was measured in the following position: EUT standup position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.

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### 3) above 1 GHz

#### Test mode : Receiver

| EUT   | Wireless Active Noise<br>Cancelling Headphones | Measurement Detail |                |  |
|-------|--|--------------------|----------------|--|
| Model | BT 330 NC                                      | Frequency Range    | 1-25GHz        |  |
| woder | DI 330 NC                                      | Detector function  | Average / Peak |  |

#### Remarks

We have tested three mode (X, Y, Z). The worst mode (Z axis) for final test.

The requirements are:

| $\boxtimes$ | Complies |
|-------------|----------|
|-------------|----------|

|  | equency<br>(MHz) | Measured Data<br>(dBuV/m) | Margin<br>(dB) | Remark |  |  |  |  |  |
|--|------------------|---------------------------|----------------|--------|--|--|--|--|--|
| No emissions were detected at a level greater than 20dB below limit. |                  |                           |                |        |  |  |  |  |  |

### Test Data

#### Ch.0(Low Channel)

| Frequency |     | Reading AV | Reading PK | Factor    | Level<br>AV      | Level<br>PK | Limit            | Limit<br>PK |            | Margin<br>PK |
|-----------|-----|------------|------------|-----------|------------------|-------------|------------------|-------------|------------|--------------|
| [MHz]     | (P) | [dB(uV)]   | [dB(uV)]   | [dB(1/m)] | AV<br>[dB(uV/m)] |             | AV<br>[dB(uV/m)] |             | AV<br>[dB] | [dB]         |

No emissions were detected at a level greater than 20dB below limit.

#### Ch.39(Mid Channel)

| Frequency |     | Reading AV | Reading PK | Factor    | Level<br>AV | Level<br>PK | Limit<br>AV      | Limit<br>PK | Margin<br>AV | Margin<br>PK |
|-----------|-----|------------|------------|-----------|-------------|-------------|------------------|-------------|--------------|--------------|
| [MHz]     | (P) | [dB(uV)]   | [dB(uV)]   | [dB(1/m)] |             |             | AV<br>[dB(uV/m)] |             |              | [dB]         |

No emissions were detected at a level greater than 20dB below limit.

#### Ch.78(High Channel)

| Frequency | (P) | Reading AV | Reading PK | Factor    | Level<br>AV | Level<br>PK | Limit<br>AV | Limit<br>PK | Margin<br>AV | Margin<br>PK |
|-----------|-----|------------|------------|-----------|-------------|-------------|-------------|-------------|--------------|--------------|
| [MHz]     | ~ / | [dB(uV)]   | [dB(uV)]   | [dB(1/m)] | [dB(uV/m)]  | [dB(uV/m)]  | [dB(uV/m)]  | [dB(uV/m)]  | [dB]         | [dB]         |

No emissions were detected at a level greater than 20dB below limit.

#### Restricted band edge test data

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

| Frequency |     | Reading AV | Reading PK | Factor    | Level      | Level      | Limit      | Limit      | Margin | Margin |
|-----------|-----|------------|------------|-----------|------------|------------|------------|------------|--------|--------|
|           | (P) |            |            |           | AV         | PK         | AV         | PK         | AV     | PK     |
| [MHz]     |     | [dB(uV)]   | [dB(uV)]   | [dB(1/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB(uV/m)] | [dB]   | [dB]   |
|           |     |            |            |           |            |            |            |            |        |        |

No emissions were detected at a level greater than 20dB below limit.

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# 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  | Conducted Limit (dBuV) |           |  |  |  |  |
|------------|------------------------|-----------|--|--|--|--|
| (MHz)      | 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:

 $\boxtimes$  Complies

#### Test mode : USB Charge

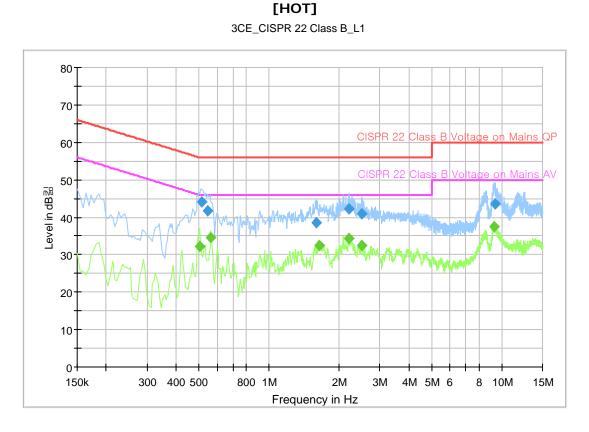
| Frequency | Measured Data | Margin | Remark  |  |  |
|-----------|---------------|--------|---------|--|--|
| (MHz)     | (dBuV/m)      | (dB)   |         |  |  |
| 0.528     | 35.0          | 11.0   | Average |  |  |



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Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501 www.e-ctk.com

