

# TEST REPORT

For

**Mobile phone incorporated with Bluetooth**

In conformity with

**FCC CFR 47 Part15 (October 1, 2007) / RSS-210 Issue 7, RSS-Gen Issue 2**

**Model: F-09A**

**FCC ID/ IC Certification No.: VQK-F09A / 337E-F09A**

**Test Item: Mobile phone incorporated with Bluetooth**

**Report No: RY0902Z26R1**

**Issue Date: 26 February, 2009**

**Prepared for**

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**History**

| Report No.  | Date              | Revisions     | Revised By |
|-------------|-------------------|---------------|------------|
| RY0902Z26R1 | 26 February, 2009 | Initial Issue | K. Ohnishi |
|             |                   |               |            |

## 1 General information

### 1.1 Product description

Test item : Mobile phone incorporated with Bluetooth  
 Manufacturer : Fujitsu Limited  
 Address : 1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki 211-8588, Japan  
 Model : F-09A  
 FCC ID : VQK-F09A  
 IC Certification No : 337E-F09A  
 Serial numbers : RF Radiated (356752020009441), RF Conducted (356752020008153)  
 Fundamental Operated Frequency : Tx/Rx Freq. (2402 - 2480 MHz)  
 Oscillator frequencies : 26 MHz  
 Type of Modulation : FHSS (GFSK,  $\pi/4$ DQPSK, 8DPSK)  
 RF Output Power : 0.80dBm (measured at the antenna terminal)  
 Antenna Gain : -0.55 dBi ( $\lambda/4$  Monopole antenna)  
 Receipt date of EUT : 3 February, 2009  
 Nominal power source voltages : DC 3.7V (Battery)

### 1.2 Test(s) performed/ Summary of test result

Test specification(s) : FCC CFR 47. Part 15 (October 1, 2007) / RSS-210 Issue 7, RSS-Gen Issue 2  
 Test method(s) : ANSI C63.4: 2003  
 Test(s) started : 9 February, 2009  
 Test(s) completed : 26 February, 2009  
 Purpose of test(s) : Grant for Certification of FCC / IC  
 Summary of test result : Complied

Note: The above judgment is only based on the measurement data and it does not include the measurement uncertainty. Accordingly, the statement below is applied to the test result.  
 The EUT complies with the limit required in the standard in case that the margin is not less than the measurement uncertainty in the Laboratory.  
 Compliance of the EUT is more probable than non-compliance is case that the margin is less than the measurement uncertainty in the Laboratory.

Test engineer : K. Ohnishi  
 K. Ohnishi  
 EMC testing Department

Reviewer : T. Ikegami  
 T. Ikegami  
 Manager  
 EMC testing Department

### 1.3 Test facility

The Federal Communications Commission has reviewed the technical characteristics of the test facilities at RF Technologies Ltd., located in 472, Nippa-cho, Kohoku-ku, Yokohama, 223-0057, Japan, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948, per October 1, 2007. The description of the test facilities has been filed under registration number 319924 at the Office of the Federal Communications Commission. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The list of all public test facilities is available on the Internet at <http://www.fcc.gov>.

Registered by Voluntary Control Council for Interference by Information Technology Equipment (VCCI)

Each registered facility number is as follows;

Test site (Semi-Anechoic chamber 3m) R-2393

Test site (Shielded room) C-2617

Registered by Industry Canada (IC): The registered facility number is as follows;

Test site No. 1 (Semi-Anechoic chamber 3m): 6974A

Accredited by **National Voluntary Laboratory Accreditation Program (NVLAP)** for the emission tests stated in the scope of the certificate under Certificate Number 200780-0

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



NVLAP LAB CODE 200780-0

### 1.4 Measurement uncertainty

The treatment of uncertainty is based on the general matters on the definition of uncertainty in “Guide to the expression of uncertainty in measurement (GUM)” published by ISO. The Lab’s uncertainty is determined by referring UKAS Publication LAB34: 2002 “The Expression of Uncertainty in EMC Testing” and CISPR16-4-2: 2003 “Uncertainty in EMC Measurements”.

The uncertainty of the measurement result in the level of confidence of approximately 95% (k=2) is as follows;

Conducted emission:  $\pm 1.9$  dB (10 kHz – 30 MHz)

Radiated emission (9 kHz - 30MHz):  $\pm 2.8$  dB

Radiated emission (30MHz - 1000MHz):  $\pm 5.7$  dB

Radiated emission (above 1000MHz):  $\pm 5.8$  dB

## 1.5 Summary of test results

### 1.5.1 Table of test summary

| Requirement of;                                     | Section in FCC15    | Section in RSS210/ RSS-Gen | Result   | Sample | Section in this report |
|-----------------------------------------------------|---------------------|----------------------------|----------|--------|------------------------|
| 1.5.1 Occupied Bandwidth (20 dB/99%)                | 15.247(a)(1)        | A8.1(1)                    | -        | A2     | 2.1                    |
| 1.5.2 Hopping Carrier Frequency Separation          | 15.247(a)(1)        | A8.1(2)                    | Complied | A2     | 2.2                    |
| 1.5.3 Number of Hopping Channel                     | 15.247(a)(1)(iii)   | A8.1(4)                    | Complied | A2     | 2.3                    |
| 1.5.4 Average Time of Occupancy                     | 15.247(a)(1)(iii)   | A8.1(4)                    | Complied | A2     | 2.4                    |
| 1.5.5 Peak Output Power                             | 15.247(a)(1)/(b)(1) | A8.4(2)                    | Complied | A2     | 2.5                    |
| 1.5.6 Conducted Spurious Emissions                  | 15.247(d)           | A8.5                       | Complied | A2     | 2.6                    |
| 1.5.7 Transmitter Radiated Spurious Emissions       | 15.205(b)/15.209    | A8.5                       | Complied | A1     | 2.7                    |
| 1.5.8 Transmitter AC Power Line Conducted Emissions | 15.207              | RSS-Gen 7.2.2              | Complied | A1     | 2.8                    |
| 1.5.9 Receiver Radiated Spurious Emissions          | 15.109              | RSS-Gen 6                  | Complied | A1     | 2.9                    |
| 1.5.10 Receiver AC Power Line Conducted Emissions   | 15.107              | RSS-Gen 7.2.2              | Complied | A1     | 2.10                   |

## 1.6 Setup of equipment under test (EUT)

### 1.6.1 Test configuration of EUT

#### Equipment(s) under test:

|    | Item                                     | Manufacturer    | Model No. | Serial No.      | Remarks            |
|----|------------------------------------------|-----------------|-----------|-----------------|--------------------|
| A1 | Mobile phone incorporated with Bluetooth | Fujitsu Limited | F-09A     | 356752020009441 | For radiated test  |
| A2 | Mobile phone incorporated with Bluetooth | Fujitsu Limited | F-09A     | 356752020008153 | For conducted test |
| B  | Li-ion Battery Pack                      | Fujitsu Limited | F10       | AFF29105        | 3.7V, 870mAh       |

#### Support Equipment(s):

|   | Item             | Manufacturer     | Model No.        | Serial No. |
|---|------------------|------------------|------------------|------------|
| C | AC Adapter       | NEC Corporation  | MAS-BH0008-A 002 | QKA        |
| D | Monaural headset | NTT DOCOMO, INC. | -                | -          |

#### Connected cable(s):

| No. | Item             | Identification (Manu.e.t.c) | Shielded YES / NO | Ferrite Core YES / NO | Connector Type Shielded YES / NO | Length (m) |
|-----|------------------|-----------------------------|-------------------|-----------------------|----------------------------------|------------|
| 1   | DC power cable   | NEC Corporation             | No                | No                    | No                               | 0.6        |
| 2   | AC power cable   | NEC Corporation             | No                | No                    | No                               | 1.3        |
| 3   | Conversion cable | NTT DOCOMO, INC.            | No                | No                    | No                               | 0.1        |

