HCT CO., LTD.

CERTIFICATE OF COMPLIANCE

FCC Certification

Applicant Name:
SHARP CORPORATION

Address:
22-22 Nagaike-cho, Abeno-ku, Osaka 545-8522
Japan

Date of Issue:
February 24, 2011

Location:
HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, Korea

Test Report No.: HCTR1102FR10

HCT FRN: 0005866421

IC Recognition No.: 5944A-2

FCC ID	**:APYNAR0074**
APPLICANT	**:SHARP CORPORATION**

FCC Model(s):	ADS1
EUT Type:	GSM/ UMTS Phone with Bluetooth/ WiFi
Max. RF Output Power:	2.26 dBm(1.68 mW)
Frequency Range:	2402 - 2480 MHz (Bluetooth)
Modulation type	GFSK(Normal), PSK(EDR)
FCC Classification:	FCC Part 15 Spread Spectrum Transceiver
FCC Rule Part(s):	Part 15 subpart C 15.247

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

Jong Seok Lee

Report prepared by
: Jong Seok Lee
Test Engineer of RF Team

Approved by
: Sang Jun Lee
Manager of RF Team

his report only responds to the tested sample and may not be reproduced, except in full, without written approval of the HCT Co., Ltd.

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1102FR10	February 24, 2011	First Approval Report

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1. GENERAL INFORMATION

Applicant Name:	SHARP CORPORATION
Address:	22-22 Nagaike-cho, Abeno-ku, Osaka 545-8522 Japan
FCC ID:	APYNAR0074
EUT:	GSM/ UMTS Phone with Bluetooth/ WiFi
Model name(s):	ADS1
Date(s) of Tests:	February 07, 2011 ~ February 12, 2011
Contact Person:	Name: Masaaki Nishil Phone #: +81-743-55-4091 Fax #: +81-743-55-2553
Place of Tests:	HCT Co., Ltd. Icheon-si, Kyunggi-Do, Korea(Lab) (IC Recognition No. : 5944A-2)

2. EUT DESCRIPTION

EUT Type	GSM/ UMTS Phone with Bluetooth/ WiFi
FCC Model Name	ADS1
Power Supply	DC 3.7 V
Battery Type	Li-ion Battery(standard)
Frequency Range	2402 MHz - 2480 MHz (Bluetooth)
Transmit Power	2.26 dBm(1.68 mW)
Modulation Type	GFSK(Normal), PSK(EDR)
Modulation Technique	FHSS
Number of Channels	79Channels
Antenna Specification	Manufacturer: DONGNAM Co.,Ltd Antenna type: Inverted F Antenna Peak Gain : 0.80 dBi

※ 15.247 Requirements for Bluetooth transmitter

▪ This Bluetooth module has been tested by a Bluetooth Qualification Lab, and we confirm the following:

1) This system is hopping pseudorandomly.

2) Each frequency is used equally on the average by each transmitter.

3) The receiver input bandwidths that match the hopping channel bandwidths of their corresponding transmitters

4) The receiver shifts frequencies in synchronization with the transmitted signals.

▪ 15.247(g): The system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this Section 15.247 should the transmitter be presented with a continuous data (or information) stream.

▪ 15.247(h): The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

3. TEST METHODOLOGY

The measurement procedure described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz(ANSI C63.4-2003) and FCC Public Notice DA 00-705 dated March 30, 2000 entitled “Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems” were used in the measurement of the **SHARP CORPORATION.**
GSM/ UMTS Phone with Bluetooth/ WiFi FCC ID: APYNAR0074

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4. (Version :2003) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4. (Version: 2003)

3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
Channel low, mid and high with highest data rate (worst case) is chosen for full testing.

4. INSTRUMENT CALIBRATION

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 equipments, which is traceable to recognized national standards.

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated June 10, 2009 (Registration Number: 90661)

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

* The antennas of this E.U.T are permanently attached.

*The E.U.T Complies with the requirement of §15.203

7. SUMMARY OF TEST RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
20 dB Bandwidth	§15.247(a)(1)(ii) or (iii)	NA	CONDUCTED	PASS
Occupied Bandwidth		NA		PASS
Conducted Maximum Peak Output Power	§15.247(b)(1)	< 1 Watts		PASS
Carrier Frequency Separation	§15.247(a)(1)	>25 kHz or >2/3 of the 20dB BW		PASS
Number of Hopping Frequencies	§15.247(a)(1)(iii)	>15		PASS
Time of Occupancy	§15.247(a)(1)(iii)	<400 ms		PASS
Conducted Spurious Emissions	§15.247(d)	< 20 dB for all out-of band emissions		PASS
Band Edge(Out of Band Emissions)	§15.247(d)	< 20 dB for all out-of band emissions		PASS
AC Power line Conducted Emissions	§15.207(a)	cf. Section 8.7		PASS
Radiated Spurious Emissions	§15.247(d), 15.205, 15.209	cf. Section 8.6.2	RADIATED	PASS
Radiated Restricted Band Edge	§15.247(d), 15.205, 15.209	cf. Section 8.6.3		PASS

8. FCC PART 15.247 REQUIREMENTS

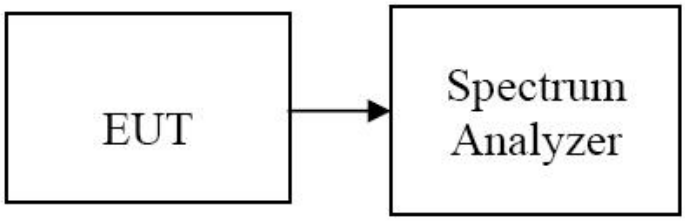
8.1 PEAK POWER

LIMIT

The maximum peak output power of the intentional radiator shall not exceed the following:

1. For systems using digital modulation in the bands of 902 ~ 928 MHz, 2400 ~ 2483.5 MHz, and 5725 ~ 5850 MHz: 1 watt.
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. The Spectrum Analyzer is set to the peak detector mode.

1. Span = 2 MHz (GFSK) / 5 MHz (8DPSK)
2. RBW = 1 MHz (GFSK) / 3 MHz (8DPSK)
3. VBW = 1 MHz (GFSK) / 3 MHz (8DPSK)
4. Sweep = auto
5. Packet type= DH5 (GFSK) / 3-DH5 (8DPSK)

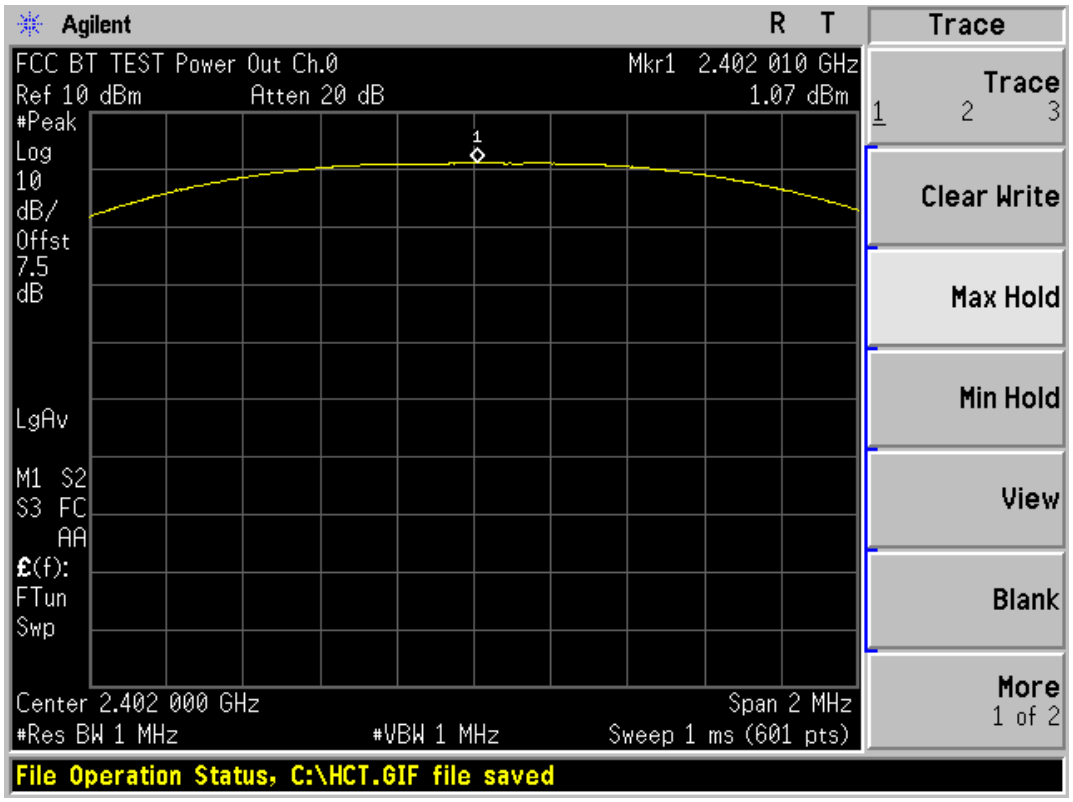
TEST RESULTS

No non-compliance noted

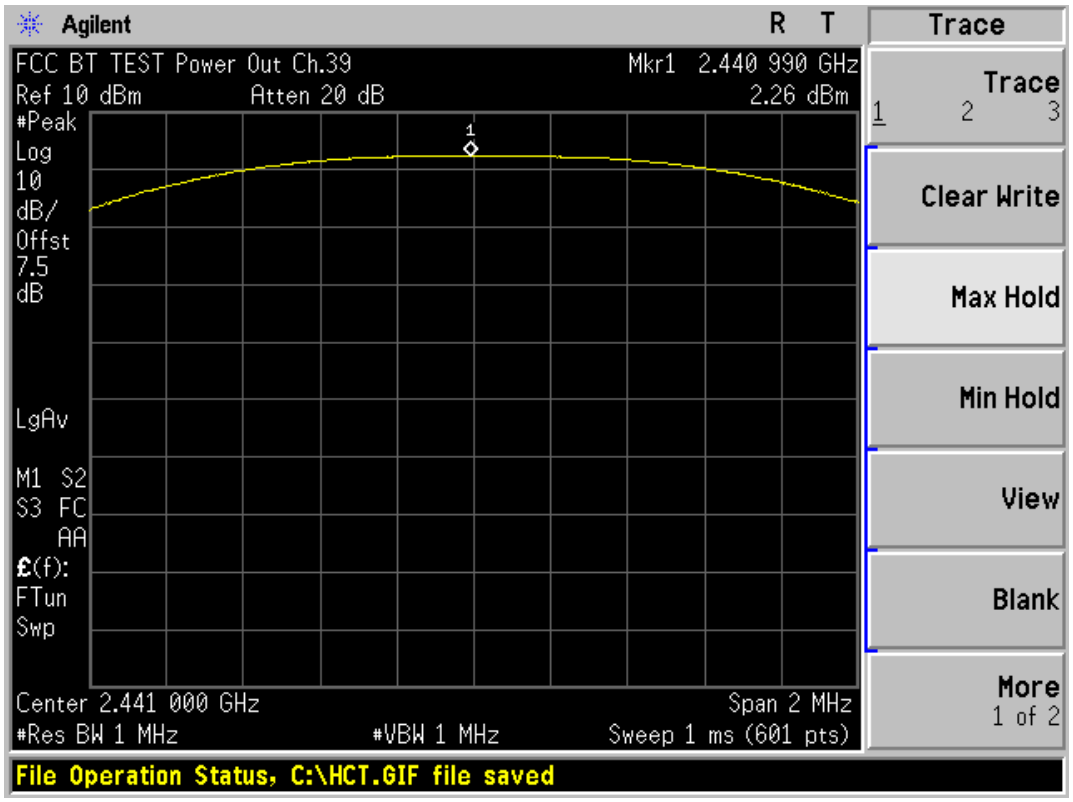
Test Data

Channel	Frequency (MHz)	Output Power(GFSK)		Output Power(8DPSK)		Limit (W)	Result
		(dBm)	(mW)	(dBm)	(mW)		
Low	2402	1.07	1.28	0.04	1.01	0.125	PASS
Mid	2441	2.26	1.68	1.24	1.33		PASS
High	2480	0.17	1.04	0.12	1.03		PASS

Test Plots (GFSK)
Peak Power (Low-CH)

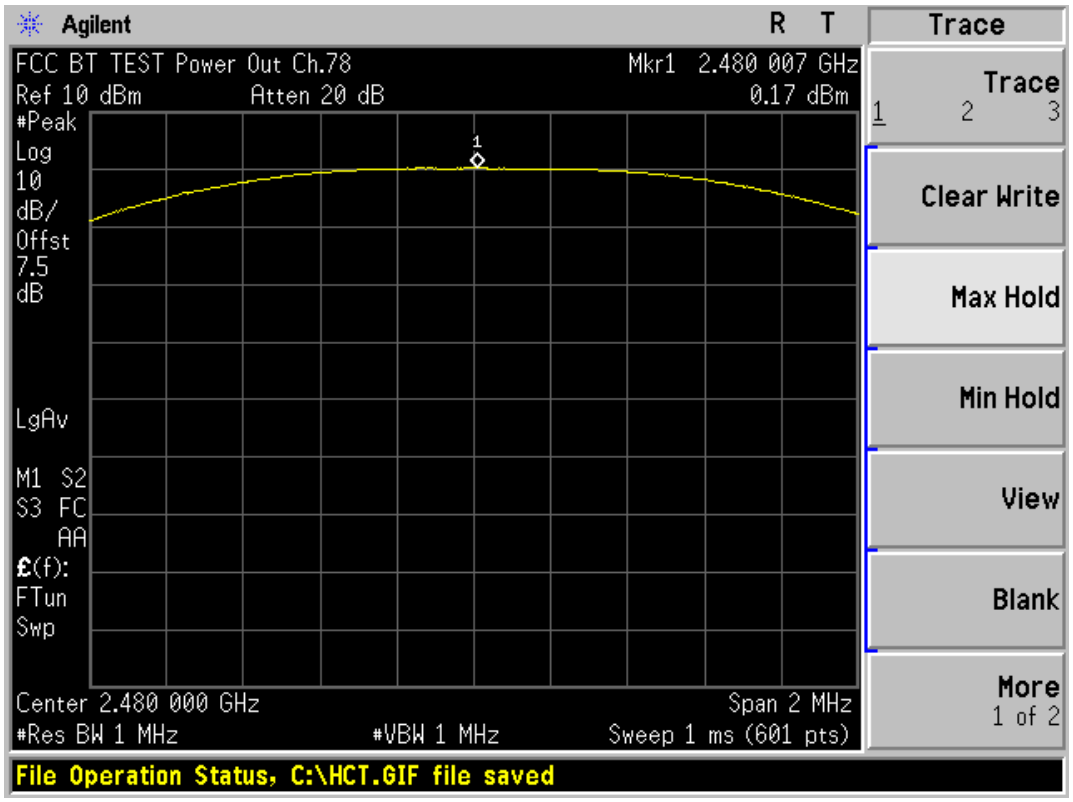


Test Plots (GFSK)
Peak Power (Mid-CH)



