

TEST REPORT

For

Mobile phone

In conformity with

FCC CFR 47 Part15C (Bluetooth)

Model: F-07C

FCC ID: VQK-F07C

Test Item: Mobile phone

Report No: RY1103Z24R1

Issue Date: 24 March, 2011

Prepared for

FUJITSU LIMITED
1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki 211-8588,
Japan

Prepared by

RF Technologies Ltd.
472, Nippa-cho, Kohoku-ku, Yokohama, 223-0057, Japan
Telephone: +81+(0)45- 534-0645
FAX: +81+(0)45- 534-0646

This report shall not be reproduced, except in full, without the written permission of RF Technologies Ltd. The test results in this report apply only to the sample tested. RF Technologies Ltd. is managed to ISO17025 and has the necessary knowledge and test facilities for testing according to the referenced standards.

Table of contents

1	General information.....	3
1.1	Product description	3
1.2	Test(s) performed/ Summary of test result	3
1.3	Test facility	4
1.4	Measurement uncertainty.....	4
1.5	Summary of test results.....	5
1.5.1	Table of test summary.....	5
1.6	Setup of equipment under test (EUT)	5
1.6.1	Test configuration of EUT	5
1.6.2	Operating condition:	5
1.6.3	Setup diagram of tested system:.....	6
1.7	Equipment modifications.....	6
1.8	Deviation from the standard	6
2	Test procedure and test data	7
2.1	Occupied Bandwidth (20 dB / 99%).....	7
2.2	Hopping Carrier Frequency Separation	9
2.3	Number of Hopping Channel.....	11
2.4	Average Time of Occupancy	12
2.5	Peak Output Power	14
2.6	Conducted Spurious Emissions (Antenna Port).....	15
3	Test setup photographs	18
3.1	Antenna Port Measurements	18
4	List of utilized test equipment/ calibration	19

History

Report No.	Date	Revisions	Issued By
RY1103Z24R1	24 March, 2011	Initial Issue	K. Ohnishi

1 General information

1.1 Product description

Test item	: Mobile phone
Manufacturer	: FUJITSU LIMITED
Address	: 1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki 211-8588, Japan
Model	: F-07C
FCC ID	: VQK-F07C
Serial numbers	: 3541 2804 0010 341
Operating Frequency	: Tx/Rx Freq. (2402 - 2480 MHz)
Oscillator frequencies	: 26 MHz
Type of Modulation	: FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK)
RF Output Power	: 2.13dBm (measured at the antenna terminal)
Antenna Gain	: -7.00 dBi ($\lambda/4$ Monopole antenna)
Receipt date of EUT	: 8 March, 2011
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, 2009)
Test method(s)	: ANSI C63.4: 2003
Test(s) started	: 17 March, 2011
Test(s) completed	: 17 March, 2011
Purpose of test(s)	: Grant for Certification of FCC


Summary of test result	: Complied (RF Conducted test only)
------------------------	-------------------------------------

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.

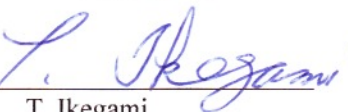
The EUT complies with the limit required in the standard in case that the margin is not less than the measurement uncertainty in the Laboratory.

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
EMC testing Department

Reviewer

: 
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, 2009. 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-1

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;

RF Conducted level: ± 1.10 dB

1.5 Summary of test results

1.5.1 Table of test summary

Requirement of;	Section in FCC15	Test Performed	Result	Section in this report
1.5.1 Occupied Bandwidth (20 dB/99%)	2.1049, 15.247(a)(1)	Yes	-	2.1
1.5.2 Hopping Carrier Frequency Separation	15.247(a)(1)	Yes	Complied	2.2
1.5.3 Number of Hopping Channel	15.247(a)(1)(iii)	Yes	Complied	2.3
1.5.4 Average Time of Occupancy	15.247(a)(1)(iii)	Yes	Complied	2.4
1.5.5 Peak Output Power	15.247(a)(1)/(b)(1)	Yes	Complied	2.5
1.5.6 Conducted Spurious Emissions	15.247(d)	Yes	Complied	2.6
1.5.7 Transmitter Radiated Spurious Emissions	15.205(b)/15.209	No (Note)	-	-
1.5.8 Transmitter AC Power Line Conducted Emissions	15.207	No (Note)	-	-

Note: This is the manufacturer request. Please refer to another report.

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
A	Mobile phone	FUJITSU LIMITED	F-07C	3541 2804 0010 341	-

Support Equipment(s):

	Item	Manufacturer	Model No.	Serial No.