## 1.6.2 Operating condition:

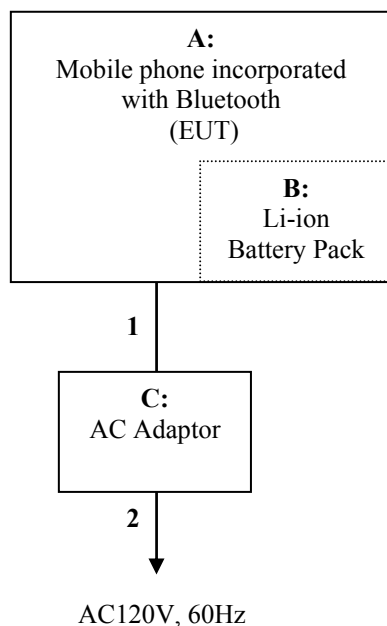
Operating mode:

The EUT was tested under the following test mode prepared by the applicant:

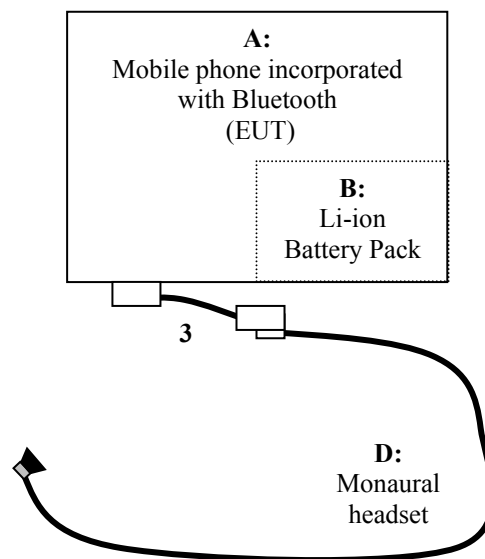
- (1-1) GFSK modulation, Continuous transmission with DH1/3/5 PACKET at hopping off (2402MHz)
- (1-2) GFSK modulation, Continuous transmission with DH1/3/5 PACKET at hopping off (2441MHz)
- (1-3) GFSK modulation, Continuous transmission with DH1/3/5 PACKET at hopping off (2480MHz)
- (1-4)  $\pi/4$ DQPSK modulation, Continuous transmission with DH1/3/5 PACKET at hopping off (2402MHz)
- (1-5)  $\pi/4$ DQPSK modulation, Continuous transmission with DH1/3/5 PACKET at hopping off (2441MHz)
- (1-6)  $\pi/4$ DQPSK modulation, Continuous transmission with DH1/3/5 PACKET at hopping off (2480MHz)
- (1-7) 8DQPSK modulation, Continuous transmission with DH1/3/5 PACKET at hopping off (2402MHz)
- (1-8) 8DQPSK modulation, Continuous transmission with DH1/3/5 PACKET at hopping off (2441MHz)
- (1-9) 8DQPSK modulation, Continuous transmission with DH1/3/5 PACKET at hopping off (2480MHz)
- (1-10) Continuous transmission with DH1/3/5 PACKET at hopping on
- (2-1) Continuous receiving (2402MHz)
- (2-2) Continuous receiving (2441MHz)
- (2-3) Continuous receiving (2480MHz)

## 1.6.3 Setup diagram of tested system:

[Configuration 1]



[Configuration 2]



## 1.7 Equipment modifications

No modifications have been made to the equipment in order to achieve compliance with the applicable standards described in clause 1.2.

## 1.8 Deviation from the standard

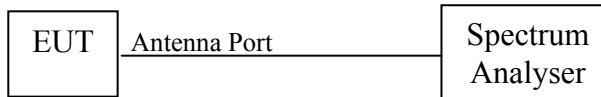
No deviations from the standards described in clause 1.2.

## 2 Test procedure and test data

### 2.1 Occupied Bandwidth (20 dB / 99%)

#### Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



#### Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4: 2003 clauses 13.1.7. The EUT antenna port connected to the spectrum analyzer. The RBW is set to 1% to 3% of the measured 20dB bandwidth. The VBW is set to 3 times of the RBW. The sweep time is coupled appropriate.

#### Limitation

There are no limitations. The measurement value is used to calculation of the limitation of the channel separation and the emission designator.

#### Test equipment used (refer to List of utilized test equipment)

|      |      |  |  |  |  |
|------|------|--|--|--|--|
| TR06 | CL23 |  |  |  |  |
|------|------|--|--|--|--|

#### Test results

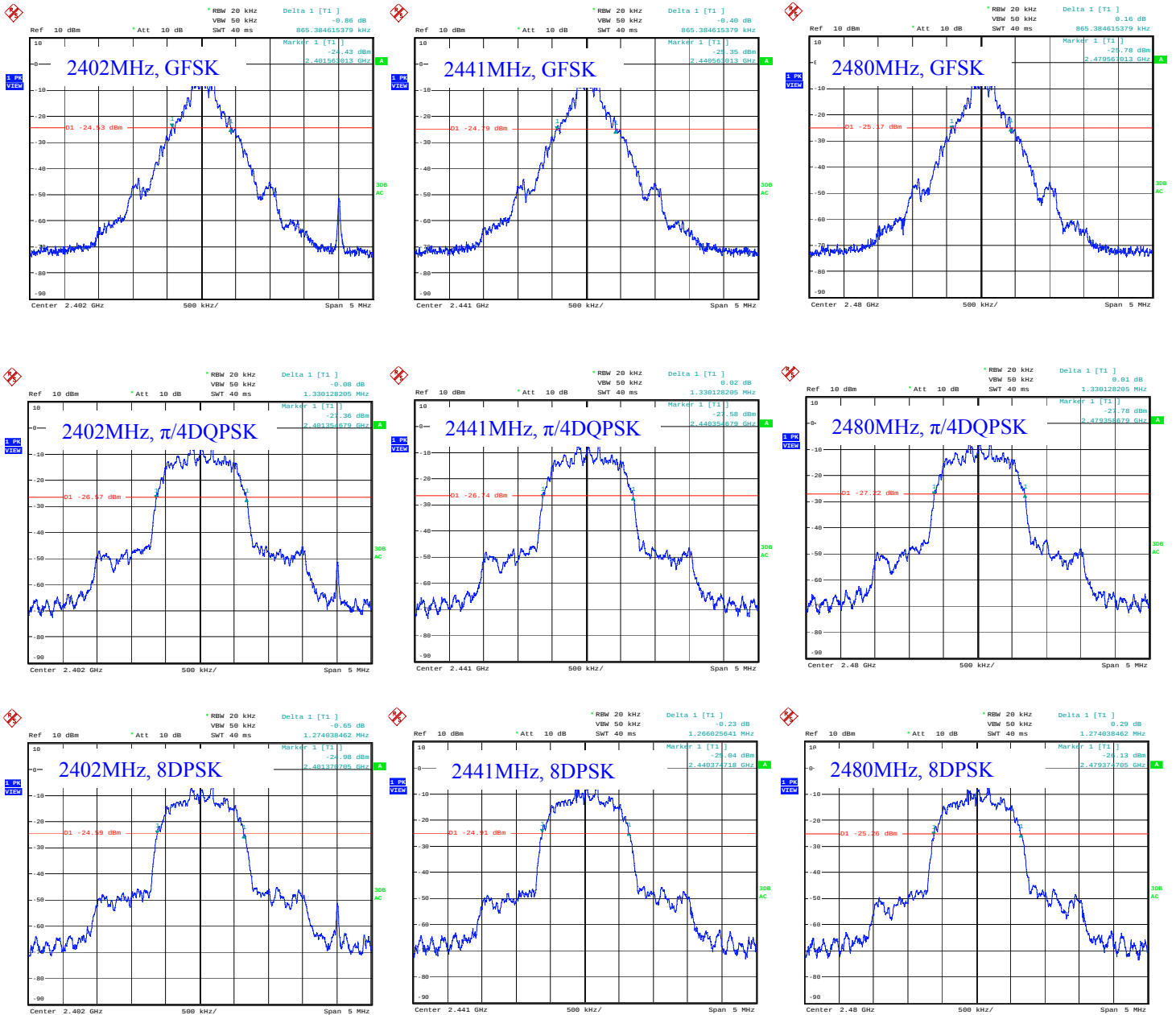
| Operating Mode        | Transmission Channel | Transmission Frequency | Bandwidth [MHz] |       |
|-----------------------|----------------------|------------------------|-----------------|-------|
|                       |                      |                        | 20dB            | 99%   |
| GFSK (1Mbps)          | Low (0ch)            | 2402                   | 0.865           | 0.964 |
|                       | Middle (39ch)        | 2441                   | 0.865           | 0.960 |
|                       | High (78ch)          | 2480                   | 0.865           | 0.956 |
| $\pi/4$ DQPSK (2Mbps) | Low (0ch)            | 2402                   | 1.330           | 1.208 |
|                       | Middle (39ch)        | 2441                   | 1.330           | 1.212 |
|                       | High (78ch)          | 2480                   | 1.330           | 1.212 |
| 8DPSK (3Mbps)         | Low (0ch)            | 2402                   | 1.274           | 1.220 |
|                       | Middle (39ch)        | 2441                   | 1.266           | 1.220 |
|                       | High (78ch)          | 2480                   | 1.274           | 1.224 |