Test Data



# **Final Result 1**

| Frequency<br>(MHz) | QuasiPeak<br>(dBuV) | Meas.<br>Time<br>(ms) | Bandwidth<br>(kHz) | Filter | Line | Corr.<br>(dB) | Margin<br>(dB) | Limit<br>(dBuV) |
|--------------------|---------------------|-----------------------|--------------------|--------|------|---------------|----------------|-----------------|
| 0.514500           | 44.0                | 1000.0                | 9.000              | On     | L1   | 9.9           | 12.0           | 56.0            |
| 0.546000           | 41.7                | 1000.0                | 9.000              | On     | L1   | 9.9           | 14.3           | 56.0            |
| 1.603500           | 38.4                | 1000.0                | 9.000              | On     | L1   | 9.7           | 17.6           | 56.0            |
| 2.197500           | 42.3                | 1000.0                | 9.000              | On     | L1   | 9.7           | 13.7           | 56.0            |
| 2.512500           | 41.0                | 1000.0                | 9.000              | On     | L1   | 9.8           | 15.0           | 56.0            |
| 9.420000           | 43.6                | 1000.0                | 9.000              | On     | L1   | 9.9           | 16.4           | 60.0            |

# **Final Result 2**

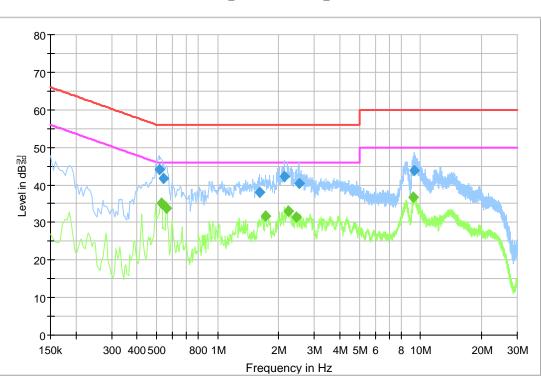
| Frequency<br>(MHz) | CAverage<br>(dBuV) | Meas.<br>Time<br>(ms) | Bandwidth<br>(kHz) | Filter | Line | Corr.<br>(dB) | Margin<br>(dB) | Limit<br>(dBuV) |
|--------------------|--------------------|-----------------------|--------------------|--------|------|---------------|----------------|-----------------|
| 0.505500           | 32.1               | 1000.0                | 9.000              | On     | L1   | 9.9           | 13.9           | 46.0            |
| 0.564000           | 34.6               | 1000.0                | 9.000              | On     | L1   | 9.9           | 11.4           | 46.0            |
| 1.653000           | 32.5               | 1000.0                | 9.000              | On     | L1   | 9.7           | 13.5           | 46.0            |
| 2.215500           | 34.4               | 1000.0                | 9.000              | On     | L1   | 9.7           | 11.6           | 46.0            |
| 2.508000           | 32.5               | 1000.0                | 9.000              | On     | L1   | 9.8           | 13.5           | 46.0            |
| 9.253500           | 37.4               | 1000.0                | 9.000              | On     | L1   | 9.9           | 12.6           | 50.0            |

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#### [NEUTRAL] 3CE\_CISPR 22 Class B\_N

# Final Result 1

| Frequency<br>(MHz) | QuasiPeak<br>(dBuV) | Meas.<br>Time<br>(ms) | Bandwidth<br>(kHz) | Filter | Line | Corr.<br>(dB) | Margin<br>(dB) | Limit<br>(dBuV) |
|--------------------|---------------------|-----------------------|--------------------|--------|------|---------------|----------------|-----------------|
| 0.514500           | 44.1                | 1000.0                | 9.000              | On     | Ν    | 9.9           | 11.9           | 56.0            |
| 0.541500           | 41.7                | 1000.0                | 9.000              | On     | Ν    | 9.9           | 14.3           | 56.0            |
| 1.603500           | 38.0                | 1000.0                | 9.000              | On     | Ν    | 9.7           | 18.0           | 56.0            |
| 2.134500           | 42.2                | 1000.0                | 9.000              | On     | Ν    | 9.6           | 13.8           | 56.0            |
| 2.512500           | 40.5                | 1000.0                | 9.000              | On     | Ν    | 9.7           | 15.5           | 56.0            |
| 9.280500           | 43.9                | 1000.0                | 9.000              | On     | Ν    | 9.9           | 16.1           | 60.0            |

# Final Result 2

| Frequency<br>(MHz) | CAverage<br>(dBuV) | Meas.<br>Time<br>(ms) | Bandwidth<br>(kHz) | Filter | Line | Corr.<br>(dB) | Margin<br>(dB) | Limit<br>(dBuV) |
|--------------------|--------------------|-----------------------|--------------------|--------|------|---------------|----------------|-----------------|
| 0.528000           | 35.0               | 1000.0                | 9.000              | On     | Ν    | 9.9           | 11.0           | 46.0            |
| 0.559500           | 33.9               | 1000.0                | 9.000              | On     | Ν    | 9.9           | 12.1           | 46.0            |
| 1.725000           | 31.7               | 1000.0                | 9.000              | On     | Ν    | 9.7           | 14.3           | 46.0            |
| 2.229000           | 33.1               | 1000.0                | 9.000              | On     | Ν    | 9.6           | 12.9           | 46.0            |
| 2.436000           | 31.5               | 1000.0                | 9.000              | On     | Ν    | 9.7           | 14.5           | 46.0            |
| 9.249000           | 36.8               | 1000.0                | 9.000              | On     | Ν    | 9.9           | 13.2           | 50.0            |