Connected cable(s):

No.	Item	Identification (Manu.e.t.c)	Shielded YES / NO	Ferrite Core YES / NO	Connector Type Shielded YES / NO	Length (m)

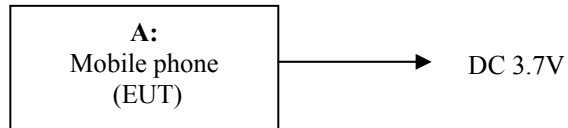
1.6.2 Operating condition:

Operating mode:

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

- (1-1) GFSK modulation, Continuous transmission with DH5 PACKET at hopping off (2402MHz)
- (1-2) GFSK modulation, Continuous transmission with DH5 PACKET at hopping off (2441MHz)
- (1-3) GFSK modulation, Continuous transmission with DH5 PACKET at hopping off (2480MHz)
- (1-4) $\pi/4$ DQPSK modulation, Continuous transmission with DH5 PACKET at hopping off (2402MHz)
- (1-5) $\pi/4$ DQPSK modulation, Continuous transmission with DH5 PACKET at hopping off (2441MHz)
- (1-6) $\pi/4$ DQPSK modulation, Continuous transmission with DH5 PACKET at hopping off (2480MHz)
- (1-7) 8DPSK modulation, Continuous transmission with DH5 PACKET at hopping off (2402MHz)
- (1-8) 8DPSK modulation, Continuous transmission with DH5 PACKET at hopping off (2441MHz)
- (1-9) 8DPSK modulation, Continuous transmission with DH5 PACKET at hopping off (2480MHz)
- (1-10) Continuous transmission with DH5 PACKET at hopping on

1.6.3 Setup diagram of tested system:



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)

SA06	CL23				
------	------	--	--	--	--

Test results

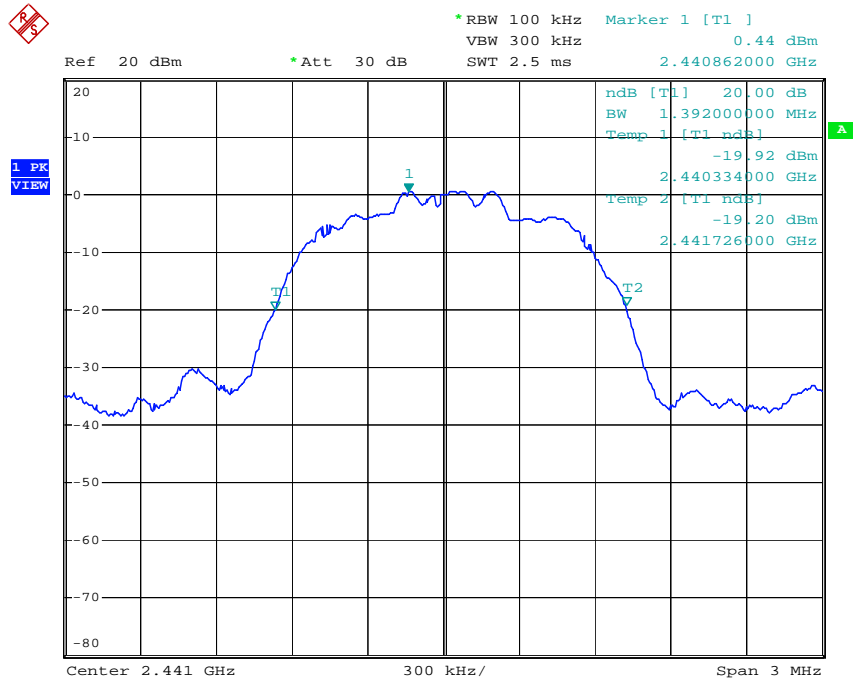
Operating Mode	Transmission Channel	Transmission Frequency	Bandwidth [MHz]	
			20dB	99%
GFSK (1Mbps)	Low (0ch)	2402	1.122	0.972
	Middle (39ch)	2441	1.122	0.960
	High (78ch)	2480	1.122	0.960
$\pi/4$ DQPSK (2Mbps)	Low (0ch)	2402	1.380	1.212
	Middle (39ch)	2441	1.380	1.212
	High (78ch)	2480	1.380	1.212
8DPSK (3Mbps)	Low (0ch)	2402	1.386	1.224
	Middle (39ch)	2441	1.392	1.218
	High (78ch)	2480	1.392	1.218