## Test Data

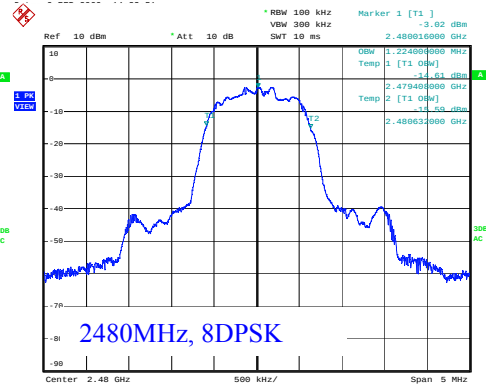
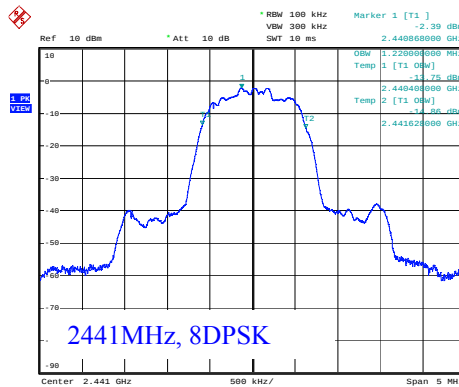
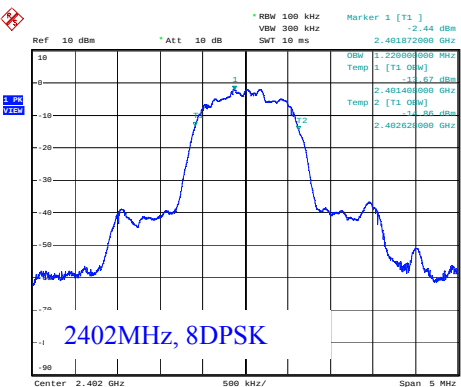
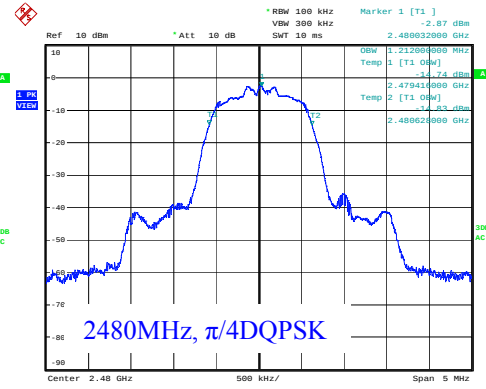
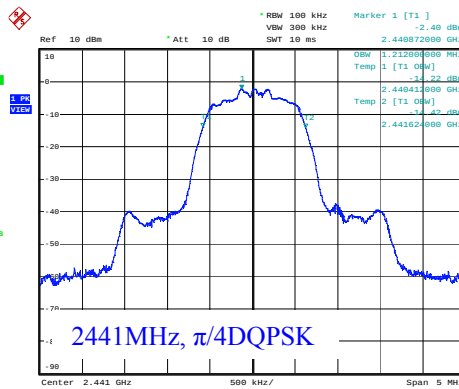
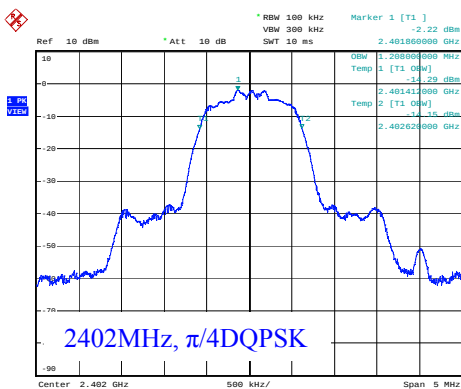
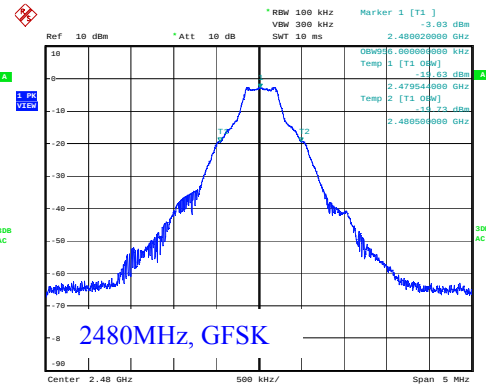
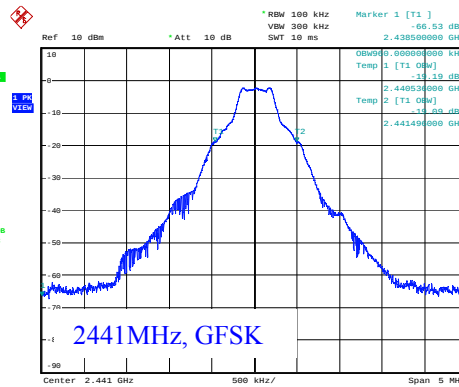
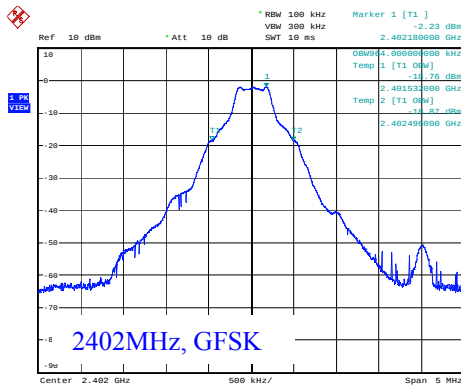
Tested Date: February 9, 2009

Temperature: 22 °C  
Humidity: 27 %  
Atmos. Press: 1009 hPa

## 20dB Bandwidth



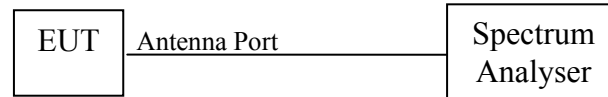
## 99% Occupied Bandwidth



## 2.2 Hopping Carrier Frequency Separation

### Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



### Test procedure

The EUT antenna port connected to the spectrum analyzer. The RBW is set to more than 1% of its span. The VBW is set to more than RBW. The sweep time is coupled appropriate.