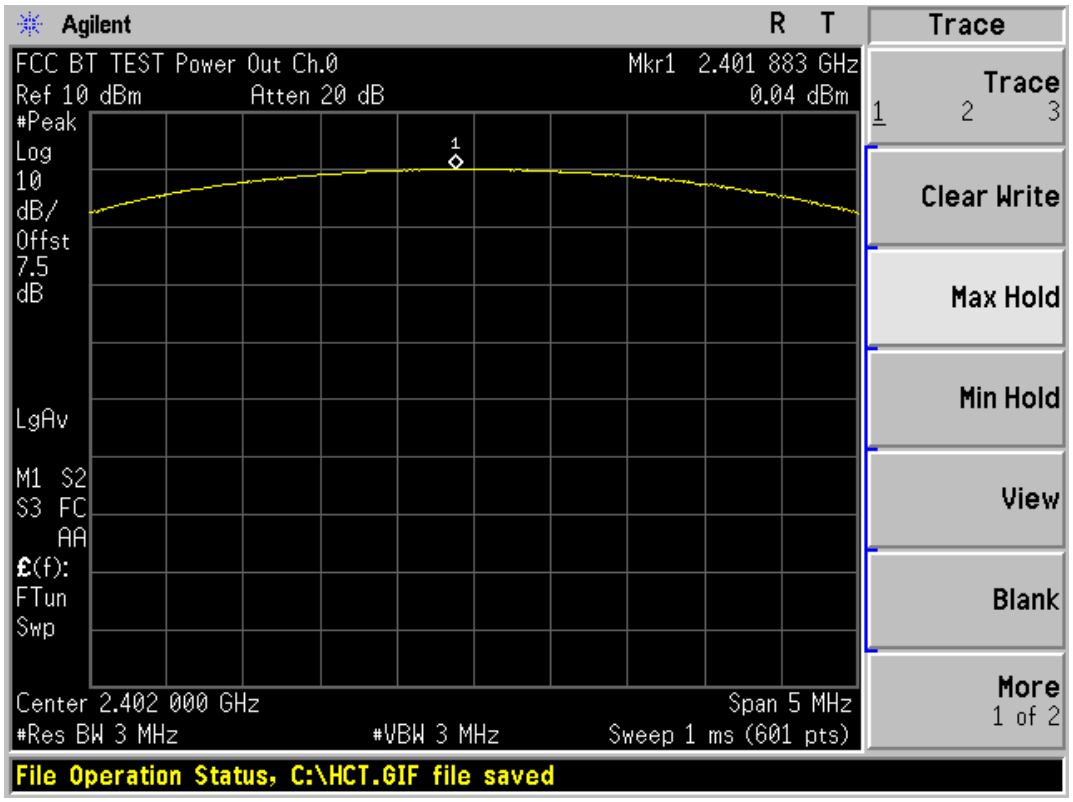
Test Plots (GFSK)

Peak Power (High-CH)

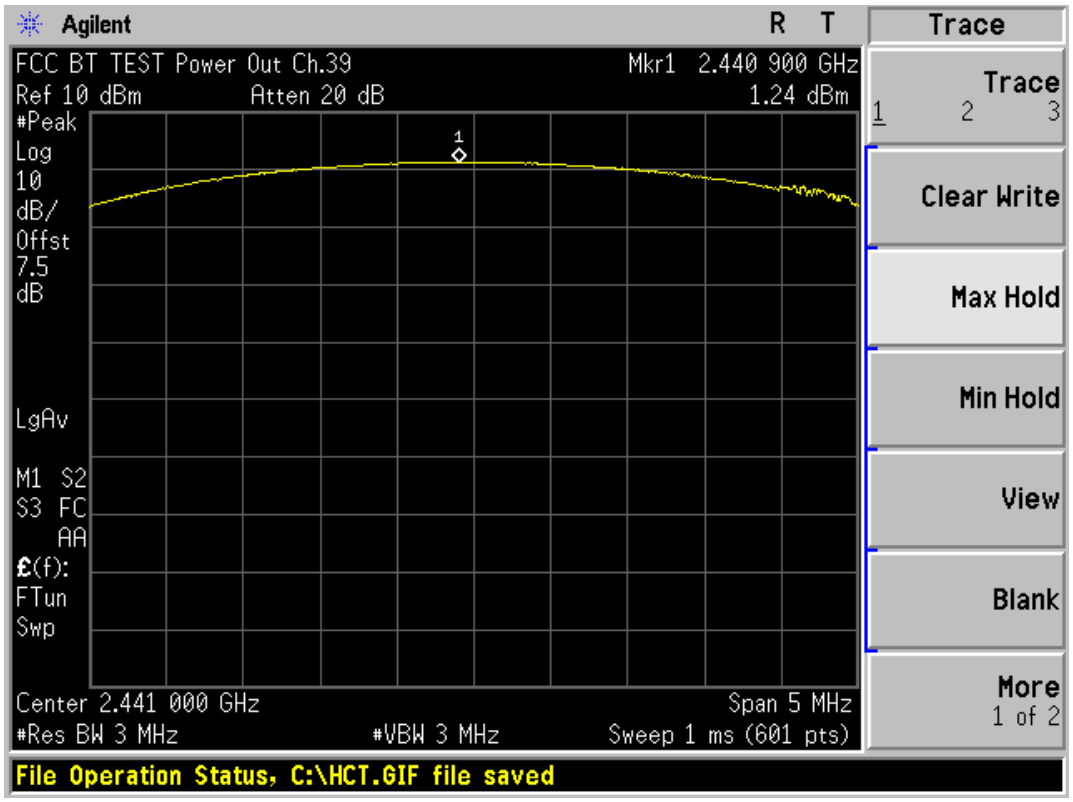


Test Plots (8DPSK)

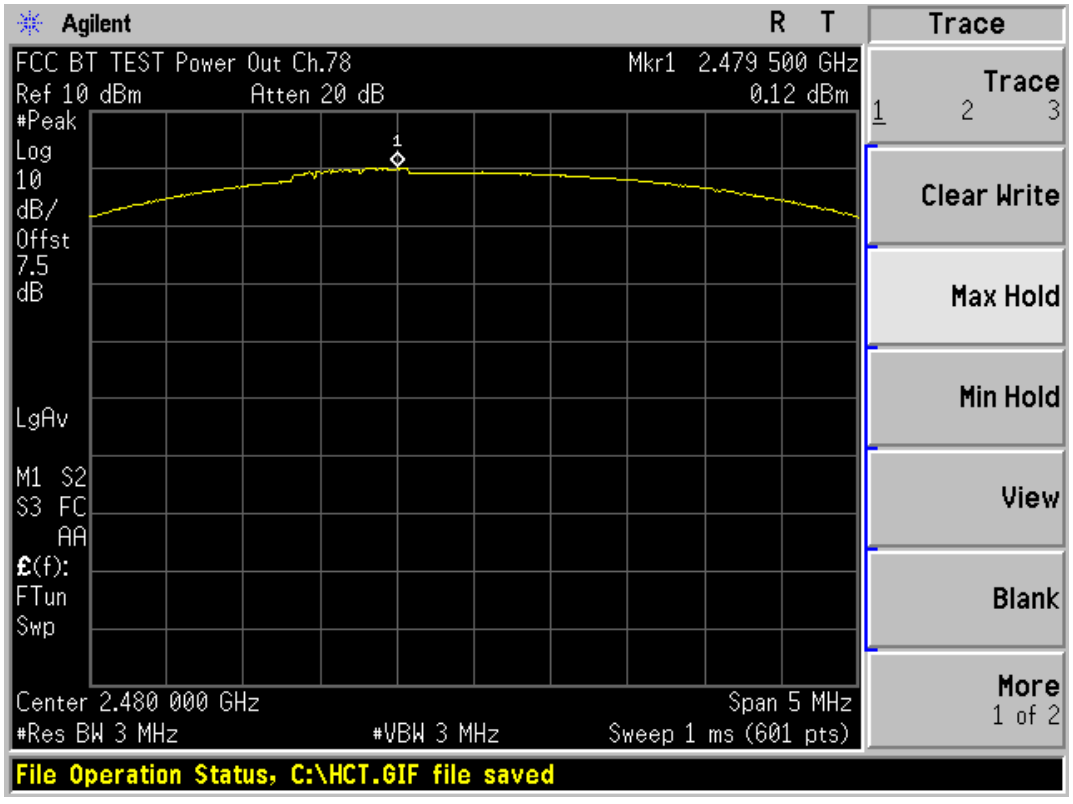
Peak Power (Low-CH)



Test Plots (8DPSK)
Peak Power (Mid-CH)



Test Plots (8DPSK)
Peak Power (High-CH)

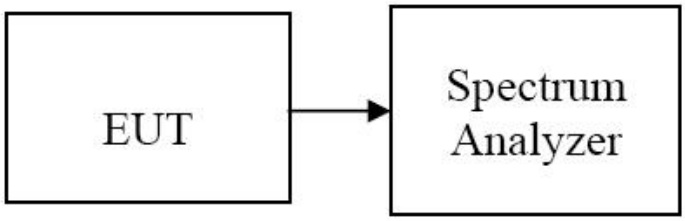


8.2 BAND EDGES MEASUREMENT

LIMIT

According to §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 Configuration



TEST PROCEDURE

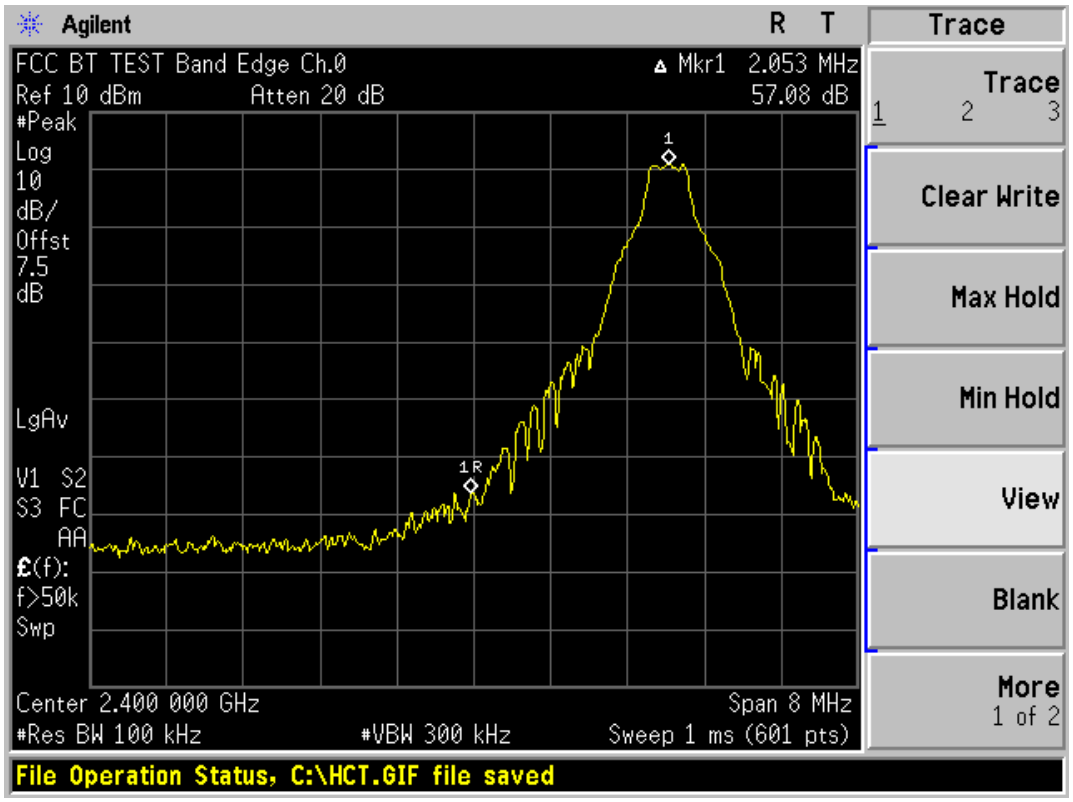
The spectrum analyzer is set to :

1. Span = 8 MHz
2. RBW = 100 kHz
3. VBW = 300 kHz
4. Sweep = auto
5. Detector Mode = Peak

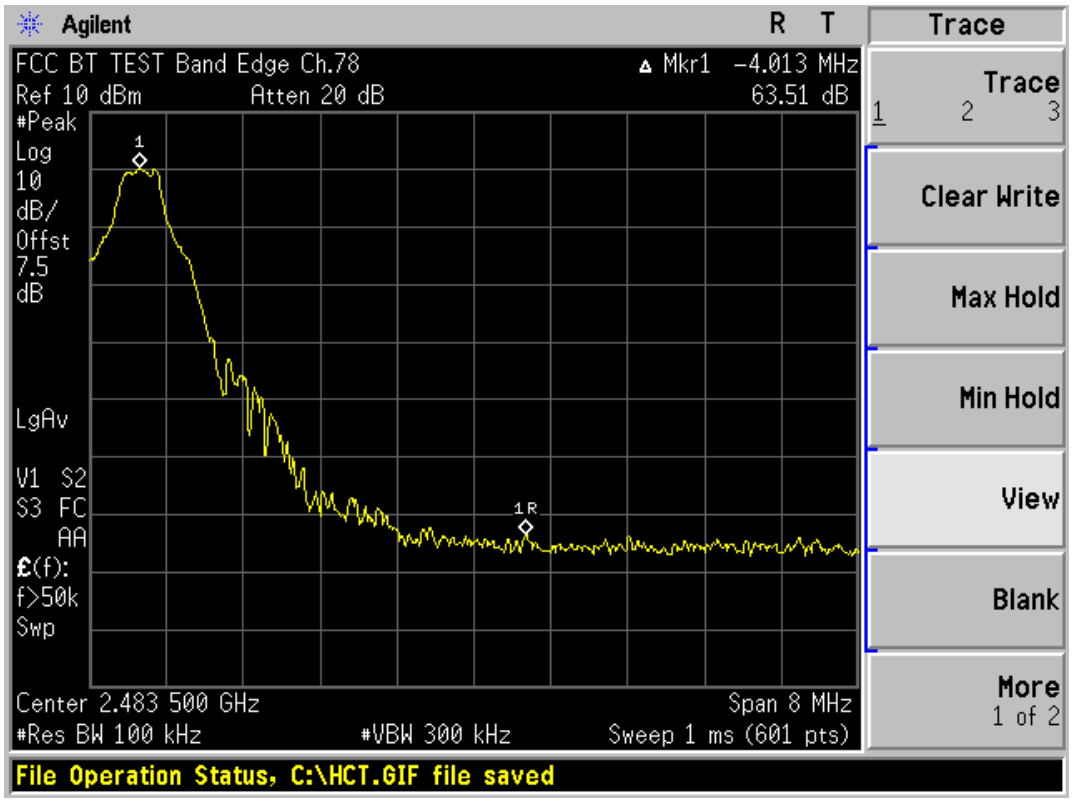
TEST RESULTS

See attached.

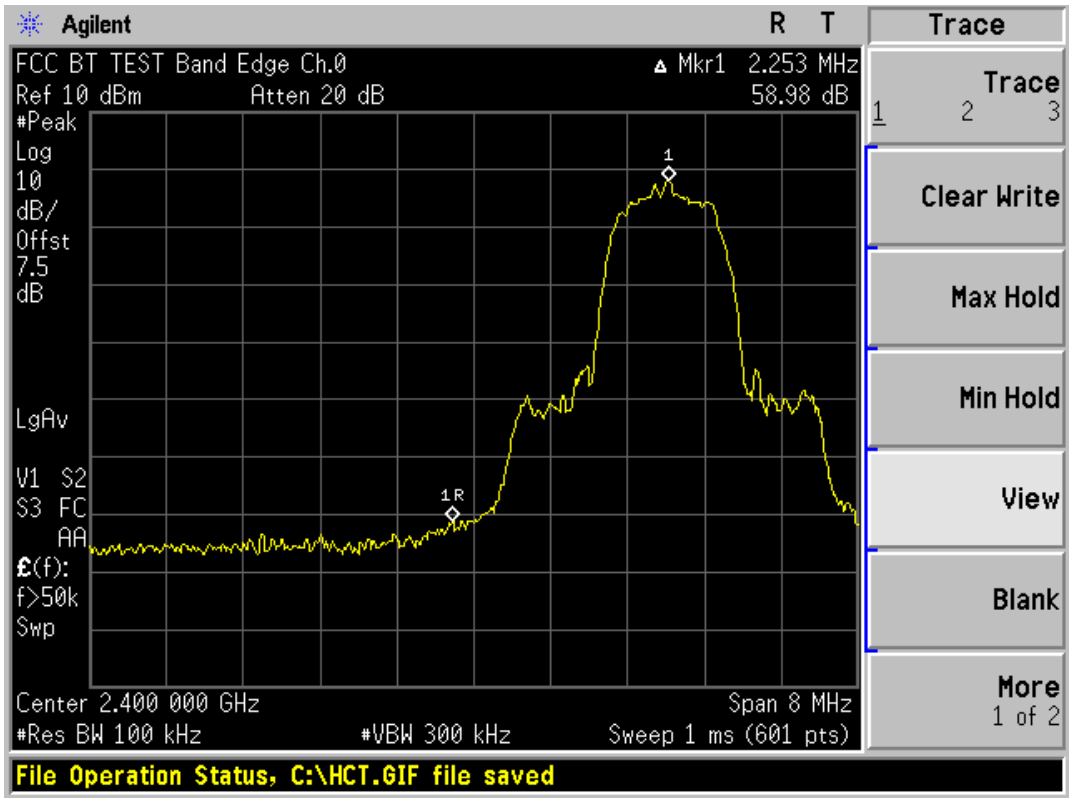
Test Plots (GFSK)
Band Edges (Low-CH)