Test Data

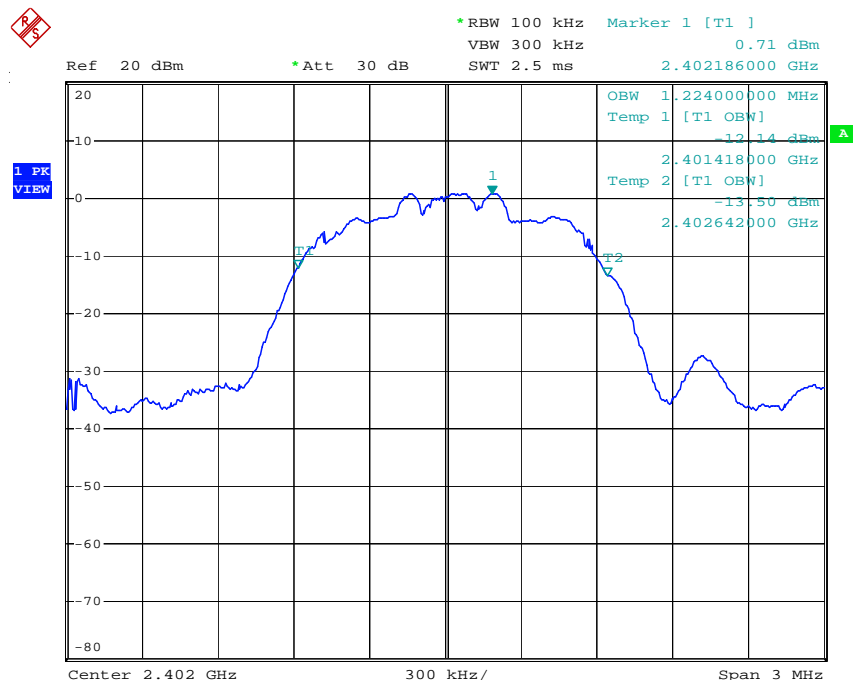
Tested Date: 17 March, 2011

Temperature: 25 °C
Humidity: 15 %
Atmos. Press: 1007 hPa

20dB Bandwidth



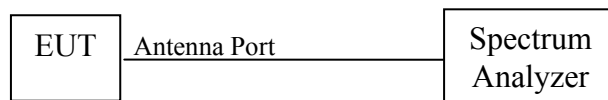
99% Occupied Bandwidth



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)

SA06	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	0.748	1.0
$\pi/4$ DQPSK	Middle (39ch)	2441	0.920	1.0
8DPSK	Middle (39ch)	2441	0.928	1.0