### Limitation

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

### Test equipment used (refer to List of utilized test equipment)

|      |      |  |  |  |  |
|------|------|--|--|--|--|
| TR06 | CL23 |  |  |  |  |
|------|------|--|--|--|--|

### Test results – comply with the limitation

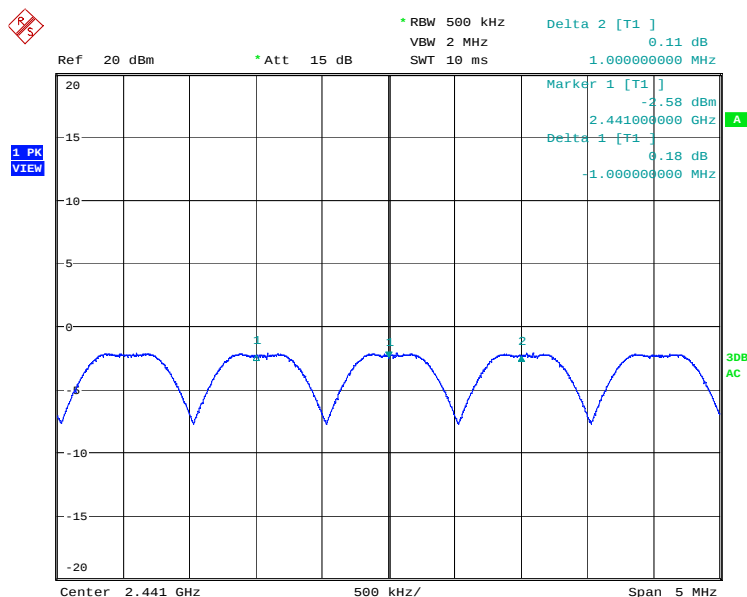
| Operating Mode | Measured Channel | Measured Frequency (MHz) | Two-third of the 20dB bandwidth (MHz) | Frequency Separation (MHz) |
|----------------|------------------|--------------------------|---------------------------------------|----------------------------|
| GFSK           | Middle (39ch)    | 2441                     | 0.577                                 | 1.0                        |
| $\pi/4$ DQPSK  | Middle (39ch)    | 2441                     | 0.887                                 | 1.0                        |
| 8DPSK          | Middle (39ch)    | 2441                     | 0.844                                 | 1.0                        |

### Test Data

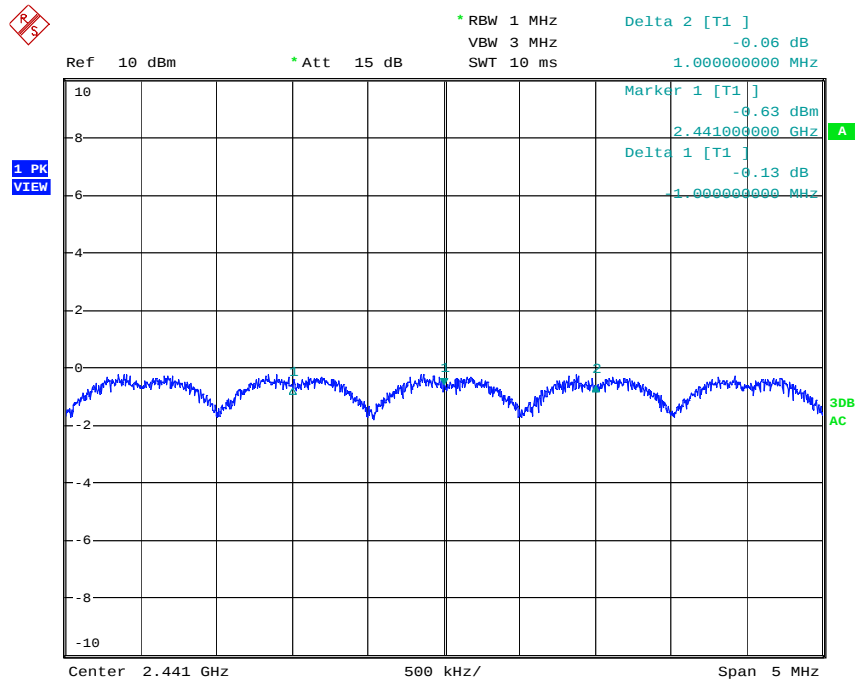
Tested Date: February 9, 2009

Temperature: 22 °C  
Humidity: 27 %  
Atmos. Press: 1009 hPa

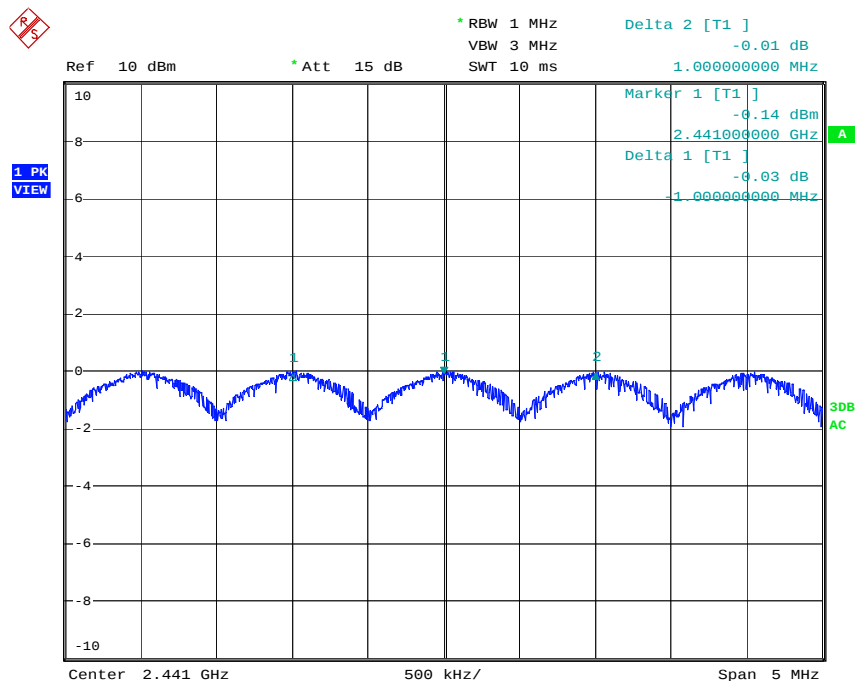
### Operating mode: GFSK



## Operating mode: $\pi/4$ DQPSK



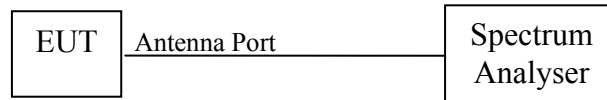
## Operating mode: 8DPSK



## 2.3 Number of Hopping Channel

### Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



### Test procedure

The EUT antenna port connected to the spectrum analyzer. The RBW is set to more than 1% of its span. The VBW is set to more than RBW. The sweep time is coupled appropriate. The span is set to cover the authorized band. The analyzer is set to MAX HOLD. The EUT is hopping operation.