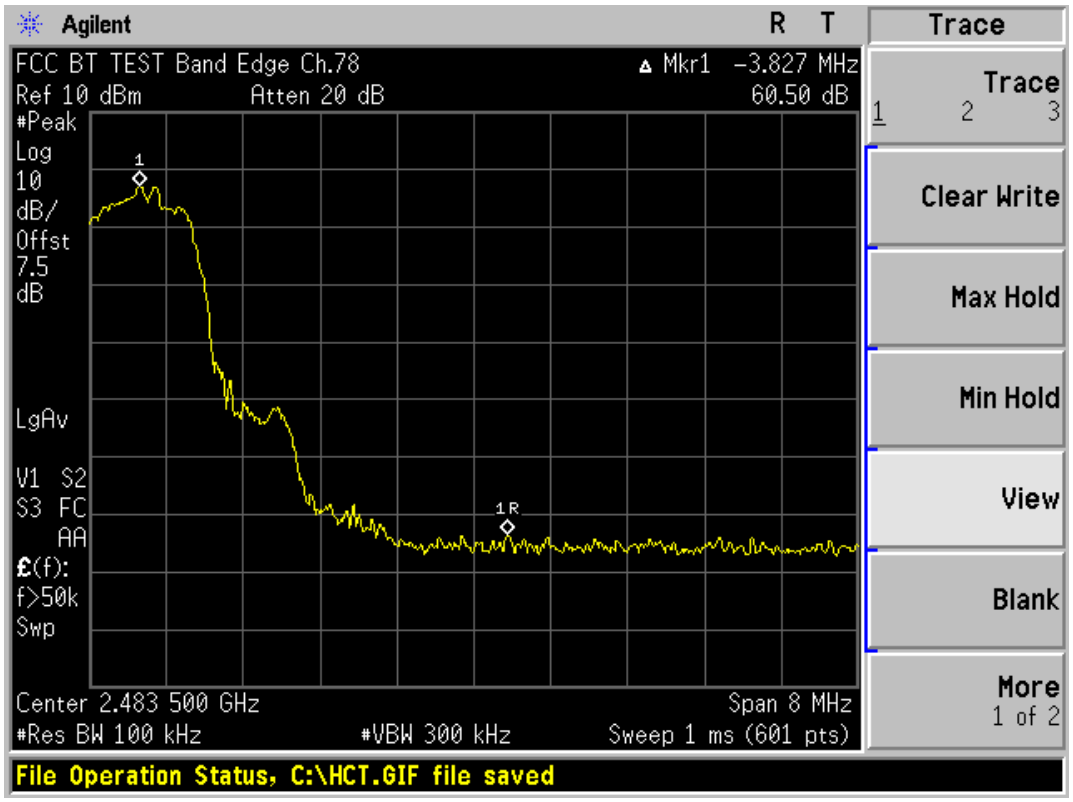
Test Plots (GFSK)
Band Edges (High-CH)



Test Plots (8DPSK)
Band Edges (Low-CH)



Test Plots (8DPSK)
Band Edges (High-CH)

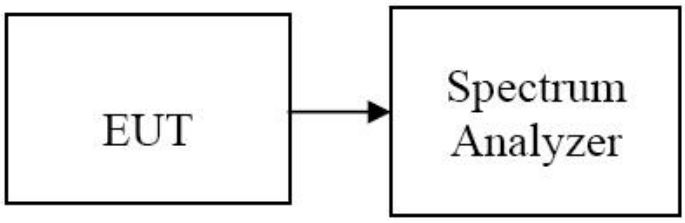


8.3 FREQUENCY SEPARATION / OCCUPIED BANDWIDTH (99% BW)

LIMIT

According to §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.

Test Configuration



TEST PROCEDURE

The spectrum analyzer is set to :

1. Span = 3 MHz
2. RBW = 30 kHz
3. VBW = 100 kHz
4. Sweep = auto

The trace was allowed to stabilize. The marker-delta function was used to determine the separation between the peaks of the adjacent channels.

TEST RESULTS

No non-compliance noted

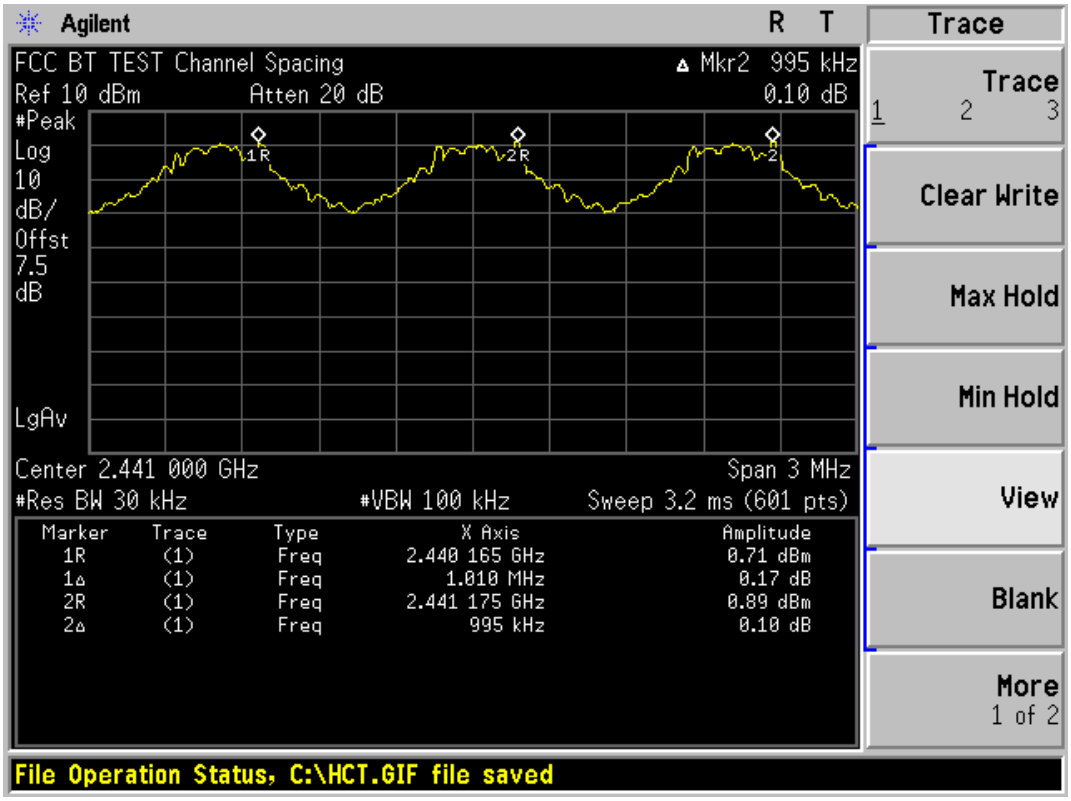
Test Data

Channel Separation (kHz)		20dB Bandwidth (kHz)			Limit (kHz)	Result
GFSK	8DPSK	Channel	GFSK	8DPSK		
995	855	Low CH	947.7	1291.0	>25 or >2/3 of the 20dB BW	Pass
		Middle CH	949.3	1273.0		
		High CH	951.6	1288.0		

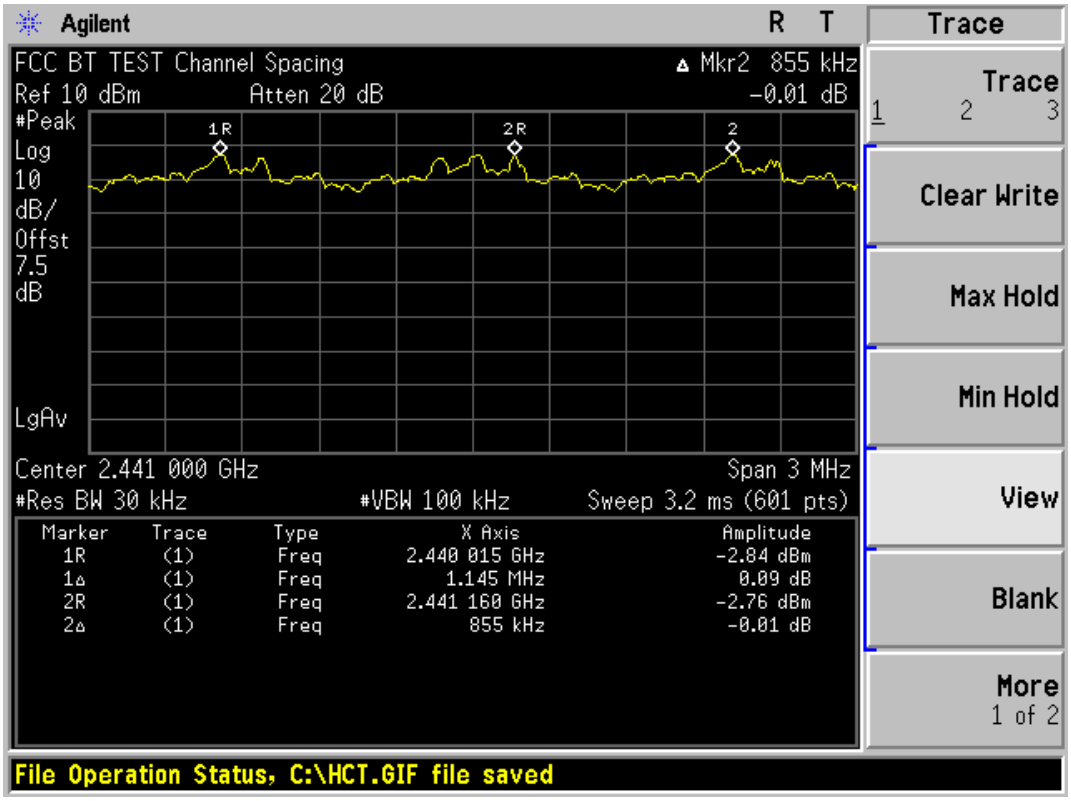
Occupied Bandwidth (99% BW)

99% BW (kHz)			Result
Channel	GFSK	8DPSK	
Low CH	900.3	1174.8	Pass
Middle CH	903.0	1161.5	
High CH	905.3	1173.9	

Test Plots (GFSK)
Channel Separation

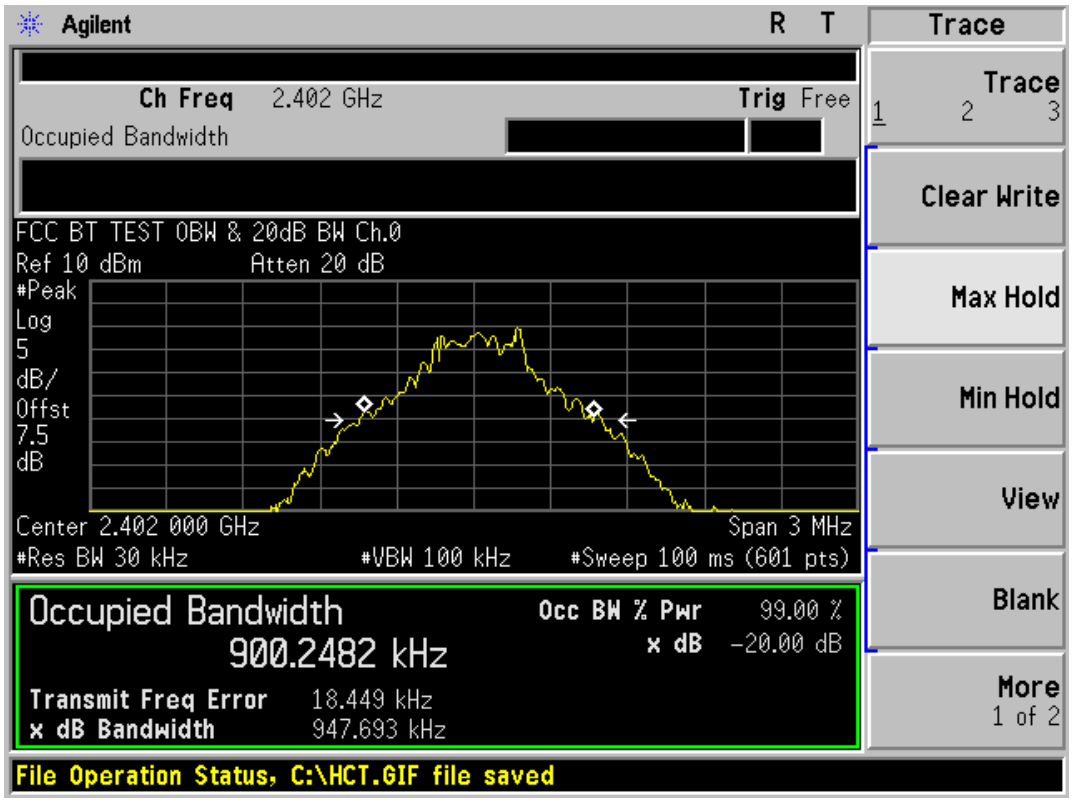


Test Plots (8DPSK)
Channel Separation



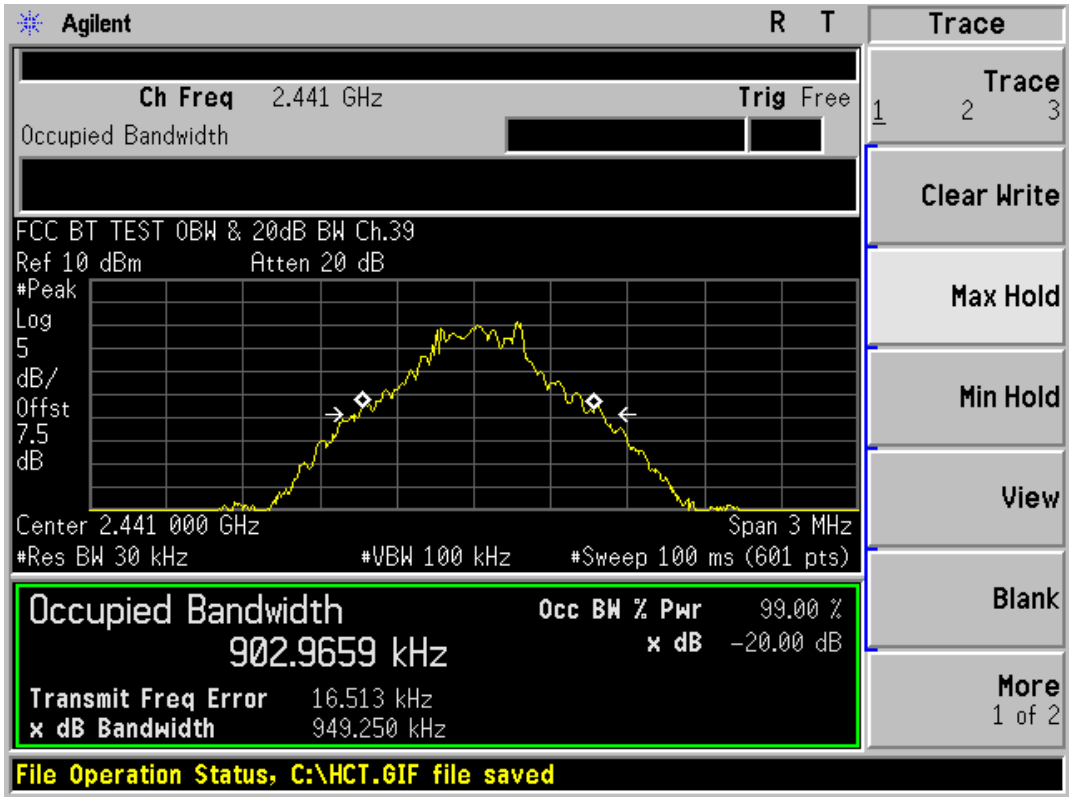
Test Plots (GFSK)

20 dB Bandwidth & Occupied Bandwidth (Low-CH)