Test Data

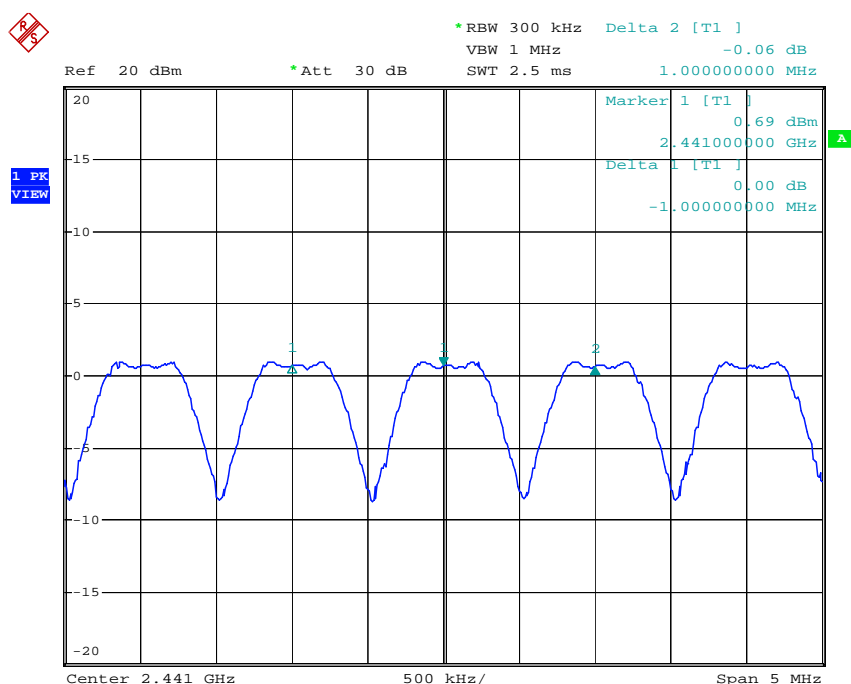
Tested Date: 17 March, 2011

Temperature: 25 °C

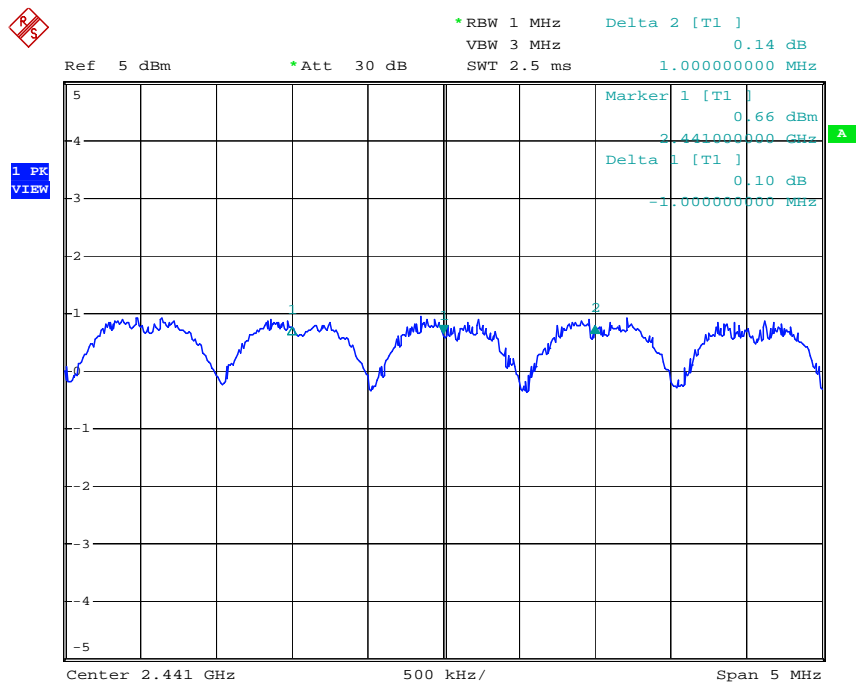
Humidity: 15 %

Atmos. Press: 1007 hPa

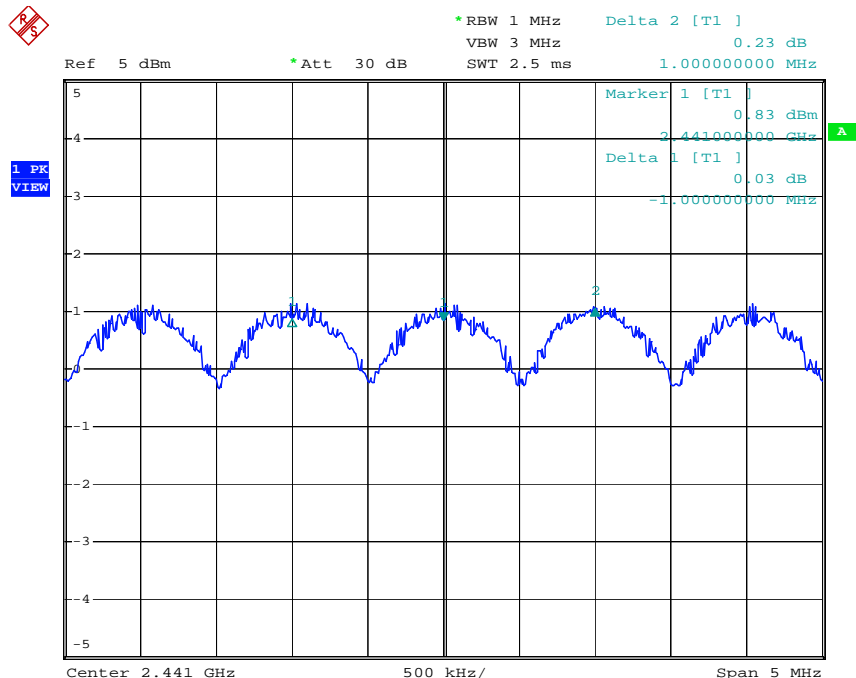
Operating mode: GFSK



Operating mode: $\pi/4$ DQPSK



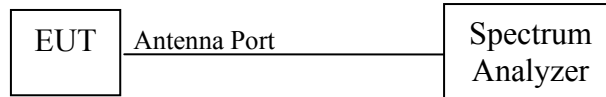
Operating mode: 8DPSK



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)