### Limitation

15.247(a) (1) (iii) (iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

### Test equipment used (refer to List of utilized test equipment)

|      |      |  |  |  |  |
|------|------|--|--|--|--|
| TR06 | CL23 |  |  |  |  |
|------|------|--|--|--|--|

### Test results – Comply with the limitation

Hopping channel: 79 channels

### Test Data

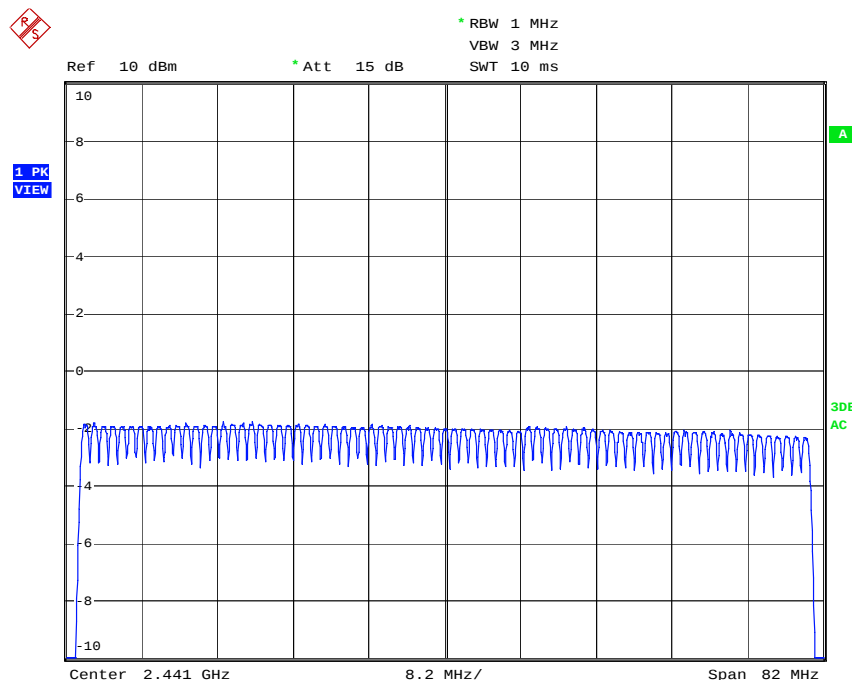
Tested Date: February 9, 2009

Temperature: 22 °C

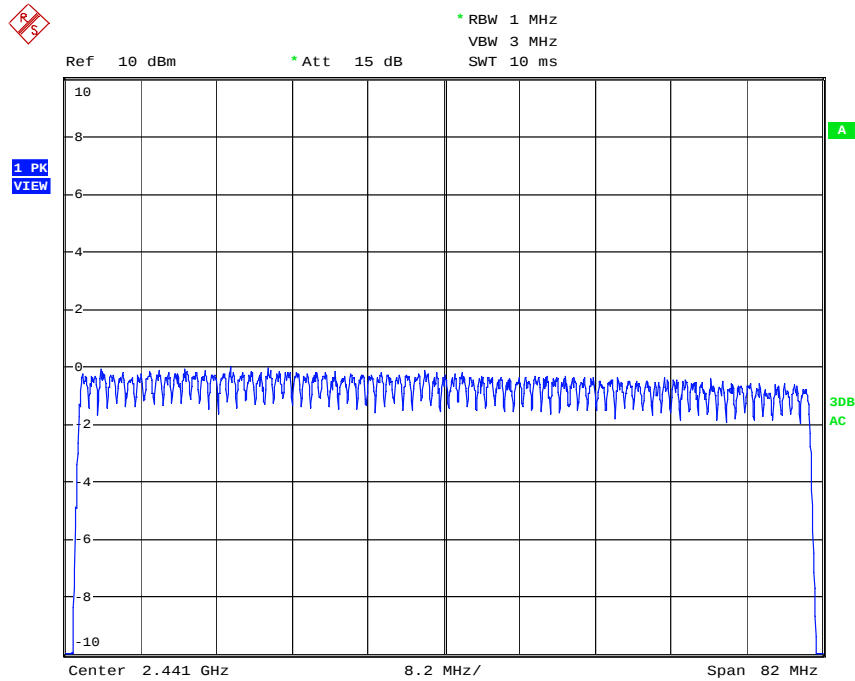
Humidity: 27 %

Atmos. Press: 1009 hPa

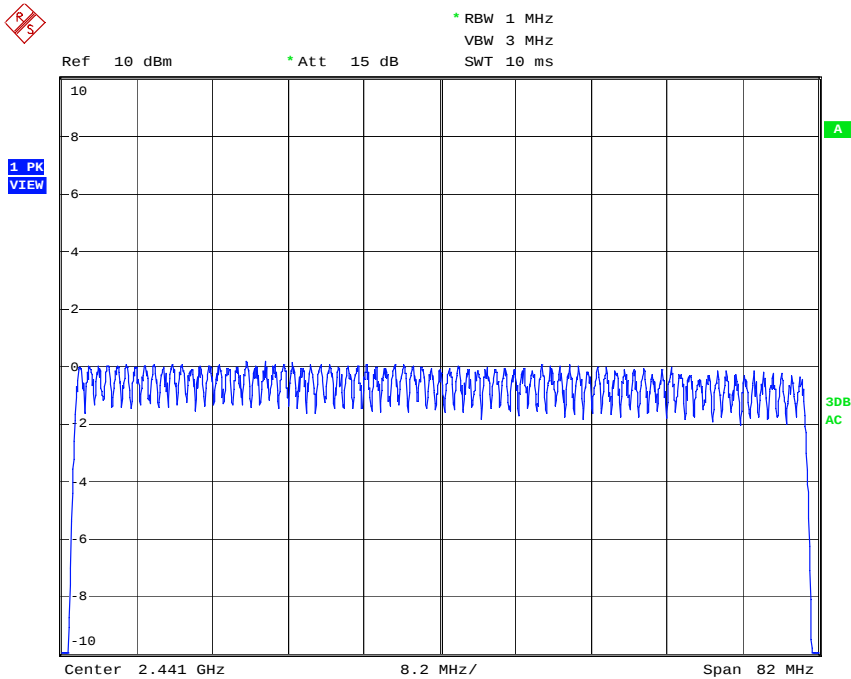
### Operating mode: GFSK



## Operating mode: $\pi/4$ DQPSK



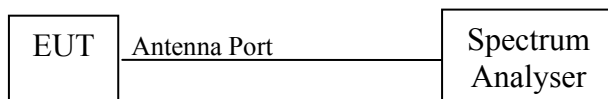
## Operating mode: 8DPSK



## 2.4 Average Time of Occupancy

### Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



### Test procedure

The EUT antenna port connected to the spectrum analyzer. The RBW is set to 1 MHz. The VBW is set to more than RBW. The sweep time is coupled appropriate. The span is set to 0 MHz and single sweep with video triggered. The EUT is hopping operation.