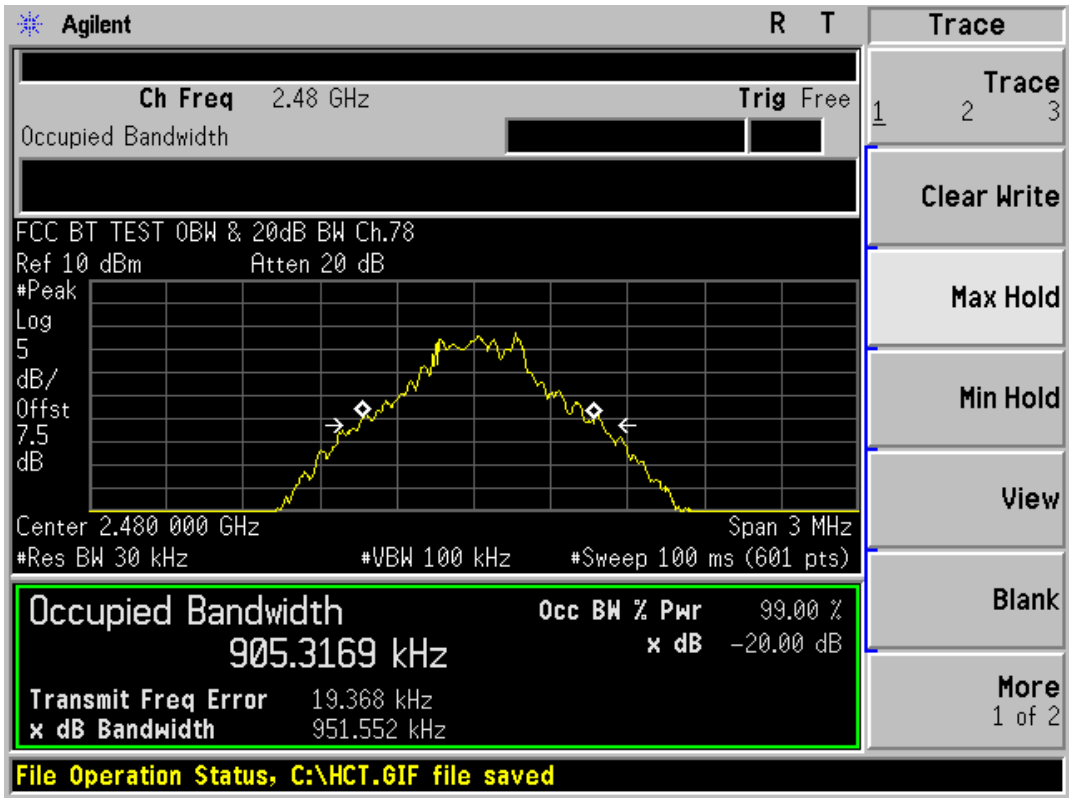
Test Plots (GFSK)

20 dB Bandwidth & Occupied Bandwidth (Mid-CH)



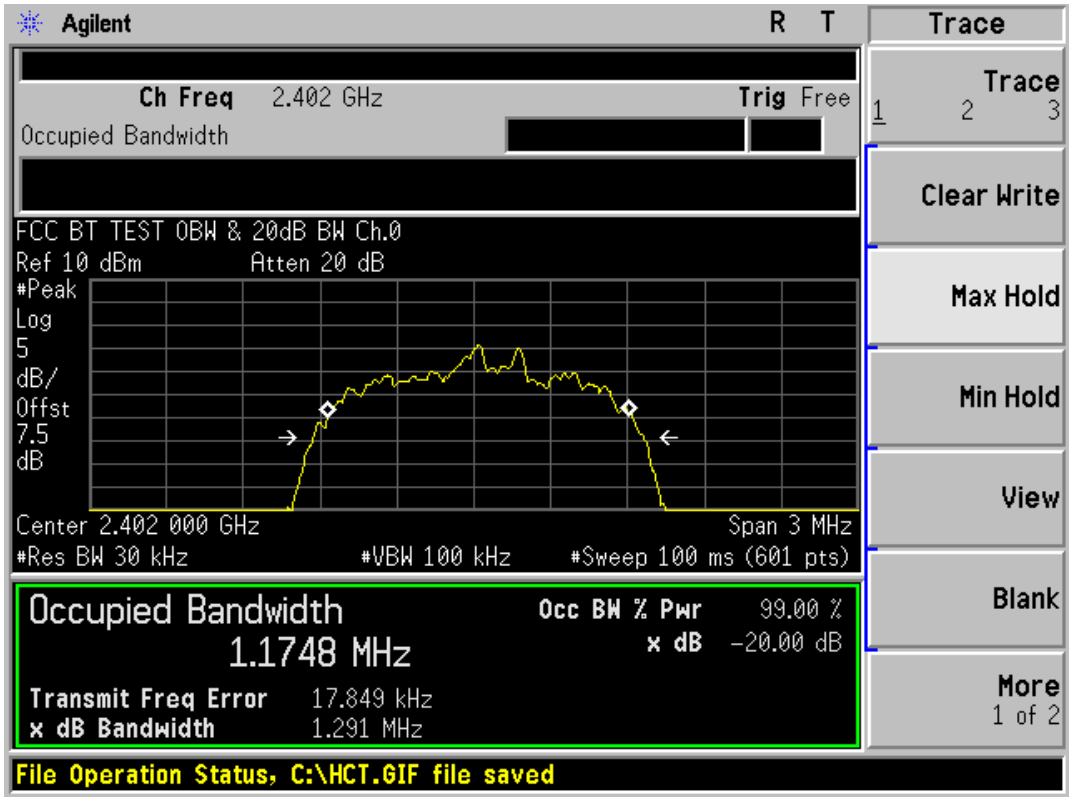
Test Plots (GFSK)

20 dB Bandwidth & Occupied Bandwidth (High-CH)

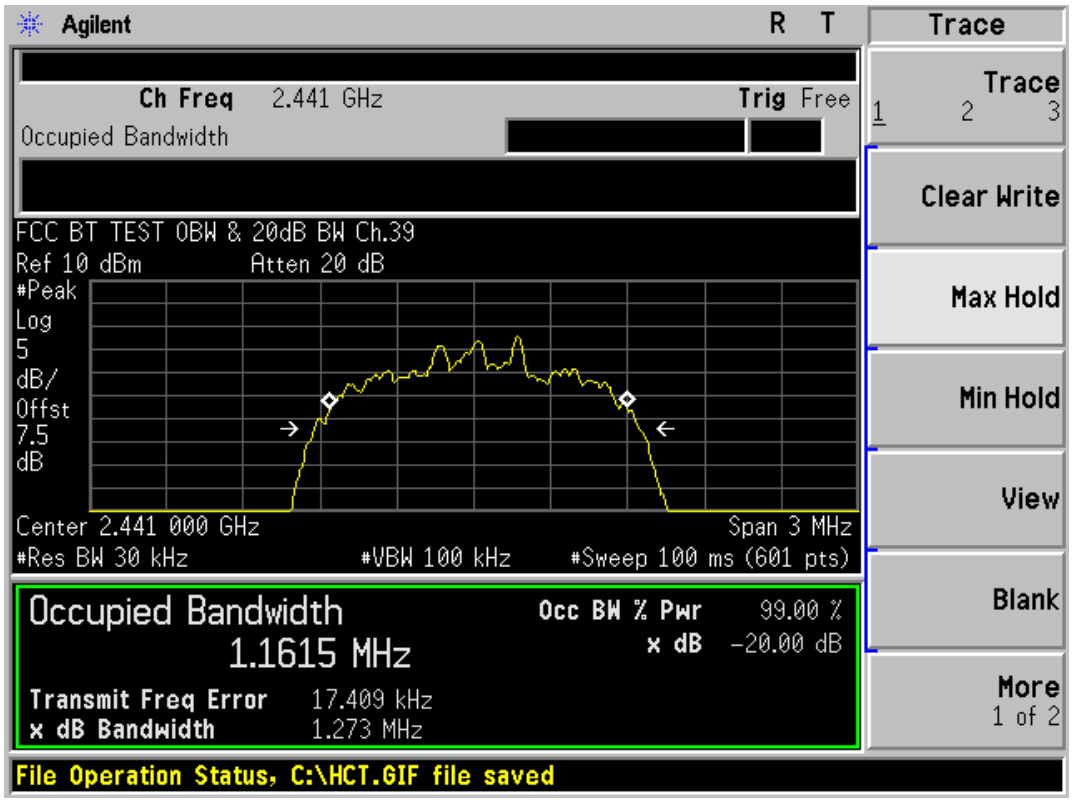


Test Plots (8DPSK)

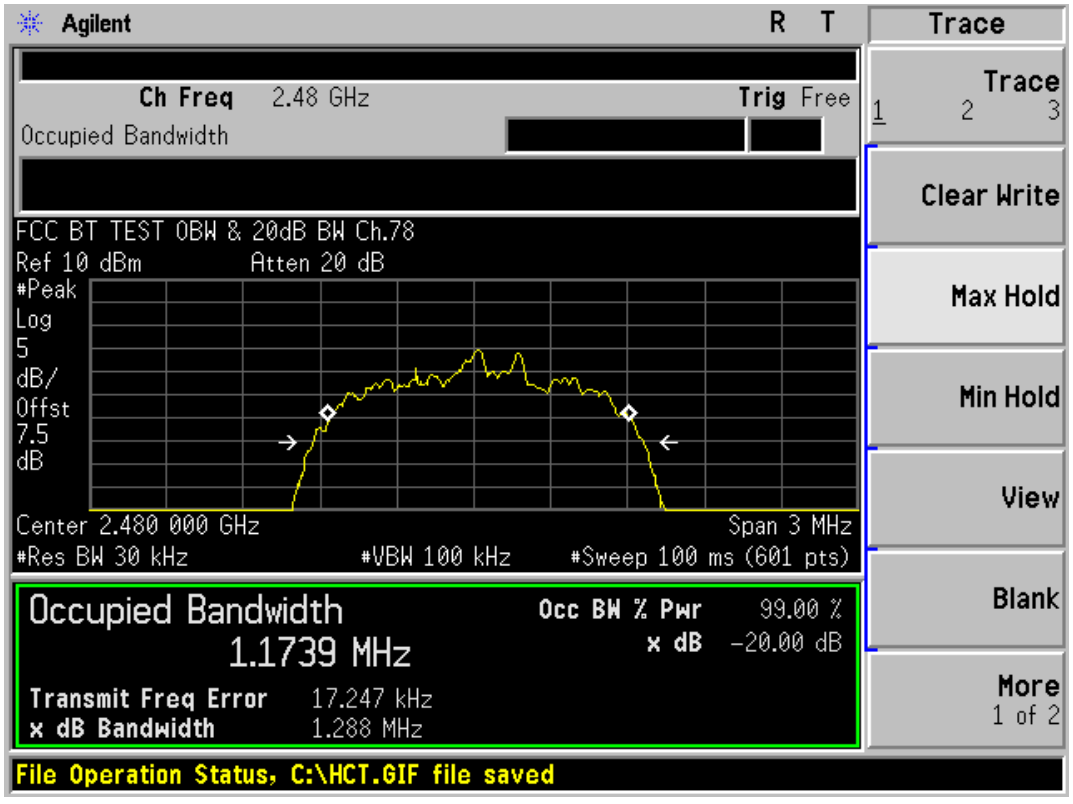
20 dB Bandwidth & Occupied Bandwidth (Low-CH)



Test Plots (8DPSK)
20 dB Bandwidth & Occupied Bandwidth (Mid-CH)



Test Plots (8DPSK)
20 dB Bandwidth & Occupied Bandwidth (High-CH)

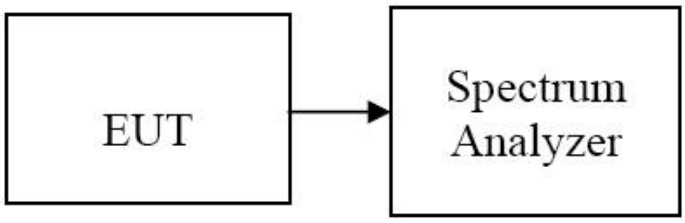


8.4 NUMBER OF HOPPING FREQUENCY

LIMIT

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400 MHz ~ 2483.5 MHz bands shall use at least 15 hopping frequencies.

Test Configuration



TEST PROCEDURE

The Bluetooth frequency hopping function of the EUT was enabled. The spectrum analyzer was set to :

1. Span = the frequency band of operation (Start = 2400 MHz, Stop = 2483.5 MHz)
2. RBW = 300 kHz
3. VBW = 300 kHz
4. Sweep = auto

The trace was allowed to stabilize.