SA06	CL23				
------	------	--	--	--	--

Test results – Comply with the limitation

Hopping channel: 79 channels

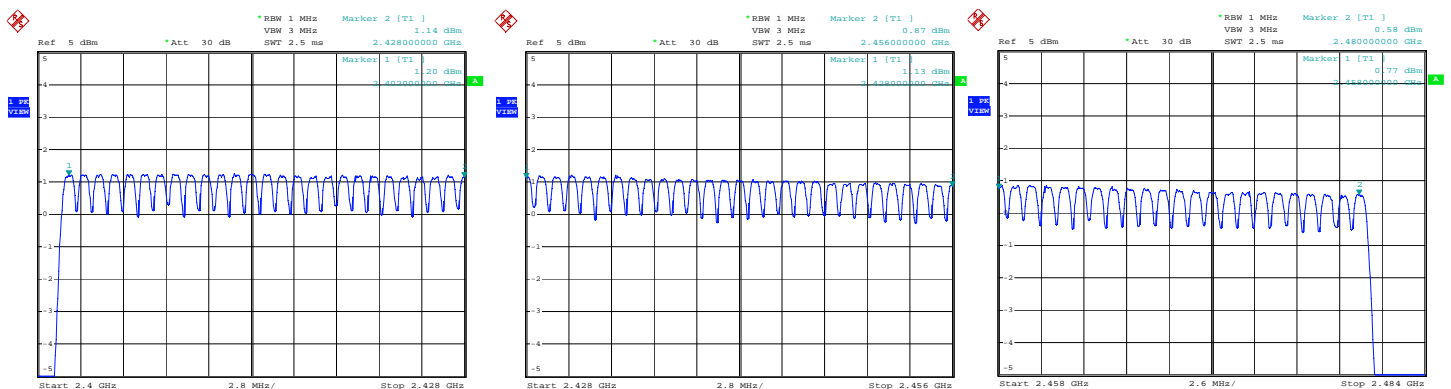
Test Data

Tested Date: 17 March, 2011

Temperature: 25 °C

Humidity: 15 %

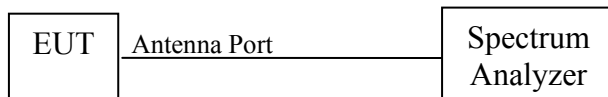
Atmos. Press: 1007 hPa



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 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)

SA06	CL23				
------	------	--	--	--	--

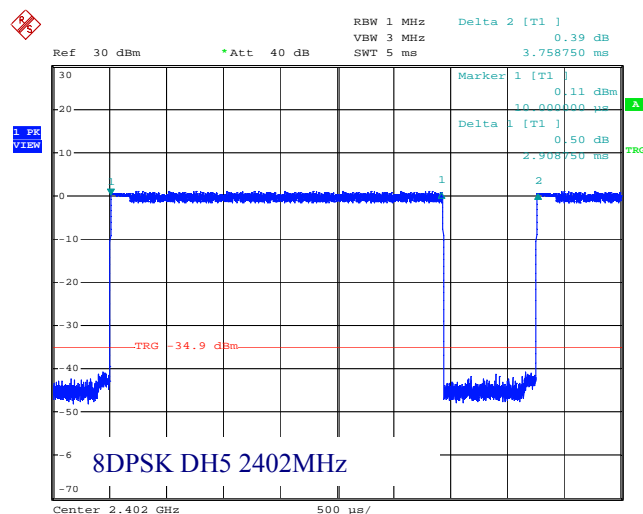
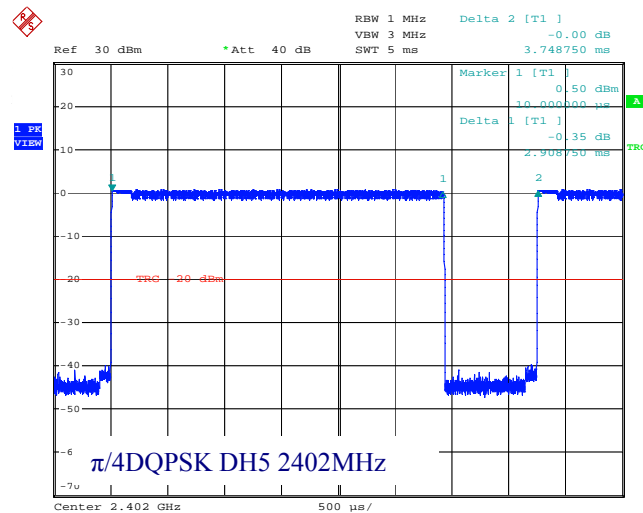
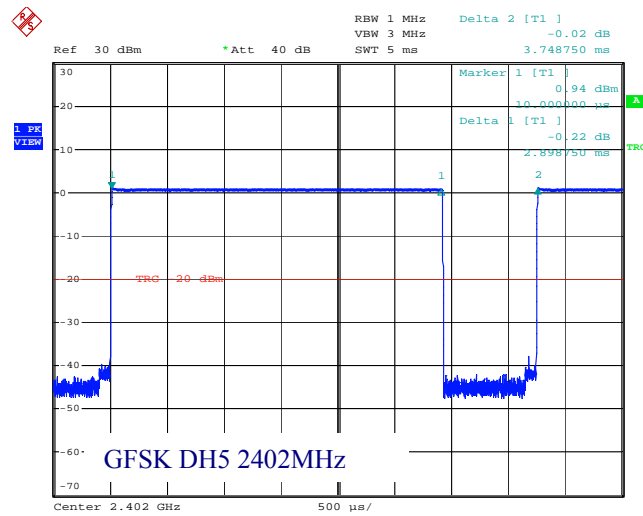
Test results – comply with the limitation.