The average time of occupancy within the 31.6 seconds (79 channels \* 0.4) is calculated as follows in accordance with Bluetooth formula;

In case of DH1: (average time of occupancy) = (pulse width) \* (1600 / 2) / 79 \* 31.6

In case of DH3: (average time of occupancy) = (pulse width) \* (1600 / 4) / 79 \* 31.6

In case of DH5: (average time of occupancy) = (pulse width) \* (1600 / 6) / 79 \* 31.6

### Limitation

15.247(a)(1)(iii) 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 equipment used (refer to List of utilized test equipment)

|      |      |  |  |  |  |
|------|------|--|--|--|--|
| TR06 | CL23 |  |  |  |  |
|------|------|--|--|--|--|

### Test results – comply with the limitation.

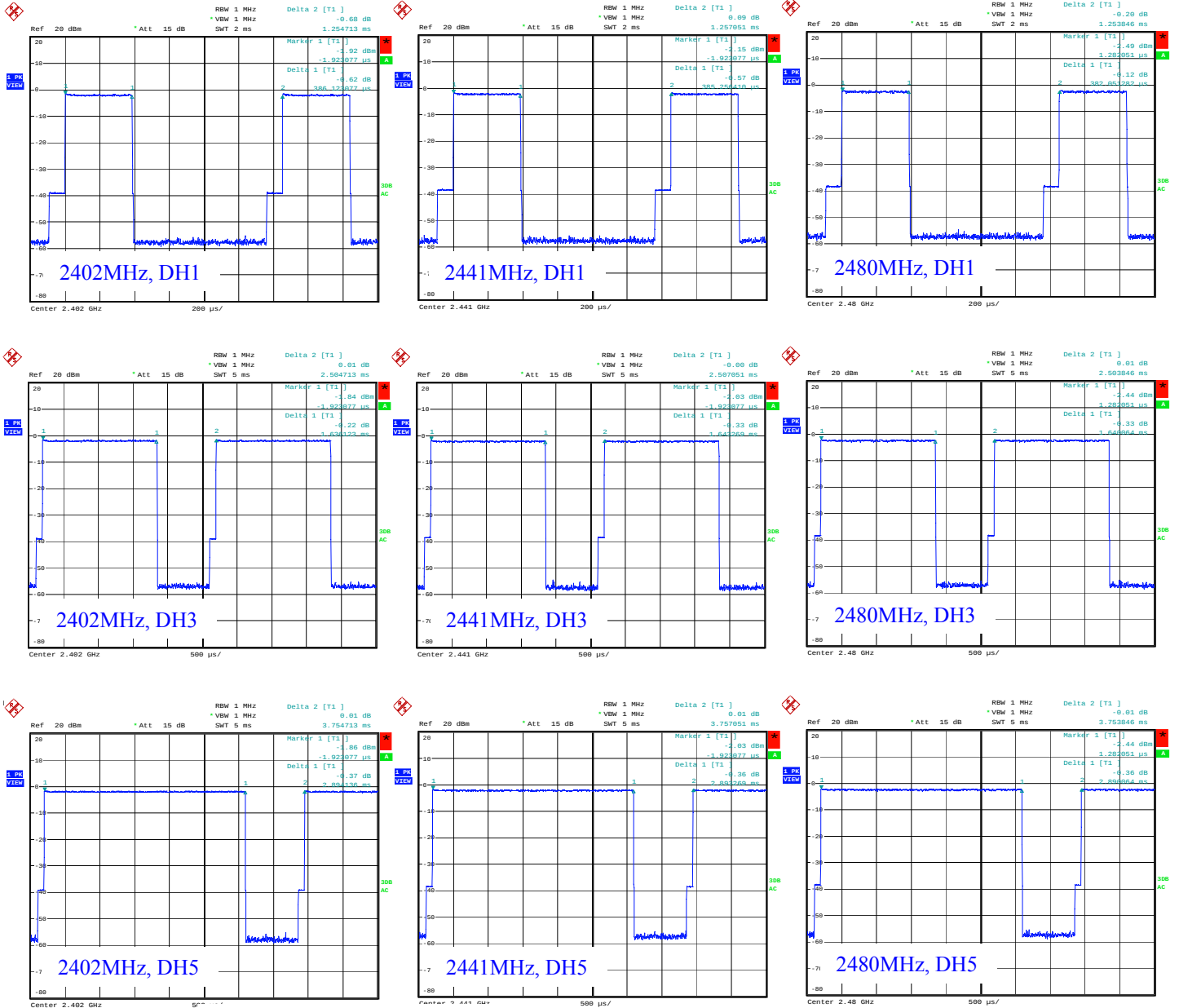
| Operating Mode | Frequency [MHz] | Transmission Packet Type | Pulse width (msec) | Time of occupancy (msec) |
|----------------|-----------------|--------------------------|--------------------|--------------------------|
| GFSK           | 2402            | DH1                      | 0.386              | 123.52                   |
|                |                 | DH3                      | 1.636              | 261.76                   |
|                |                 | DH5                      | 2.894              | 308.69                   |
|                | 2441            | DH1                      | 0.385              | 123.20                   |
|                |                 | DH3                      | 1.643              | 262.88                   |
|                |                 | DH5                      | 2.893              | 308.59                   |
|                | 2480            | DH1                      | 0.382              | 122.24                   |
|                |                 | DH3                      | 1.640              | 262.40                   |
|                |                 | DH5                      | 2.890              | 308.27                   |
| $\pi/4$ DQPSK  | 2402            | DH1                      | 0.388              | 124.16                   |
|                |                 | DH3                      | 1.638              | 262.08                   |
|                |                 | DH5                      | 2.888              | 308.05                   |
|                | 2441            | DH1                      | 0.388              | 124.16                   |
|                |                 | DH3                      | 1.638              | 262.08                   |
|                |                 | DH5                      | 2.888              | 308.05                   |
|                | 2480            | DH1                      | 0.388              | 124.16                   |
|                |                 | DH3                      | 1.638              | 262.08                   |
|                |                 | DH5                      | 2.888              | 308.05                   |
| 8DPSK          | 2402            | DH1                      | 0.388              | 124.16                   |
|                |                 | DH3                      | 1.638              | 262.08                   |
|                |                 | <b>DH5</b>               | <b>2.896</b>       | <b>308.91</b>            |
|                | 2441            | DH1                      | 0.388              | 124.16                   |
|                |                 | DH3                      | 1.638              | 262.08                   |
|                |                 | <b>DH5</b>               | <b>2.896</b>       | <b>308.91</b>            |
|                | 2480            | DH1                      | 0.388              | 124.16                   |
|                |                 | DH3                      | 1.638              | 262.08                   |
|                |                 | <b>DH5</b>               | <b>2.896</b>       | <b>308.91</b>            |