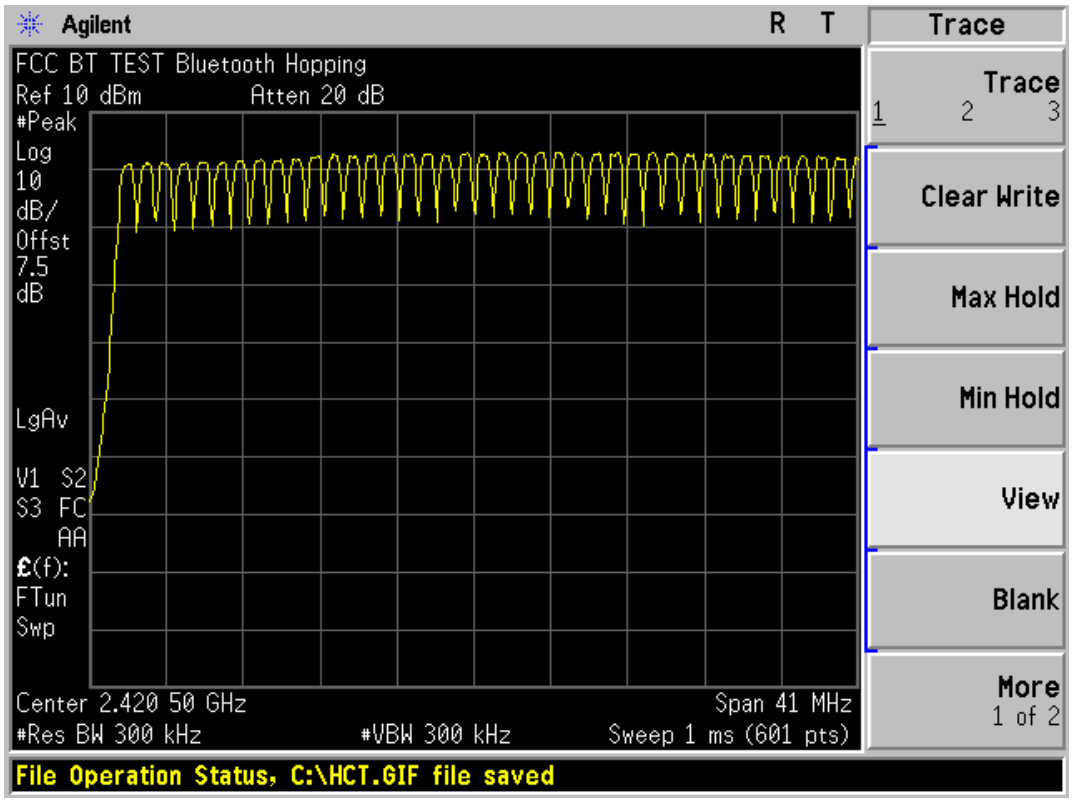
TEST RESULTS

No non-compliance noted

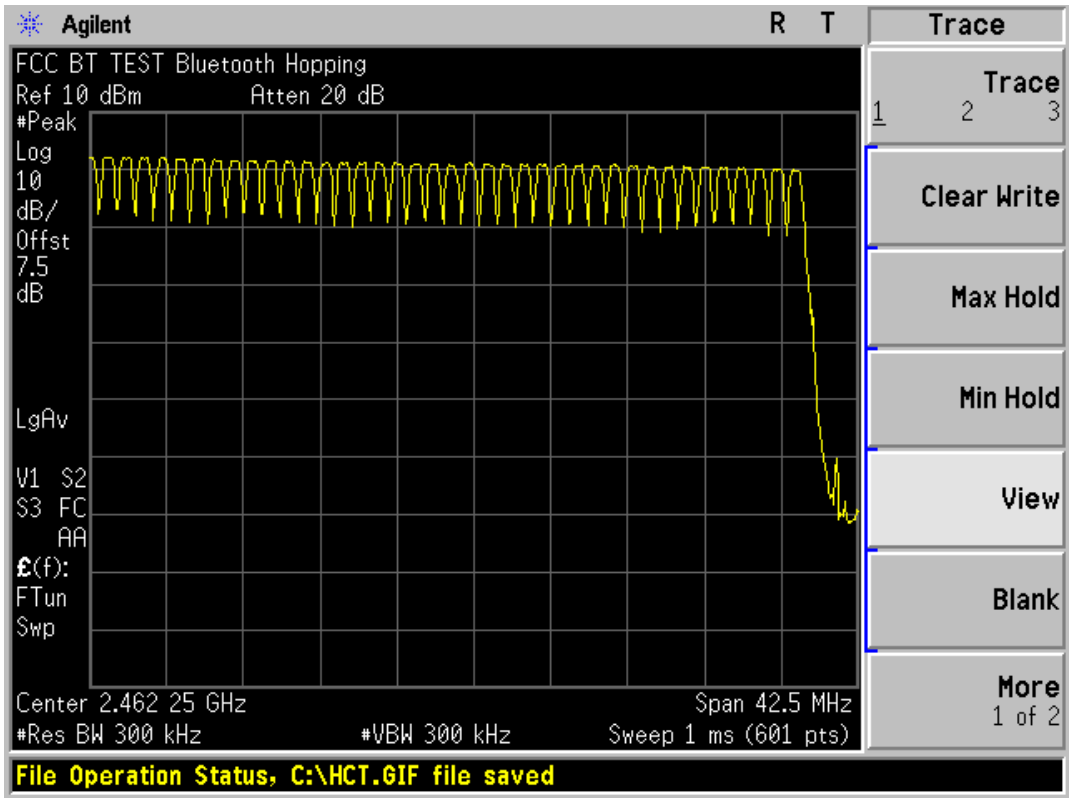
Test Data

Result (No. of CH)		Limit	Result
GFSK	8DPSK		
79	79	>15	Pass

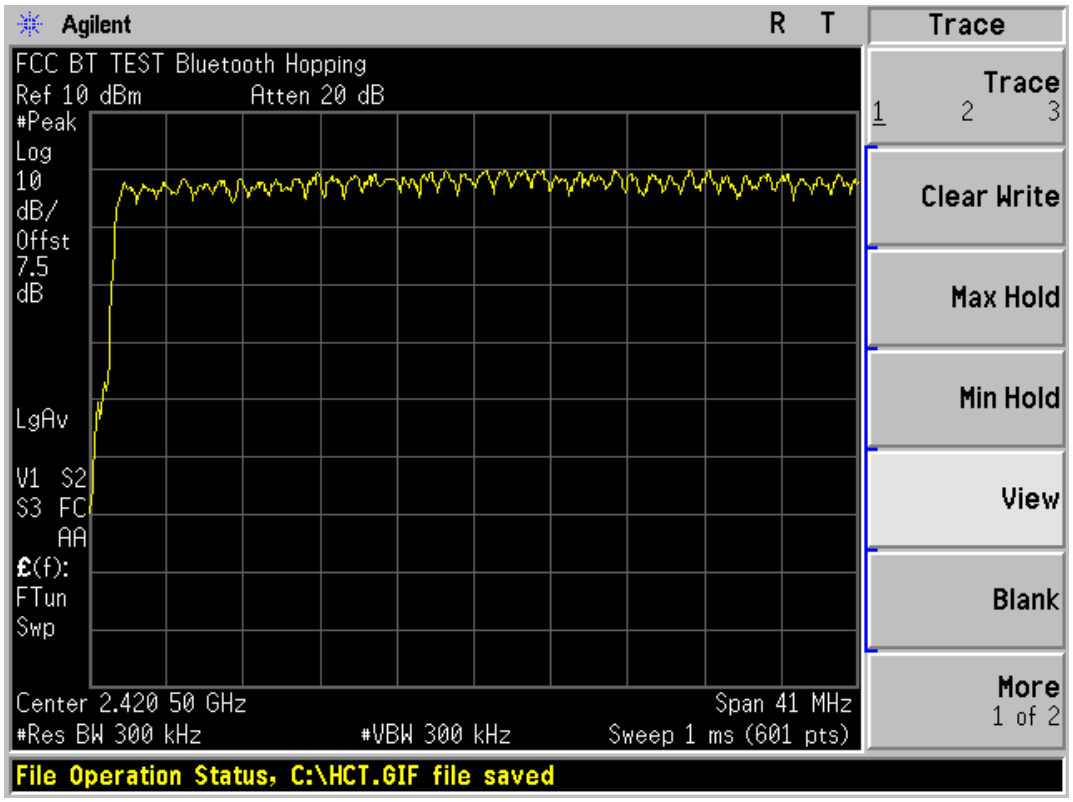
Test Plots (GFSK)
Number of Channels (2.4 GHz - 2.441 GHz)



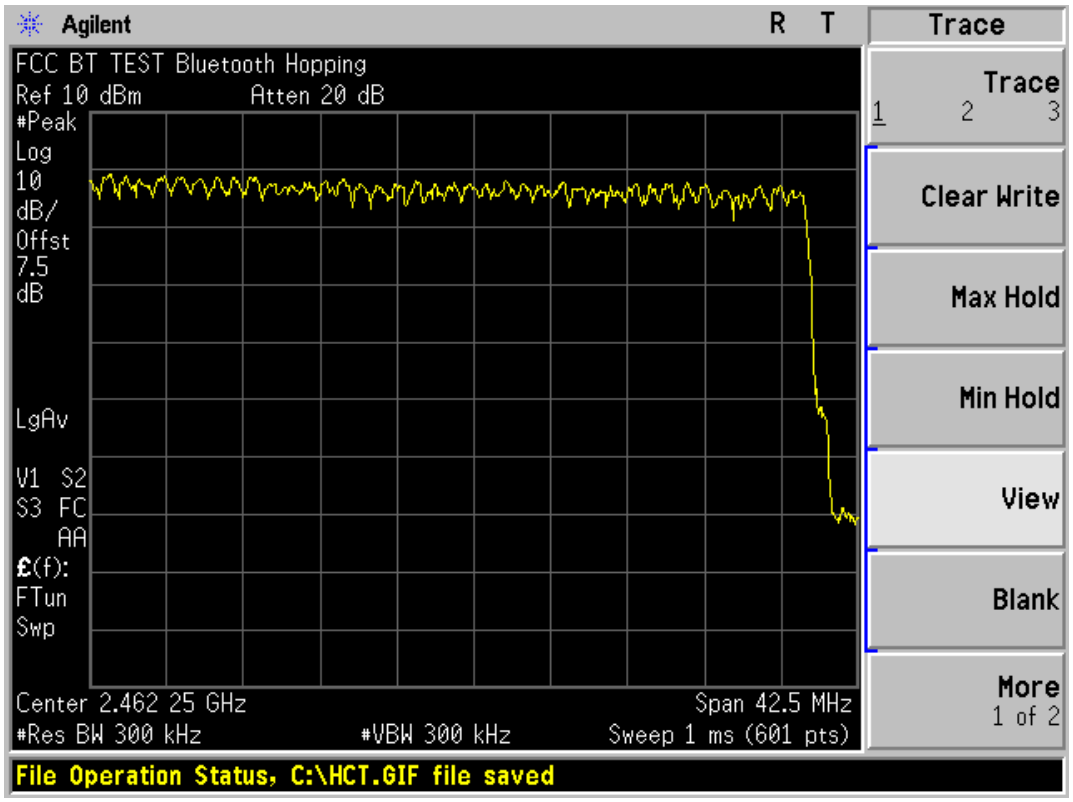
Test Plots (GFSK)
Number of Channels (2.441 GHz - 2.4835 GHz)



Test Plots (8DPSK)
Number of Channels (2.4 GHz - 2.441 GHz)



Test Plots (8DPSK)
Number of Channels (2.441 GHz - 2.4835 GHz)

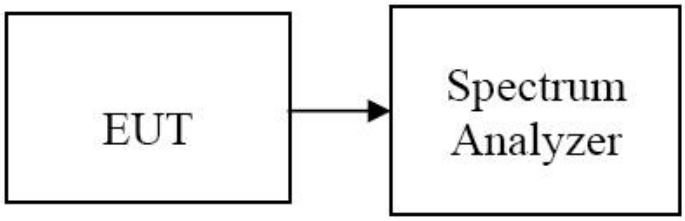


8.5 TIME OF OCCUPANCY (DWELL TIME)

LIMIT

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400 MHz ~ 2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

Test Configuration



TEST PROCEDURE

EUT was set to transmit the longest packet type (DH5)

1. Span = zero span
2. RBW = 1 MHz
3. VBW = 1 MHz
4. Sweep = as necessary to capture the entire dwell time per channel

The marker-delta function was used to determine the dwell time.

TEST RESULTS

See the table.

DH 5(The longest packet type for GFSK)

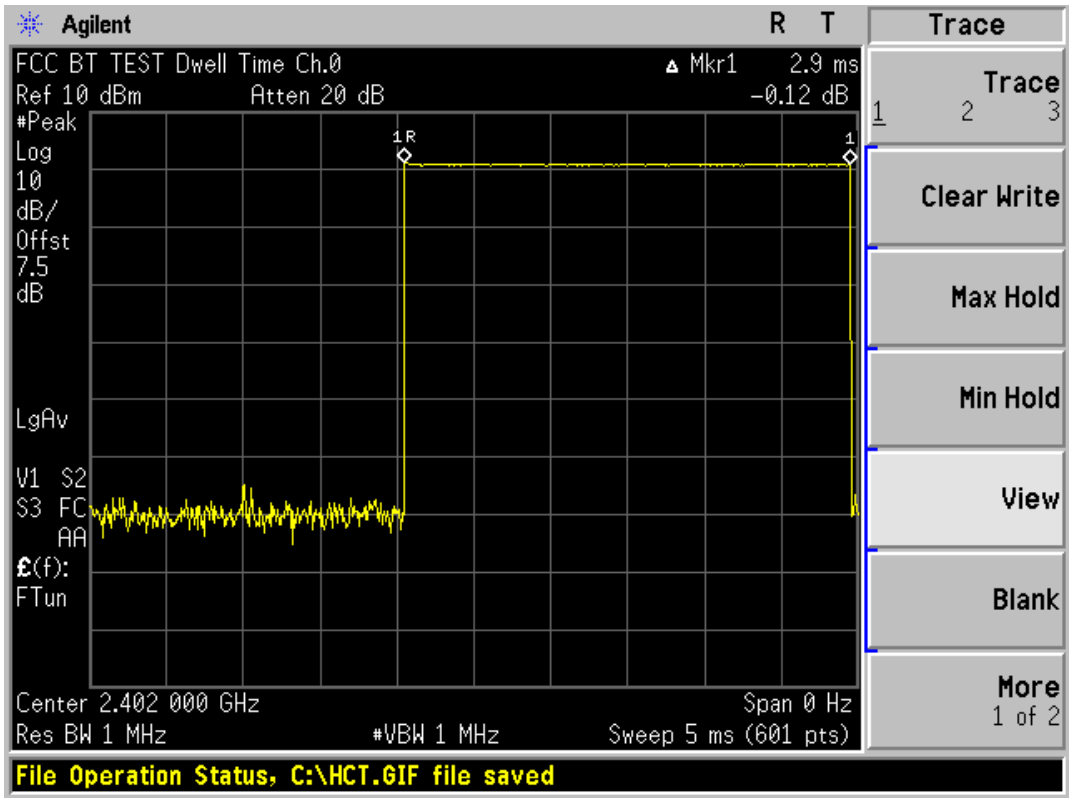
CH Mid : 2.9 * (1600/6)/79 * 31.6 = 309.33 (ms)

3-DH 5(The longest packet type for 8DPSK)

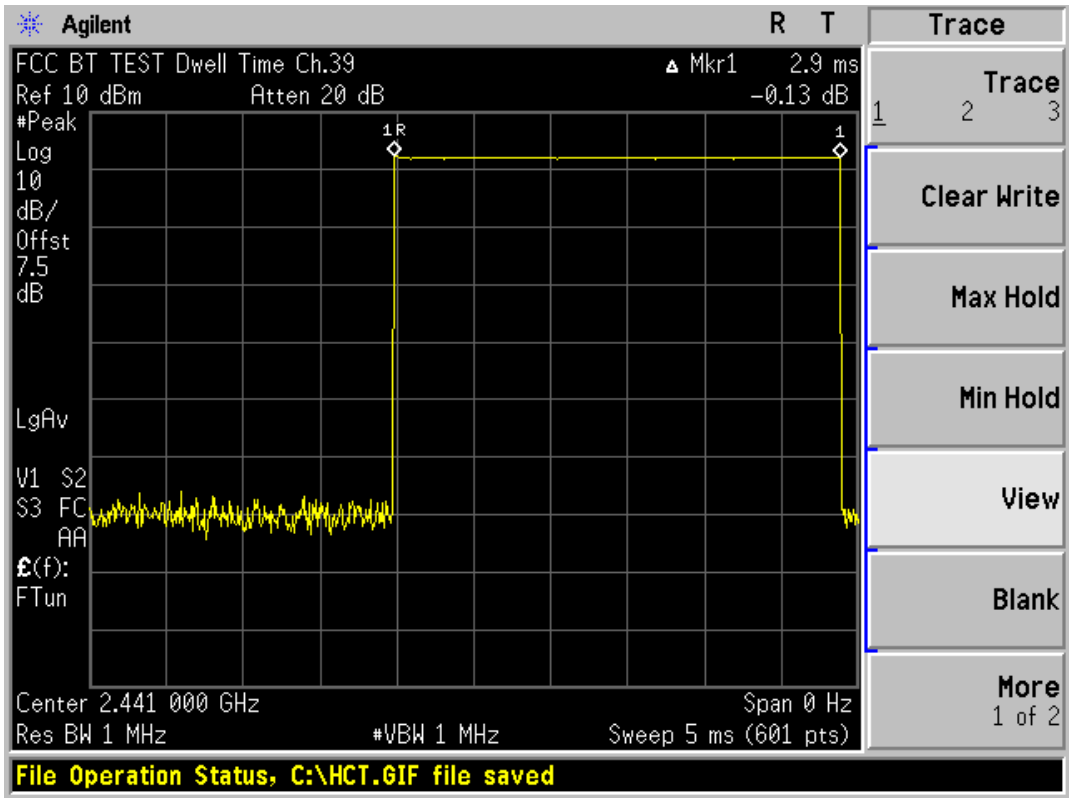
CH Mid : 2.9 * (1600/6)/79 * 31.6 = 309.33 (ms)

Channel	Pulse Time (ms)		Total of Dwell (ms)		Period Time (s)	Limit (ms)	Result
	GFSK	8DPSK	GFSK	8DPSK			
Low	2.90	2.90	309.33	309.33	31.6	400	PASS
Mid	2.90	2.90	309.33	309.33	31.6		PASS
High	2.89	2.90	308.27	309.33	31.6		PASS

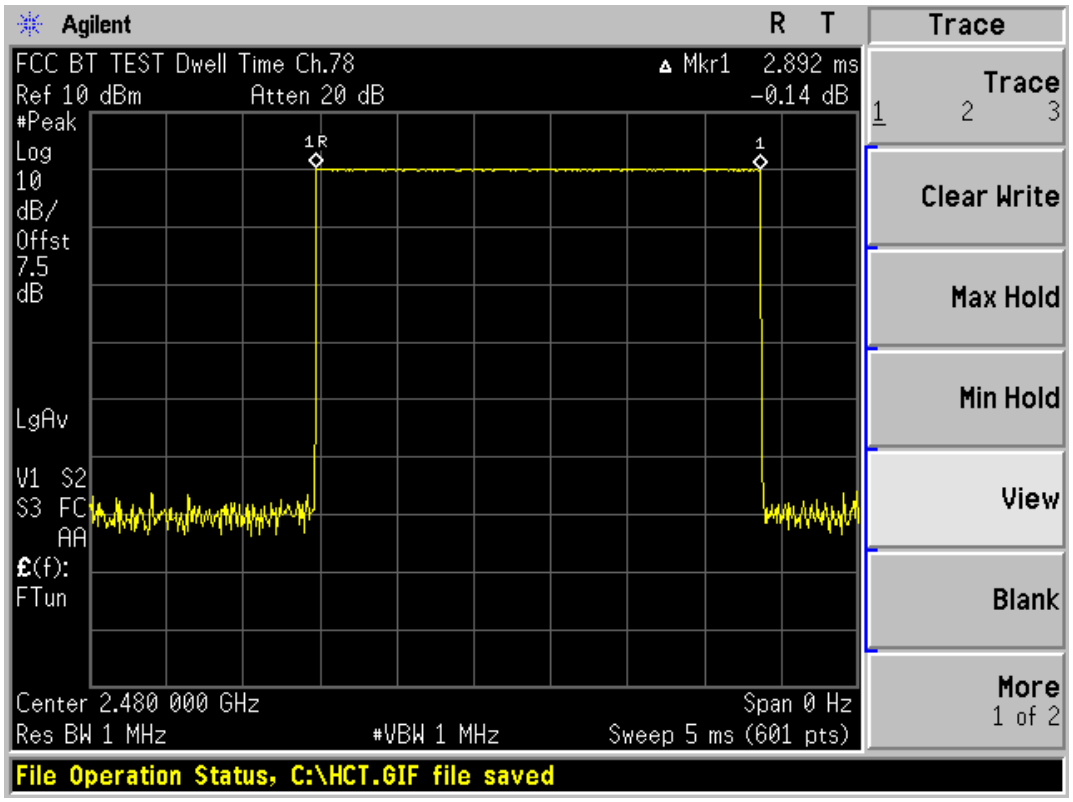
Test Plots (GFSK)
Dwell Time (Low-CH)