Test Report No.: CTK-2015-00426 Date: 2015-04-12



# **APPENDIX A – Test Equipment Used For Tests**

|    | Name of Equipment             | Manufacturer          | Model No.   | Serial No.  | Cal Date   | Due Date   |
|----|-------------------------------|-----------------------|-------------|-------------|------------|------------|
| 1  | Signal Analyzer               | Agilent               | N9020A      | MY48011598  | 2014-11-07 | 2015-11-07 |
| 2  | Spectrum Analyzer             | Rohde & Schwarz       | FSP-30      | 100994      | 2014-11-07 | 2015-11-07 |
| 3  | EMI Test Receiver             | Rohde & Schwarz       | ESCI7       | 100814      | 2014-12-05 | 2015-12-05 |
| 4  | EMI Test Receiver             | Rohde & Schwarz       | ESCI7       | 100816      | 2014-12-05 | 2015-12-05 |
| 5  | Active Loop Antenna           | SCHWARZBECK           | FMZB 1513   | 1513-126    | 2014-05-19 | 2016-05-19 |
| 6  | Attenuator                    | HP                    | 8498A       | 1801A06913  | 2014-11-11 | 2015-11-11 |
| 7  | EPM Series Power Meter        | HP                    | E4418A      | GB38272734  | 2014-11-17 | 2015-11-17 |
| 8  | Power Sensor                  | HP                    | 8487A       | 3318A03524  | 2015-02-06 | 2016-02-06 |
| 9  | Audio Analyzer                | HP                    | 8903B       | 2747A03432  | 2014-11-10 | 2015-11-10 |
| 10 | ESG-D Series Signal Generator | Agilent               | E4432B      | US40054094  | 2014-11-12 | 2015-11-12 |
| 11 | SYNTHESIZED SWEEPER           | HP                    | 8341B       | 2819A01563  | 2014-11-14 | 2015-11-14 |
| 12 | Attenuator                    | HP                    | 8494A       | 3308A33351  | 2014-11-07 | 2015-11-07 |
| 13 | Temp&Humi Chamber             | Kunpoong              | JT-TH-556-1 | 9QE5-002    | 2015-01-16 | 2016-01-16 |
| 14 | Temp&Humi Chamber             | Kunpoong              | JT-TH-556-2 | 9QE5-003    | 2015-01-16 | 2016-01-16 |
| 15 | Temp&Humi Chamber             | ESPEC CORP.           | SH-241      | 92000872    | 2014-08-18 | 2015-08-18 |
| 16 | DC POWER SUPPLY               | Agilent               | E3632A      | MY40011638  | 2014-11-07 | 2015-11-07 |
| 17 | Horn Antenna                  | ETS-Lindgren          | 3115        | 00078894    | 2013-05-13 | 2015-05-13 |
| 18 | Horn Antenna                  | ETS-Lindgren          | 3116        | 00062504    | 2013-05-27 | 2015-05-27 |
| 19 | Horn Antenna                  | ETS-Lindgren          | 3117        | 00154525    | 2013-07-03 | 2015-07-03 |
| 20 | OPT H64 AMPLIFIER             | HP                    | 8447F       | 3113A06814  | 2015-02-06 | 2016-02-06 |
| 21 | PREAMPLIFIER                  | Agilent               | 8449B       | 3008A02307  | 2014-10-24 | 2015-10-24 |
| 22 | Radio Communication Tester    | Rohde & Schwarz       | CMU200      | 106765      | 2015-02-02 | 2016-02-02 |
| 23 | LISN                          | Rohde & Schwarz       | ENV216      | 101235      | 2014-07-30 | 2015-07-30 |
| 24 | LISN                          | Rohde & Schwarz       | ENV216      | 101236      | 2014-07-30 | 2015-07-30 |
| 25 | LISN                          | Rohde & Schwarz       | ENV216      | 101151      | 2014-11-07 | 2015-11-07 |
| 26 | DC POWER SUPPLY               | Agilent               | E3632A      | MY40011638  | 2014-11-07 | 2015-11-07 |
| 27 | EMI Test Receiver             | Rohde & Schwarz       | ESCI3       | 100032      | 2015-02-02 | 2016-02-02 |
| 28 | 6dB Attenuator                | R&S                   | DNF         | 272.4110.50 | 2014-11-07 | 2015-11-07 |
| 29 | AMPLIFIER                     | Sonoma Instrument Co. | 310         | 291721      | 2015-02-02 | 2016-02-02 |
| 30 | EMI Test Receiver             | Rohde & Schwarz       | ESU40       | 100336      | 2014-05-15 | 2015-05-15 |
| 31 | Signal Generator              | Rohde & Schwarz       | SMBV100A    | 258008      | 2014-08-21 | 2015-08-21 |
| 32 | Bilog Antenna                 | Schaffner             | CBL6111C    | 2551        | 2014-05-08 | 2016-05-08 |