## Test Data

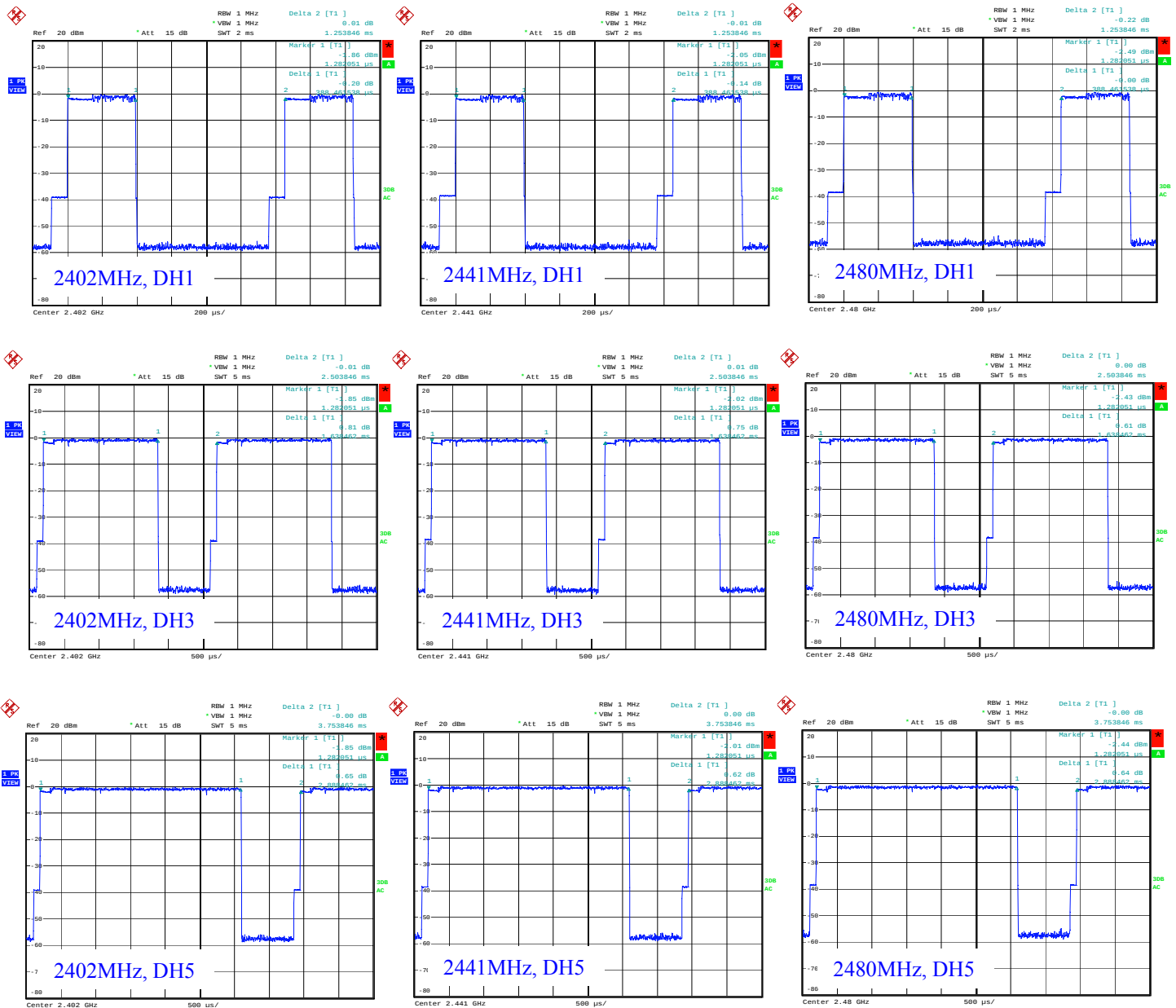
Tested Date: February 9, 2009

Temperature: 22 °C  
Humidity: 27 %  
Atmos. Press: 1009 hPa

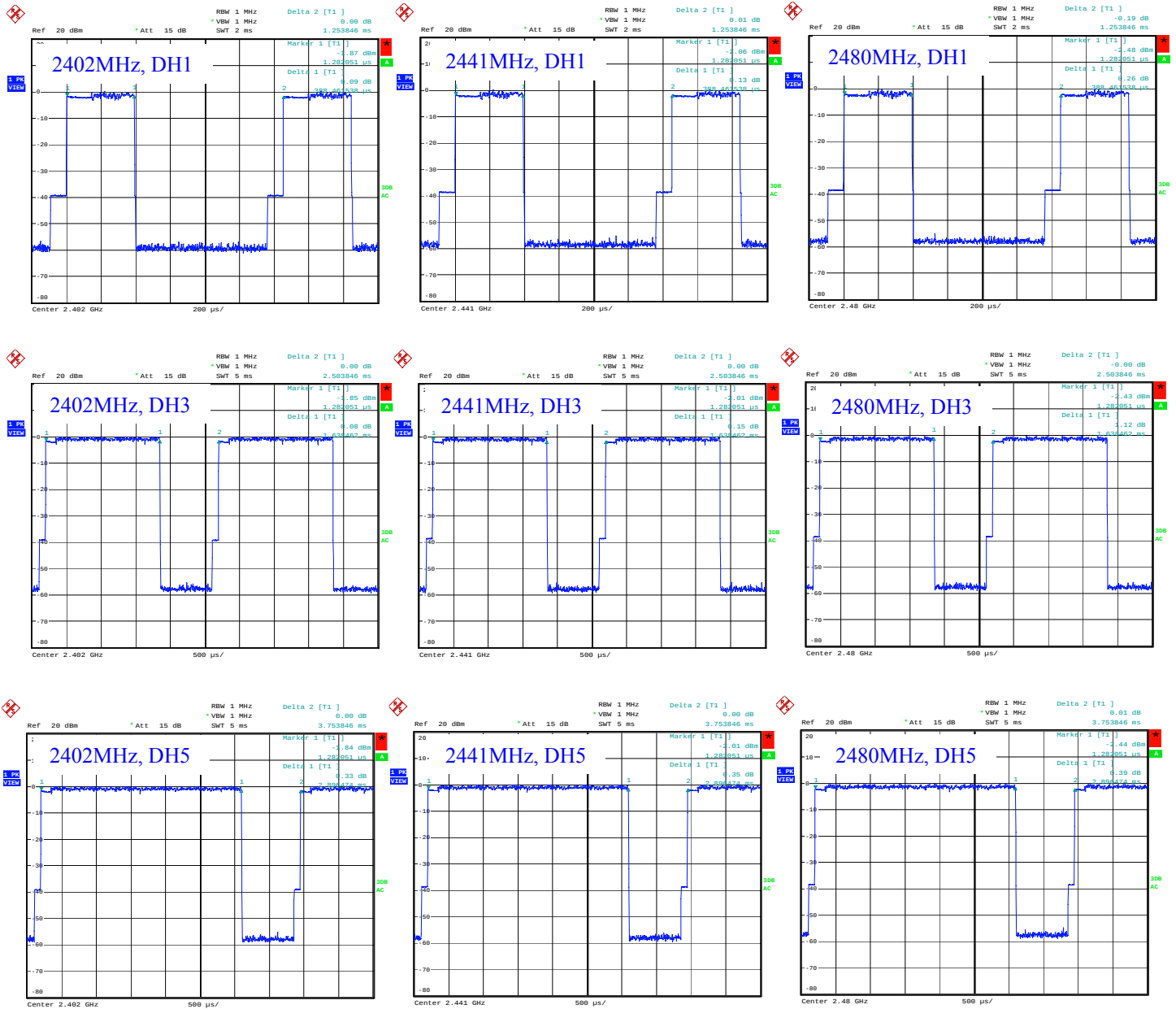
## Operating mode: GFSK



## Operating mode: $\pi/4$ DQPSK



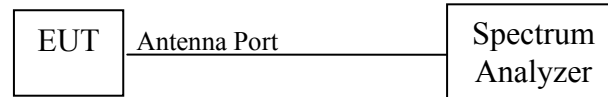
## Operating mode: 8DPSK



## 2.5 Peak Output Power

### Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



### Test procedure

The EUT antenna port connected to the spectrum analyzer. The RBW is set to the greater than 20dB bandwidth. The VBW is set to three times of RBW. The sweep time is coupled appropriate. The span is set to cover the carrier output spectrum. The analyzer is set to MAX HOLD. The EUT is set measured transmission channel under hopping off mode.

### Limitation

15.247(a) (1) Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW(21dBm).