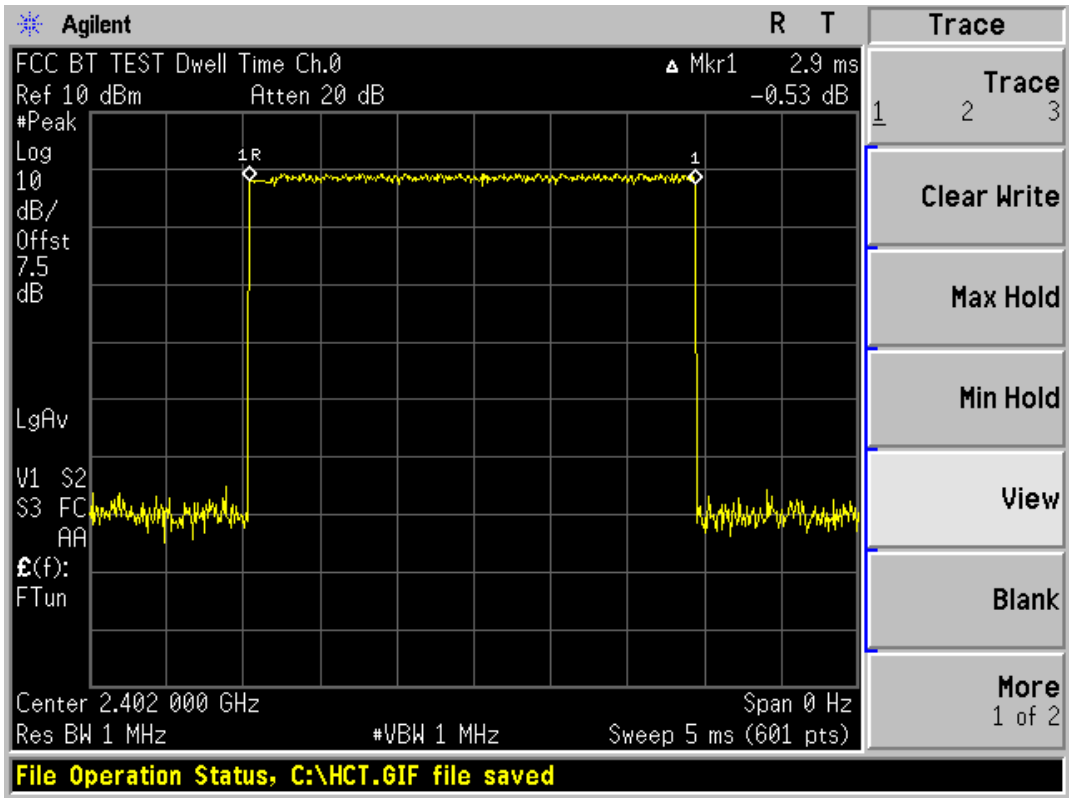
Test Plots (GFSK)
Dwell Time (Mid-CH)



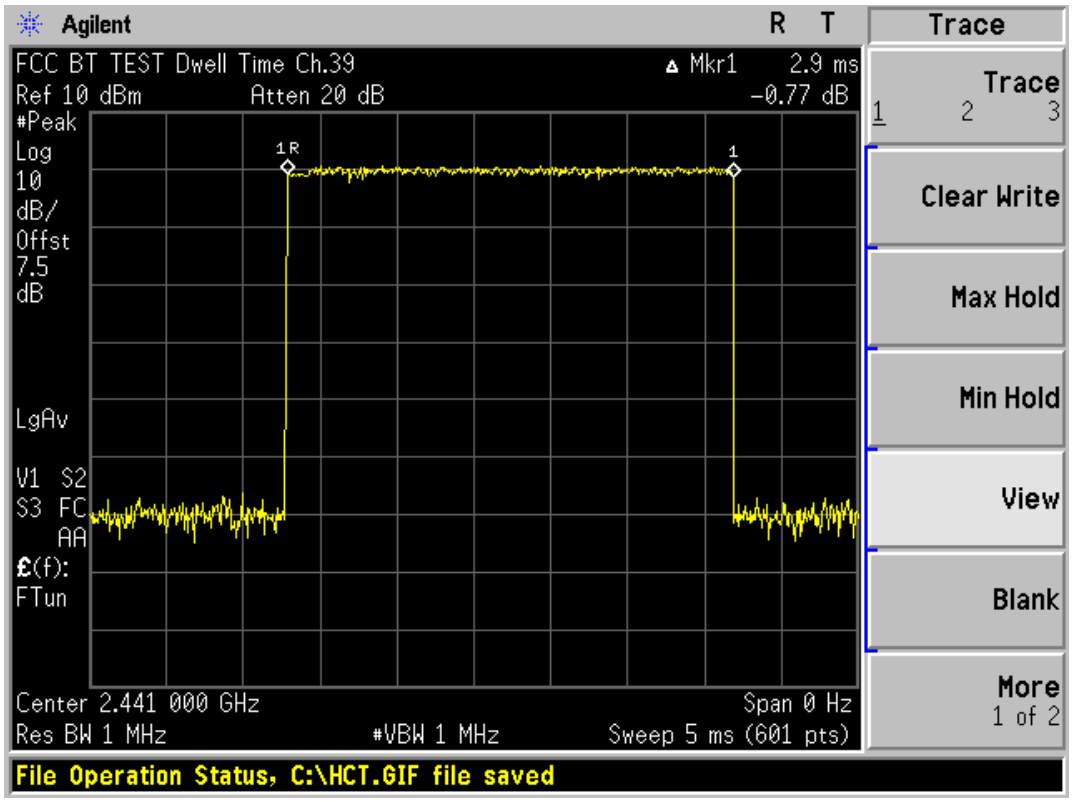
Test Plots (GFSK)
Dwell Time (High-CH)



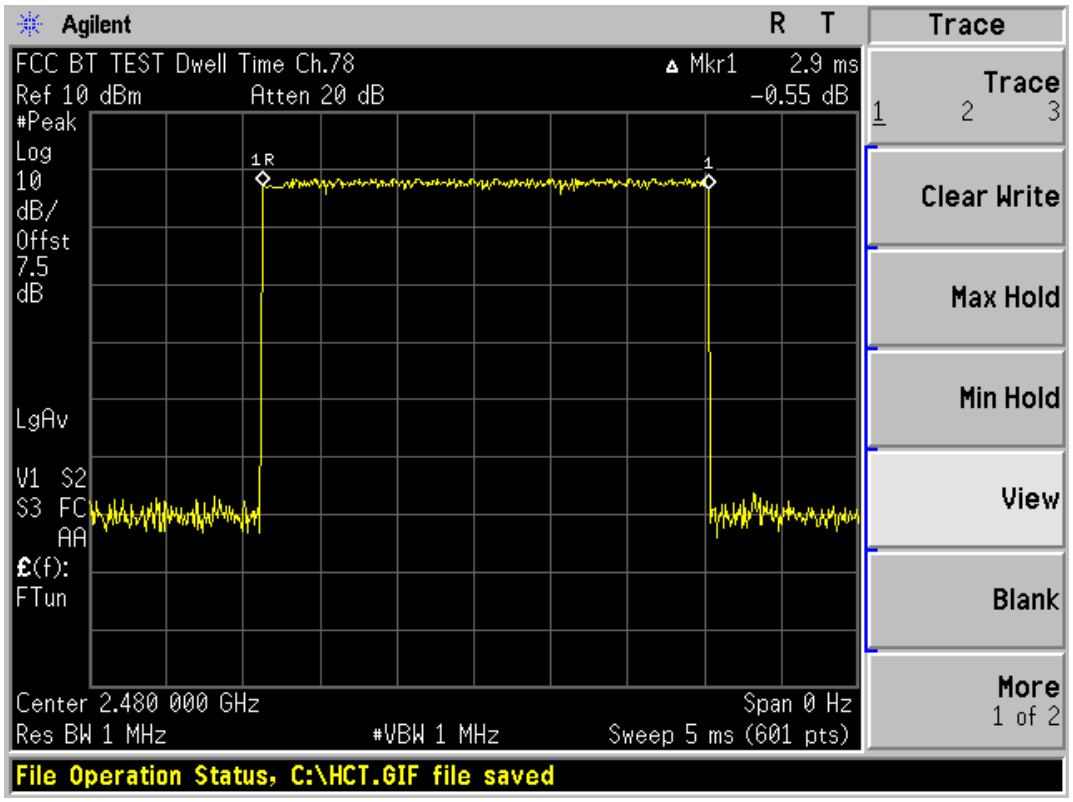
Test Plots (8DPSK)
Dwell Time (Low-CH)



Test Plots (8DPSK)
Dwell Time (Mid-CH)



Test Plots (8DPSK)
Dwell Time (High-CH)



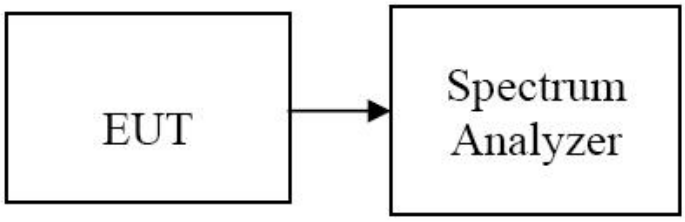
8.6 SPURIOUS EMISSIONS

8.6.1 CONDUCTED SPURIOUS MEASUREMENT

LIMIT : §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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Test Configuration



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

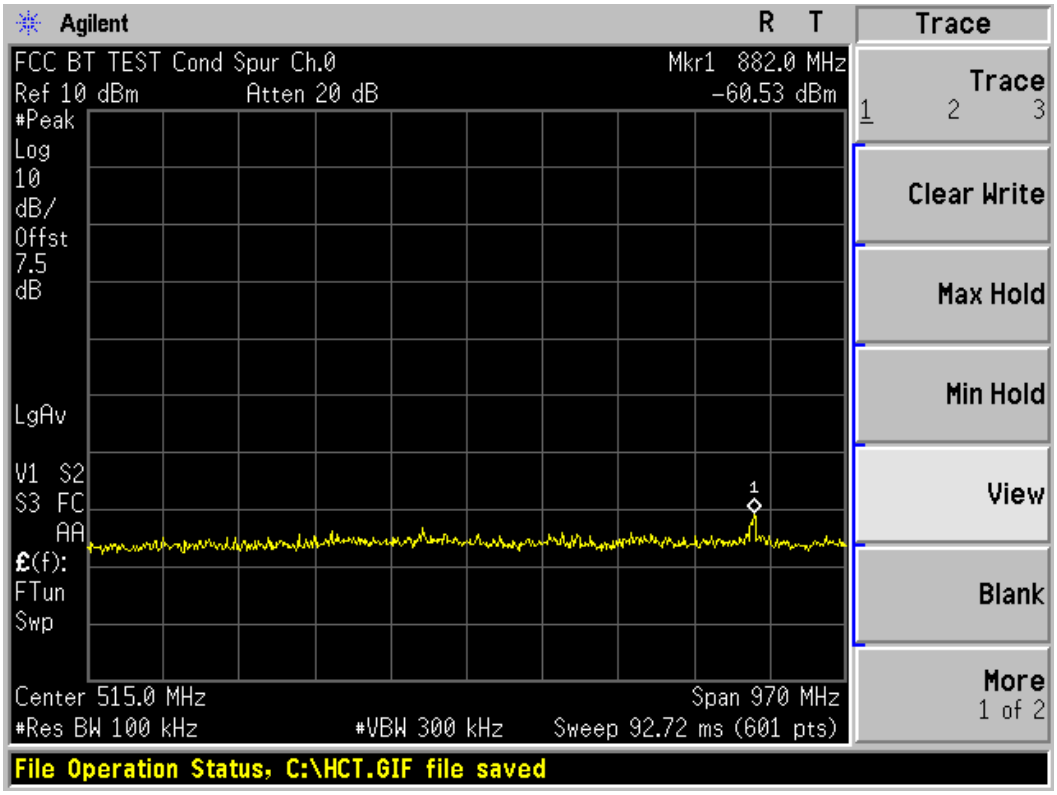
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.
Detector Mode is set to a peak detector Mode.

Measurements are made over the 30 MHz to 26 GHz range with the transmitter set to the lowest, middle, and highest channels.

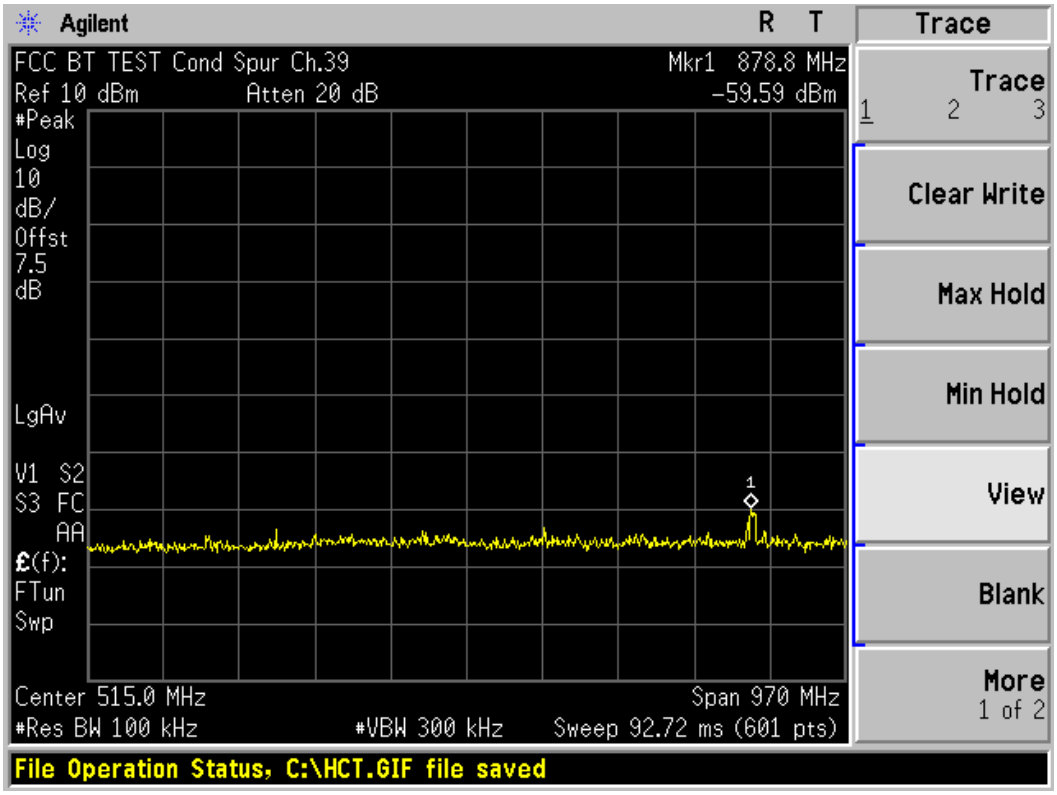
TEST RESULTS

No non-compliance noted

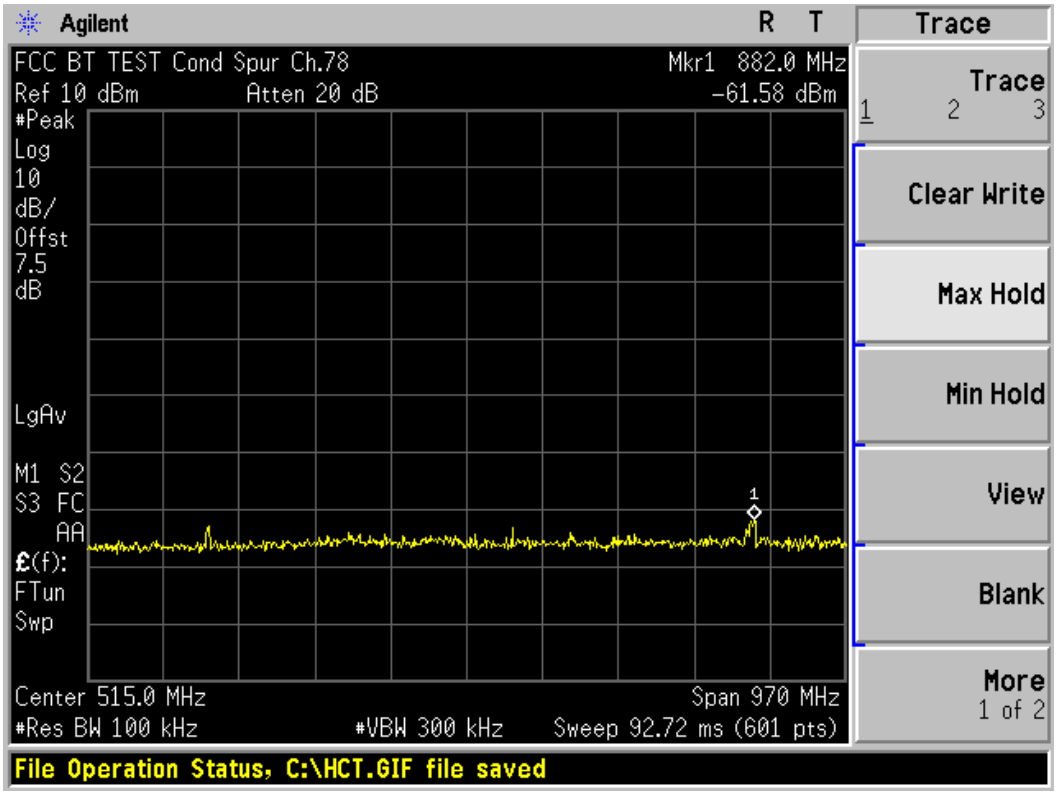
Test Plots (GFSK) - 30 MHz - 1 GHz (RBW:100 kHz, VBW: 300 kHz)
Spurious Emission (Low-CH)