Operating Mode	Frequency [MHz]	Transmission Packet Type	Pulse width (msec)	Time of occupancy (msec)
GFSK	2402	DH5	2.898	309.12
	2441	DH5	2.898	309.12
	2480	DH5	2.898	309.12
$\pi/4$ DQPSK	2402	DH5	2.908	309.19
	2441	DH5	2.908	309.19
	2480	DH5	2.908	309.19
8DPSK	2402	DH5	2.908	309.19
	2441	DH5	2.908	309.19
	2480	DH5	2.908	309.19

Test Data

Tested Date: 17 March, 2011

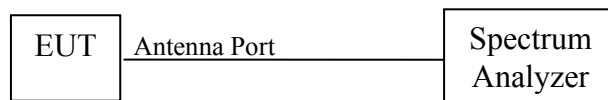
Temperature: 25 °C
Humidity: 15 %
Atmos. Press: 1007 hPa



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)

SA06	CL23				
------	------	--	--	--	--

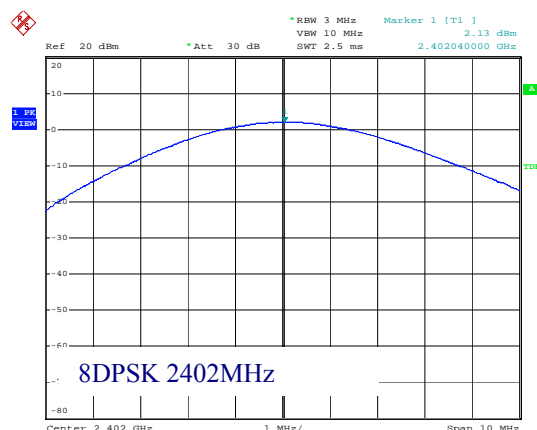
Test results – comply with the limitation.

Operating Mode	Transmission Channel (Frequency: MHz)	Output power (dBm) [Result]	Output power (mW) [Result]
GFSK	Low (2402)	1.63	1.46
	Middle (2441)	1.42	1.39
	High (2480)	0.97	1.25
$\pi/4$ DQPSK	Low (2402)	1.84	1.53
	Middle (2441)	1.63	1.46
	High (2480)	1.02	1.26
8DPSK	Low (2402)	2.13	1.63
	Middle (2441)	1.87	1.54
	High (2480)	1.25	1.33

Test Data

Tested Date: 17 March, 2011

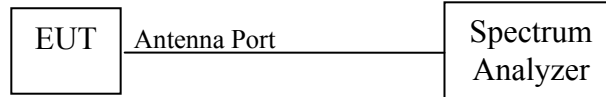
Temperature: 25 °C
Humidity: 15 %
Atmos. Press: 1007 hPa



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 (Band Edge)

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation

RBW \geq 1% of the span

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Test procedure (Conducted spurious emissions)

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 25 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)