### Test equipment used (refer to List of utilized test equipment)

|      |      |  |  |  |  |
|------|------|--|--|--|--|
| TR06 | CL23 |  |  |  |  |
|------|------|--|--|--|--|

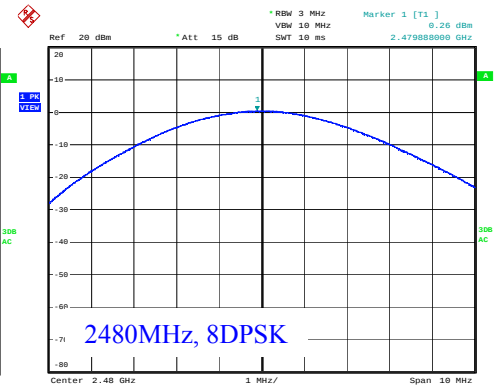
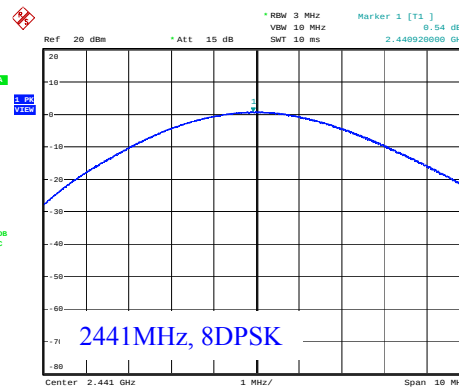
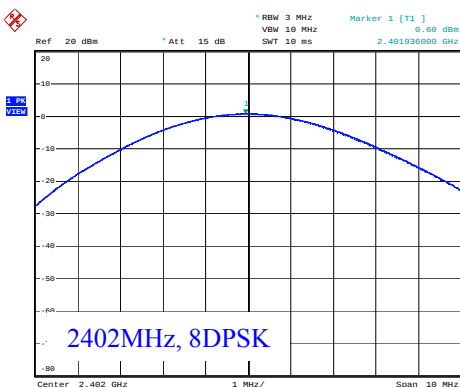
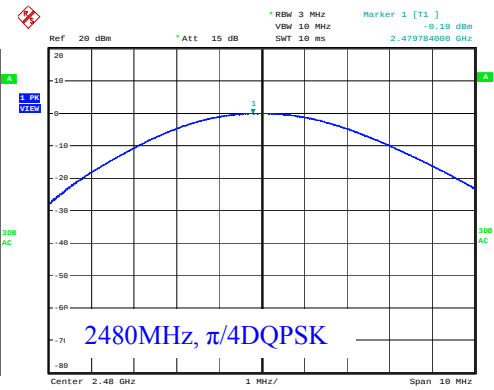
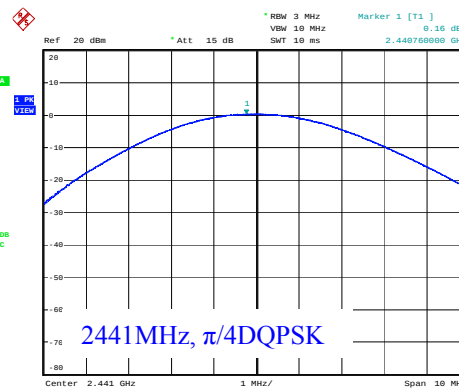
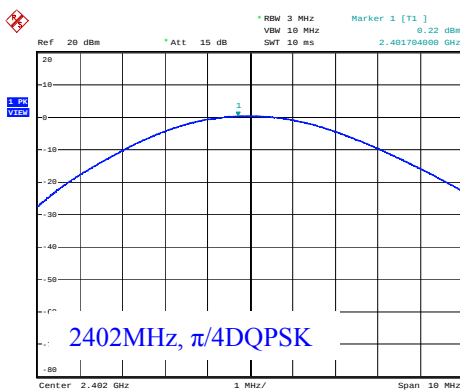
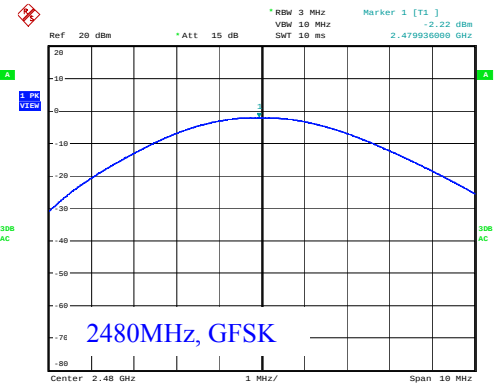
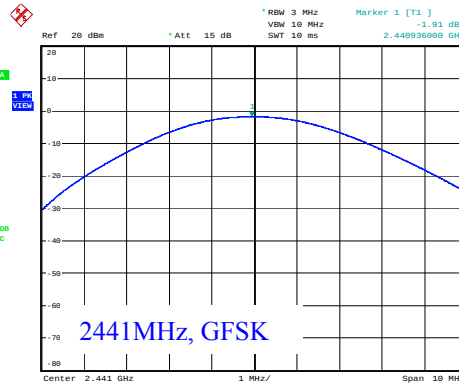
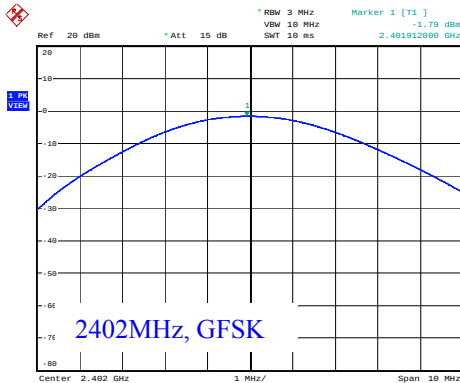
### Test results – comply with the limitation.

| Operating Mode | Transmission Channel<br>(Frequency: MHz) | Cable loss<br>(dB) | Output power<br>(dBm)<br>[Reading] | Output power<br>(dBm)<br>[Result] | Output power<br>(mW)<br>[Result] |
|----------------|------------------------------------------|--------------------|------------------------------------|-----------------------------------|----------------------------------|
| GFSK           | Low (2402)                               | 0.2                | -1.79                              | -1.59                             | 0.69                             |
|                | Middle (2441)                            | 0.2                | -1.91                              | -1.71                             | 0.67                             |
|                | High (2480)                              | 0.2                | -2.22                              | -2.02                             | 0.63                             |
| $\pi/4$ DQPSK  | Low (2402)                               | 0.2                | 0.22                               | 0.42                              | 1.10                             |
|                | Middle (2441)                            | 0.2                | 0.16                               | 0.36                              | 1.09                             |
|                | High (2480)                              | 0.2                | -0.19                              | 0.01                              | 1.00                             |
| <b>8DPSK</b>   | <b>Low (2402)</b>                        | <b>0.2</b>         | <b>0.60</b>                        | <b>0.80</b>                       | <b>1.20</b>                      |
|                | Middle (2441)                            | 0.2                | 0.54                               | 0.74                              | 1.19                             |
|                | High (2480)                              | 0.2                | 0.26                               | 0.46                              | 1.11                             |

## Test Data

Tested Date: February 9, 2009

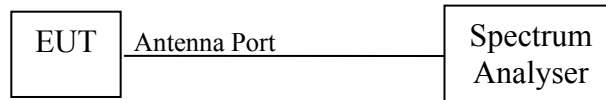
Temperature: 22 °C  
Humidity: 27 %  
Atmos. Press: 1009 hPa



## 2.6 Conducted Spurious Emissions (Antenna Port)

### Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



### Test procedure

The EUT antenna port connected to the spectrum analyzer. The RBW is set to 100 kHz. The VBW is set to 300 kHz. The sweep time is set to the coupled. The spectrum is checked from 30 MHz to 26 GHz. The EUT is set measured transmission channel under hopping off mode.

### Limitation

15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

### Test equipment used (refer to List of utilized test equipment)

|      |      |  |  |  |  |
|------|------|--|--|--|--|
| TR06 | CL23 |  |  |  |  |
|------|------|--|--|--|--|

### Test results – comply with the limitation.

There were no conducted spurious emissions with levels of more than 20 dB below the applicable limit.