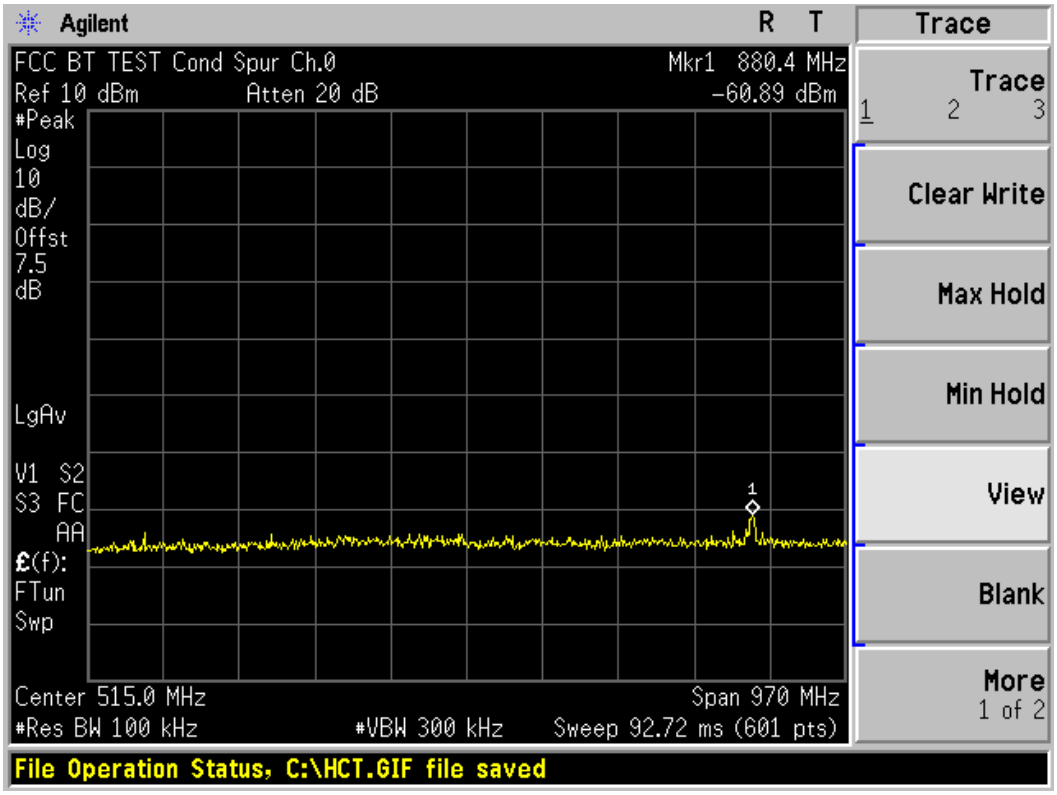
Test Plots (GFSK) - 30 MHz - 1 GHz (RBW:100 kHz, VBW: 300 kHz)
Spurious Emission (Mid-CH)



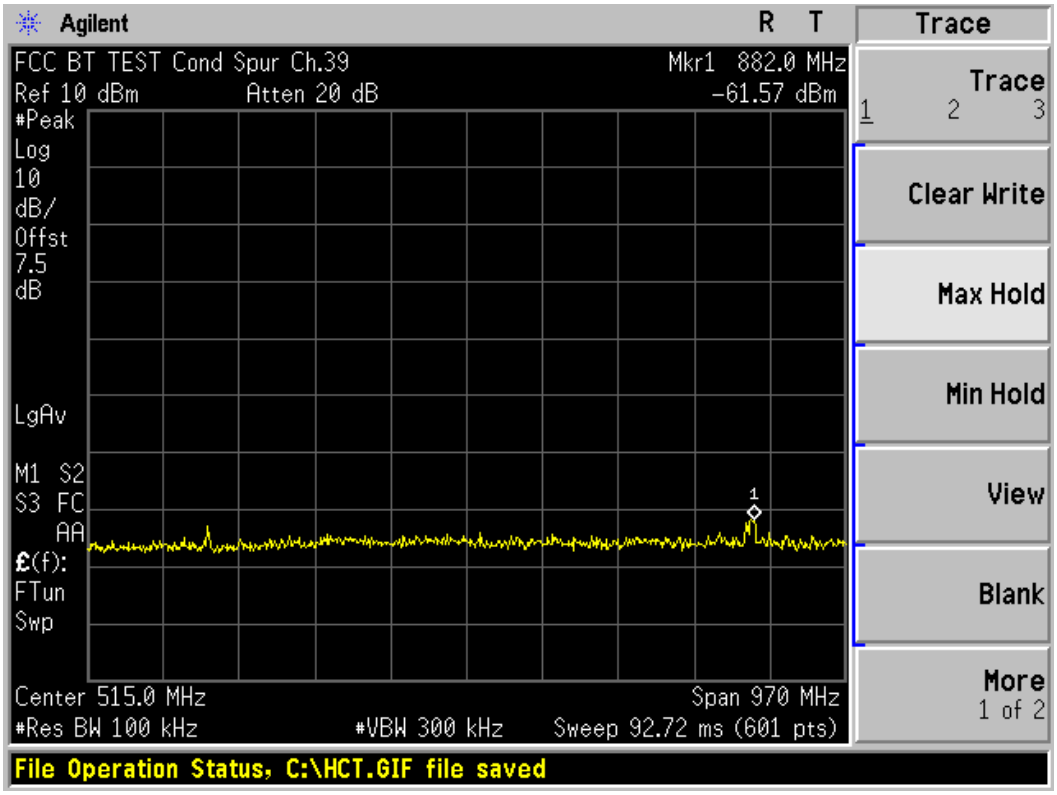
Test Plots (GFSK) - 30 MHz - 1 GHz (RBW:100 kHz, VBW: 300 kHz)
Spurious Emission (High-CH)



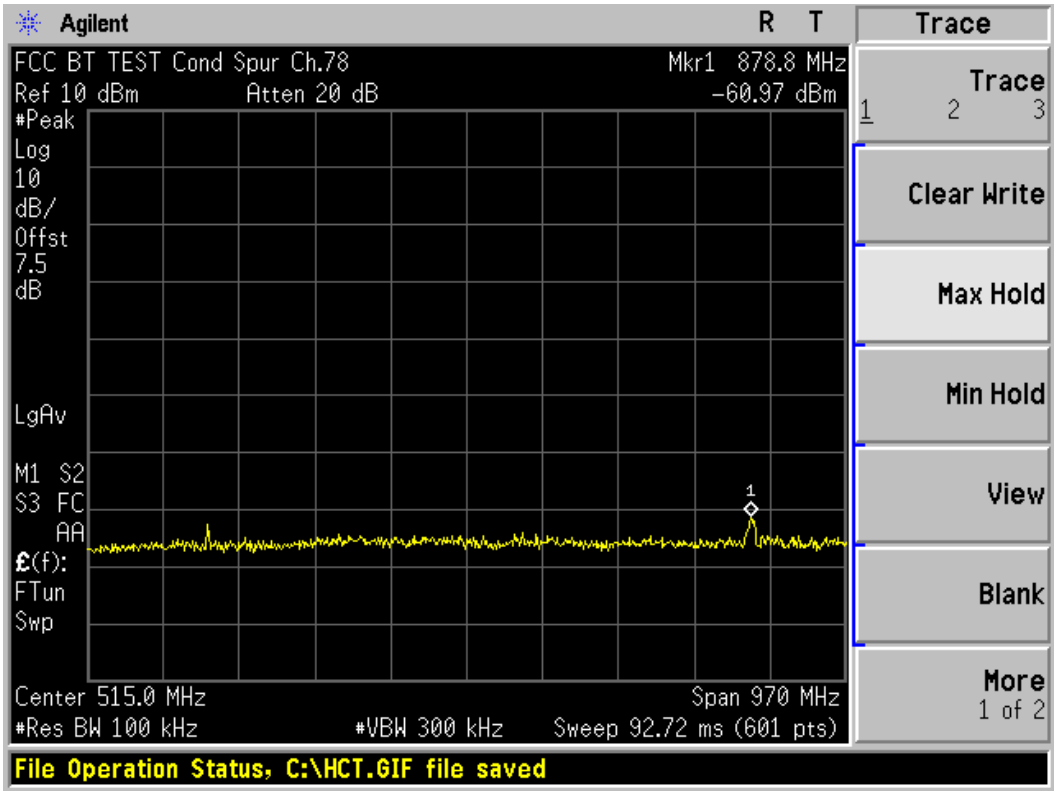
Test Plots (8DPSK) - 30 MHz - 1 GHz (RBW:100 kHz, VBW: 300 kHz)
Spurious Emission (Low-CH)



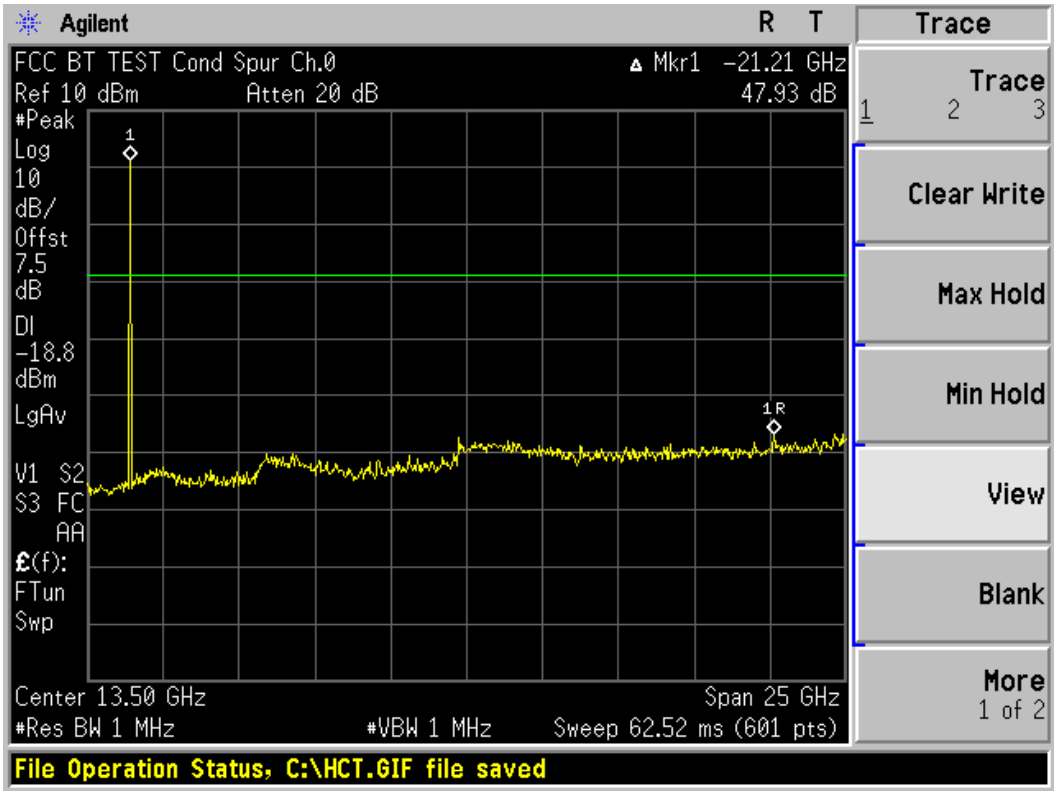
Test Plots (8DPSK) - 30 MHz - 1 GHz (RBW:100 kHz, VBW: 300 kHz)
Spurious Emission (Mid-CH)



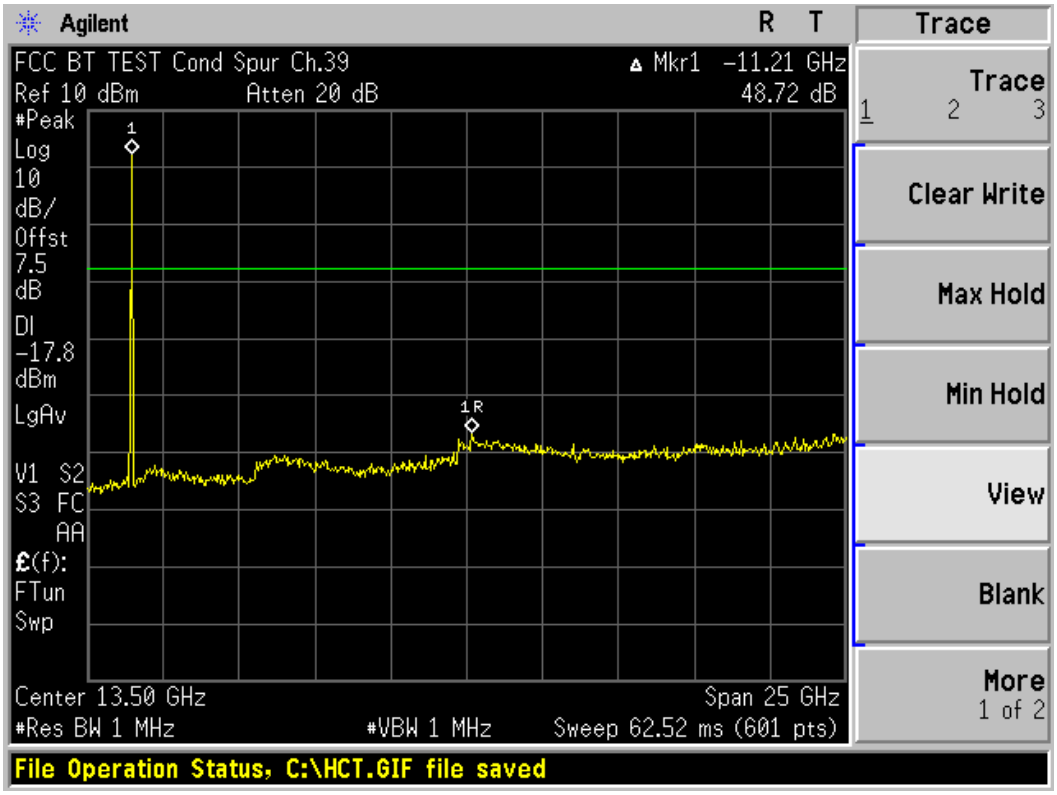
Test Plots (8DPSK) - 30 MHz - 1 GHz (RBW:100 kHz, VBW: 300 kHz)
Spurious Emission (High-CH)