SA06	CL23				
------	------	--	--	--	--

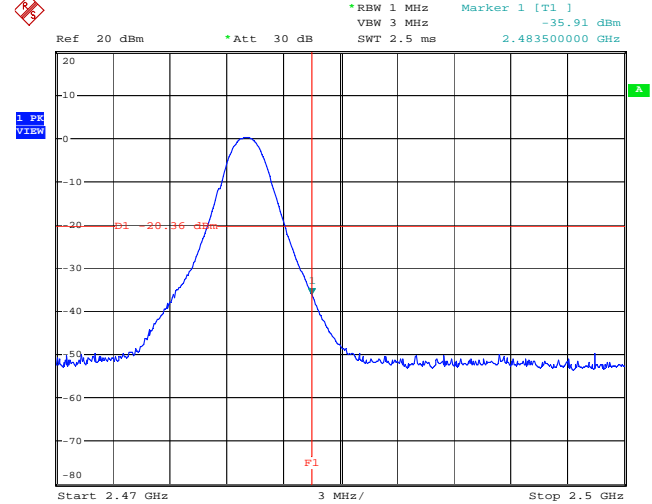
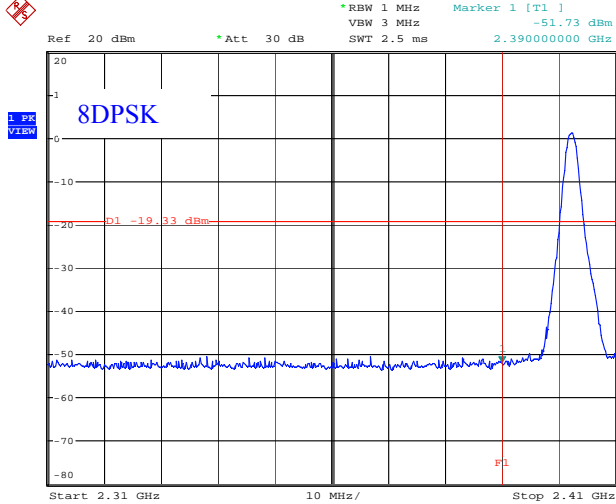
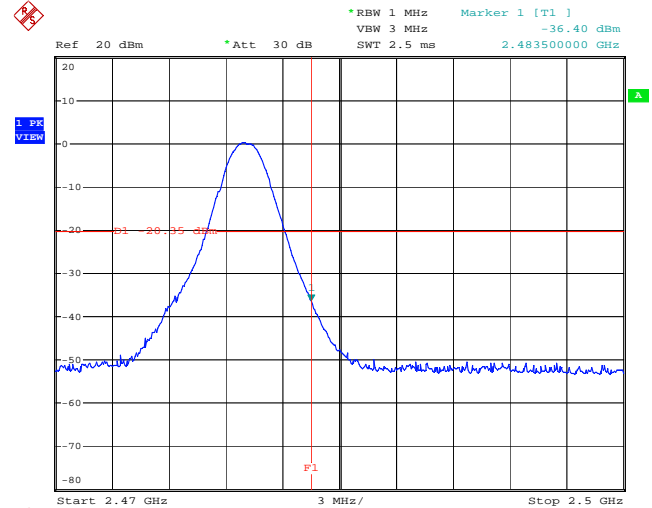
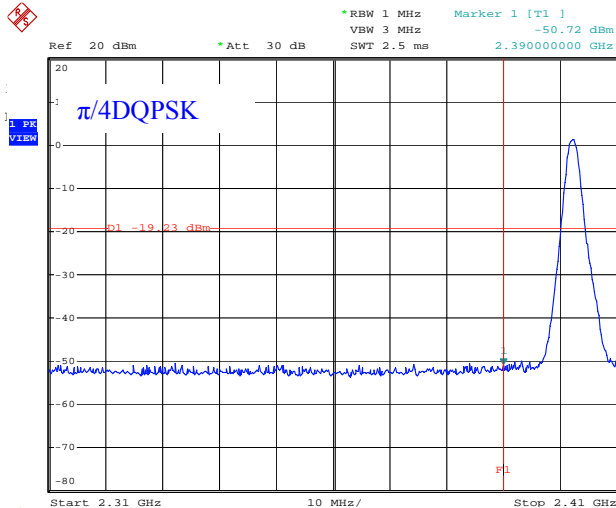
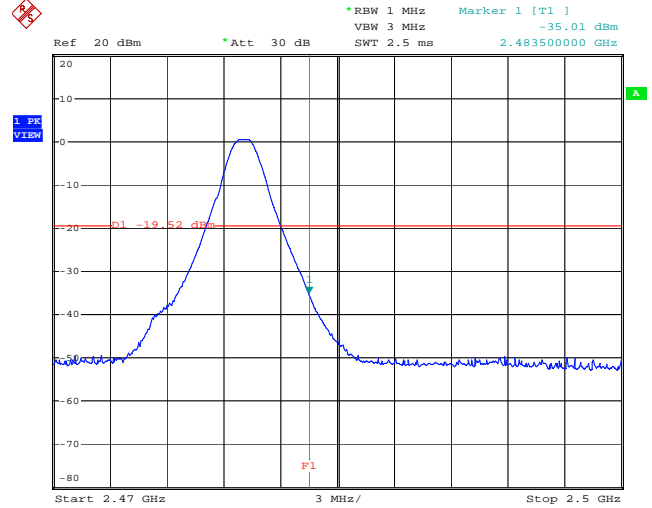
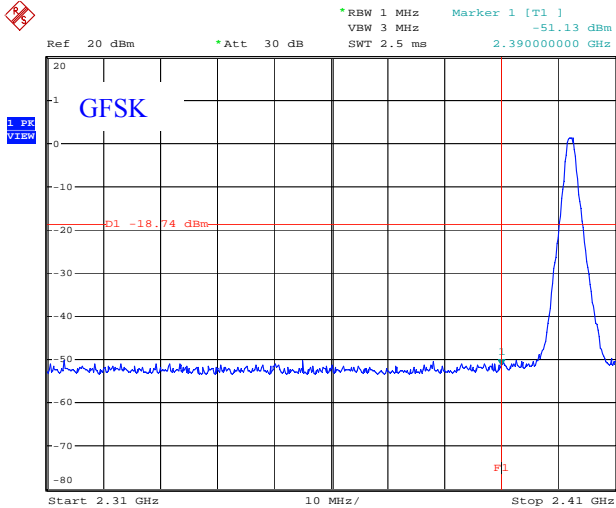
Test results – comply with the limitation.

Test Data

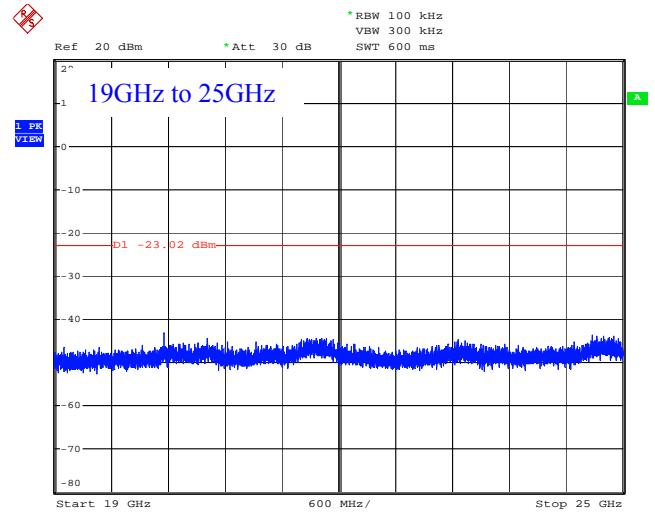
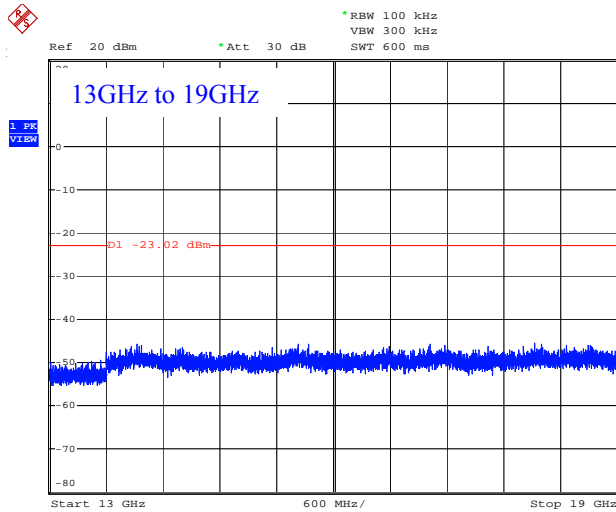
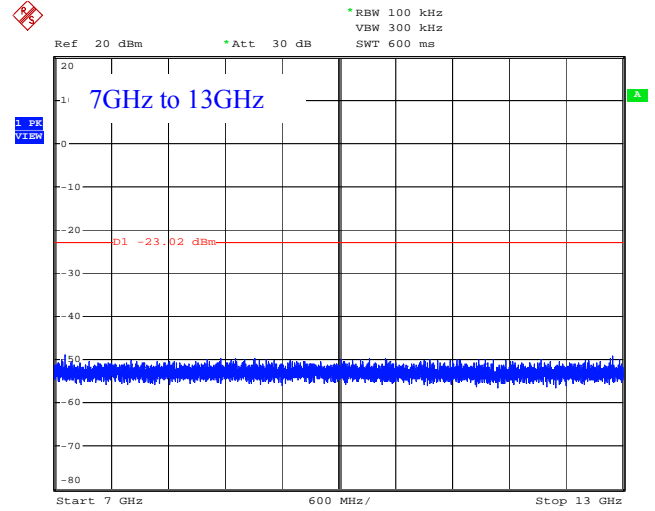
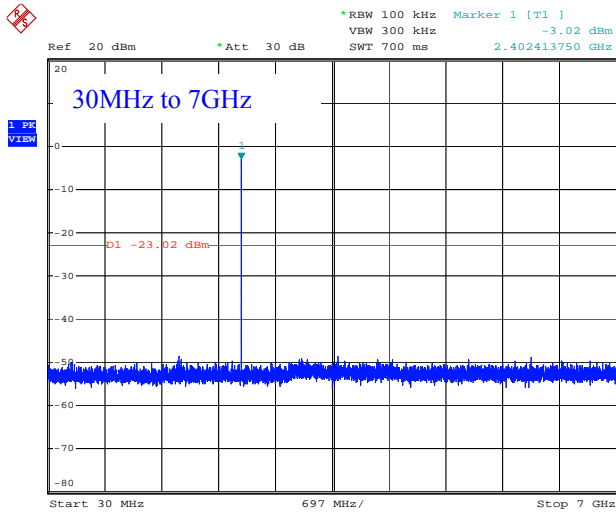
Tested Date: 17 March, 2011

Temperature: 25 °C
Humidity: 15 %
Atmos. Press: 1007 hPa

Restricted Band Edge



Worst Configuration (2480MHz, $\pi/4$ DQPSK)



4 List of utilized test equipment/ calibration

RFT ID No.	Kind of Equipment and Precision	Manufacturer	Model No.	Serial Number	Calibration Date	Calibrated until
CL23	RF Cable 0.5m	SUHNER	SUCOFLEX104PE	48773	2010/06/15	2011/06/30
SA06	Spectrum Analyzer (F/W: 3.60 SP1)	Rohde & Schwarz	FSP40	100071	2010/11/15	2011/11/30

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.