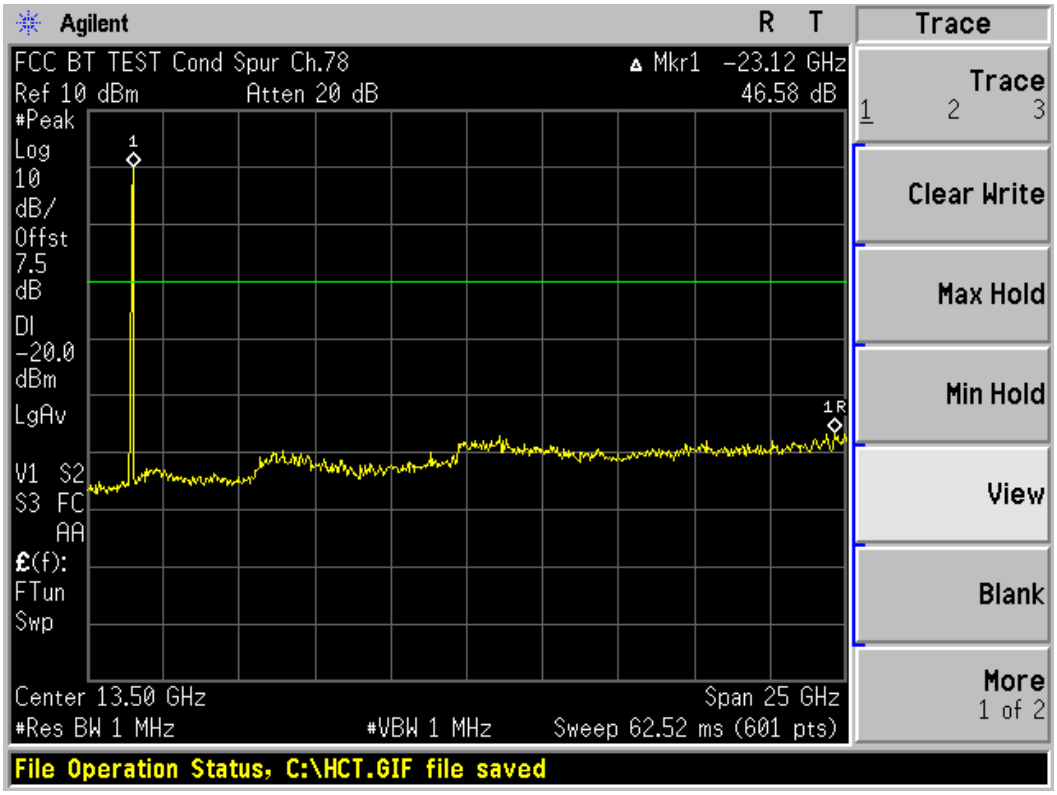
Test Plots (GFSK) - 1 GHz - 26 GHz (RBW:1 MHz, VBW: 1 MHz)
Spurious Emission (Low-CH)



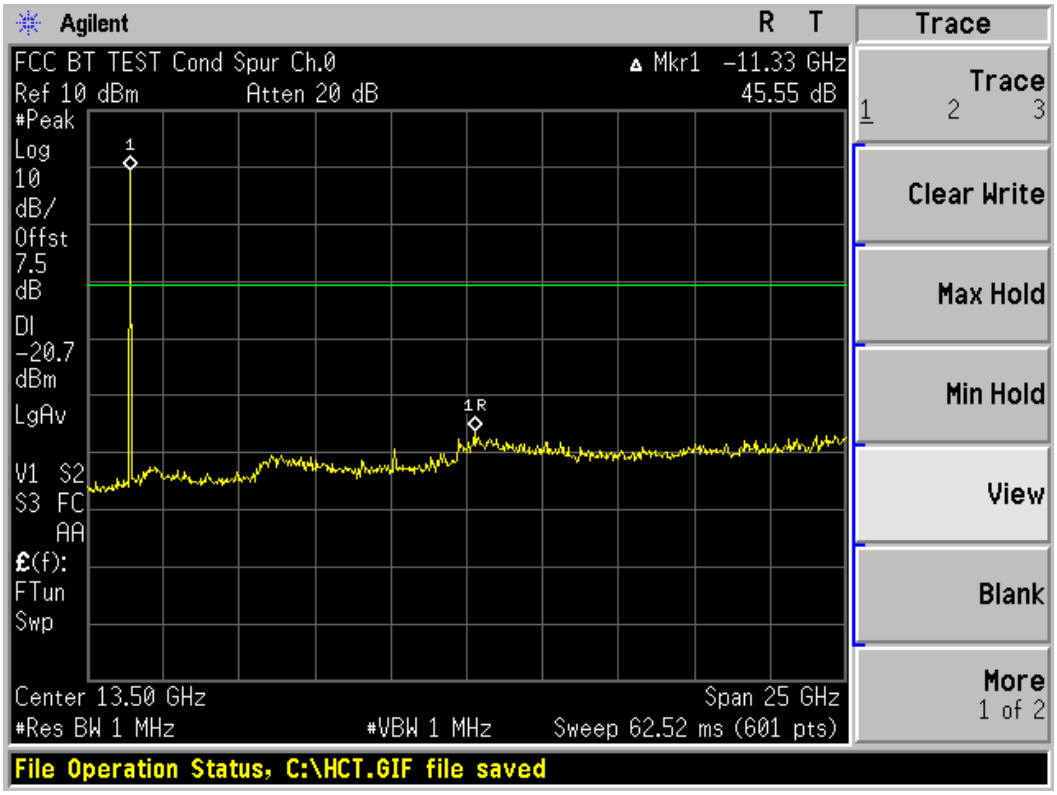
Test Plots (GFSK) - 1 GHz - 26 GHz (RBW:1 MHz, VBW: 1 MHz)
Spurious Emission (Mid-CH)



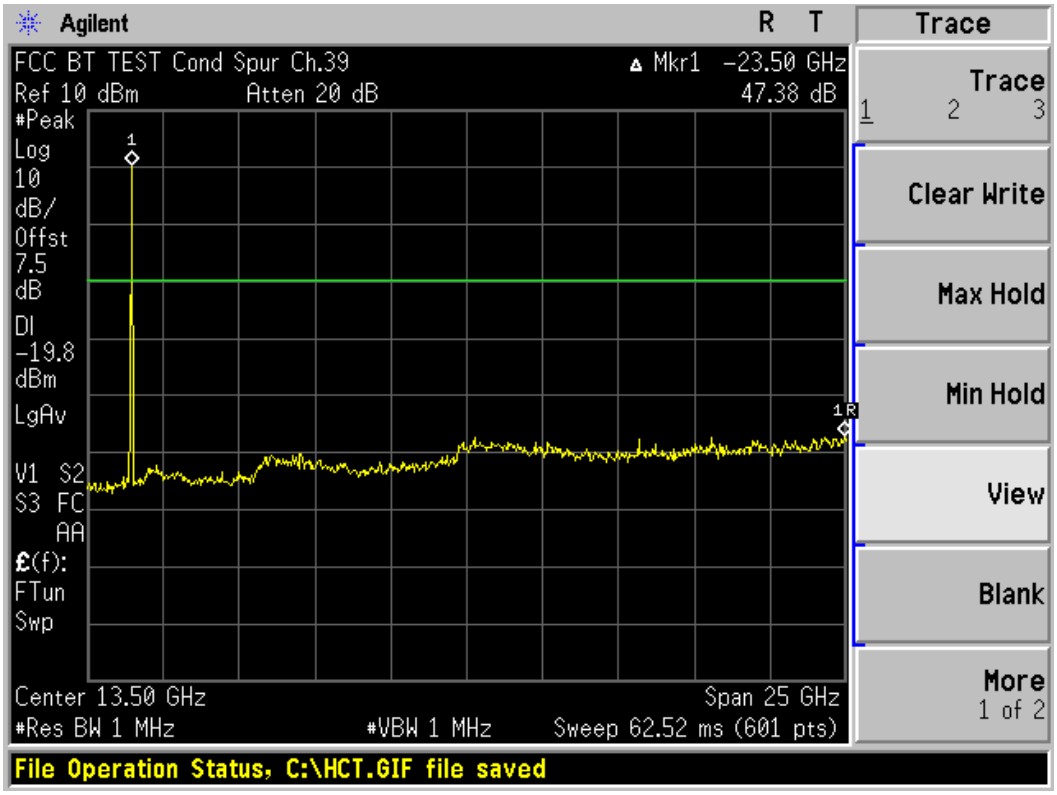
Test Plots (GFSK) - 1 GHz - 26 GHz (RBW:1 MHz, VBW: 1 MHz)
Spurious Emission (High-CH)



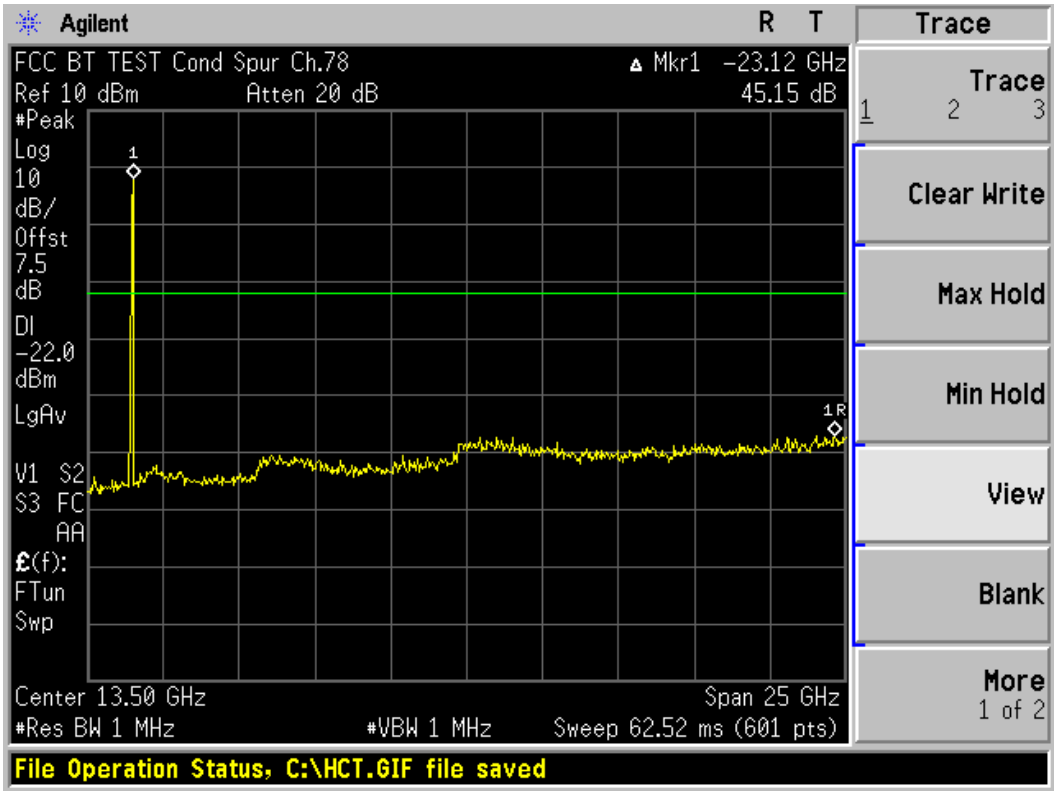
Test Plots (8DPSK) - 1 GHz - 26 GHz (RBW:1 MHz, VBW: 1 MHz)
Spurious Emission (Low-CH)



Test Plots (8DPSK) - 1 GHz - 26 GHz (RBW:1 MHz, VBW: 1 MHz)
Spurious Emission (Mid-CH)



Test Plots (8DPSK) - 1 GHz - 26 GHz (RBW:1 MHz, VBW: 1 MHz)
Spurious Emission (High-CH)



8.6.2 RADIATED SPURIOUS EMISSIONS

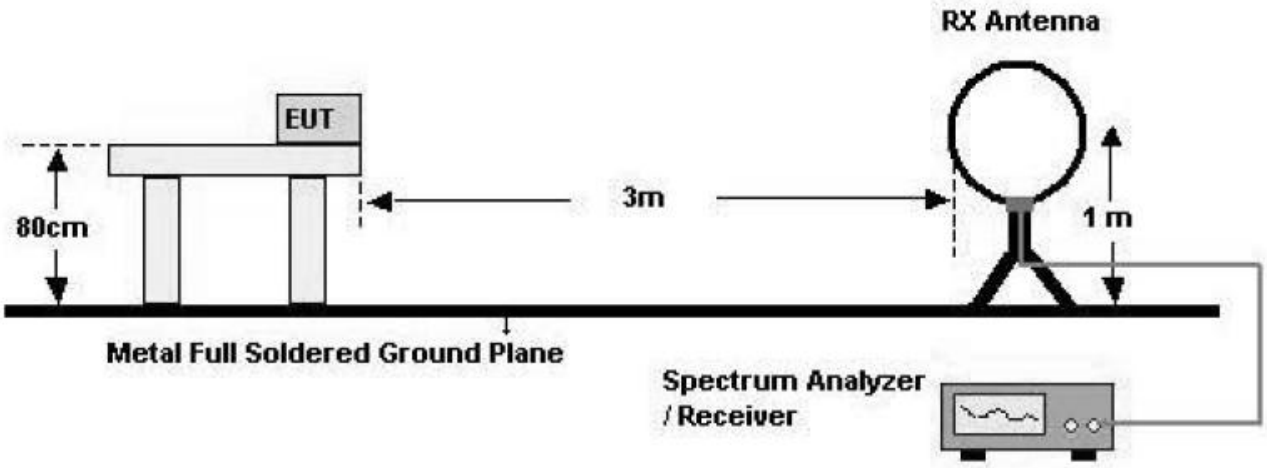
LIMIT : §15.247(d), §15.205, §15.209

1. 20dBc in any 100kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

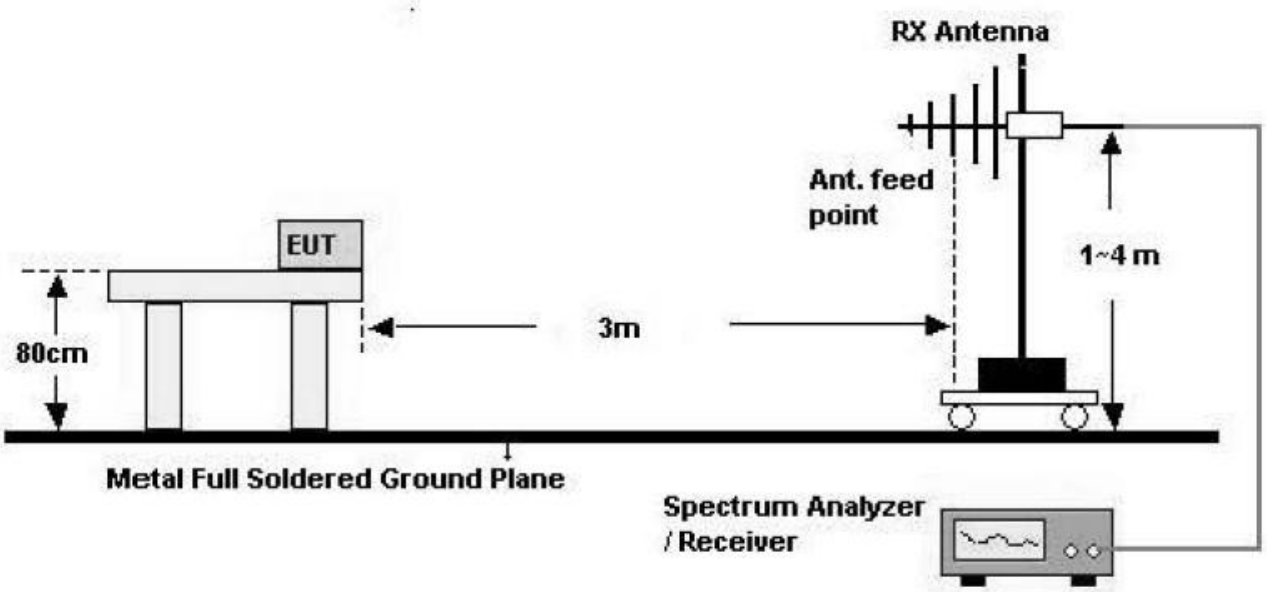
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

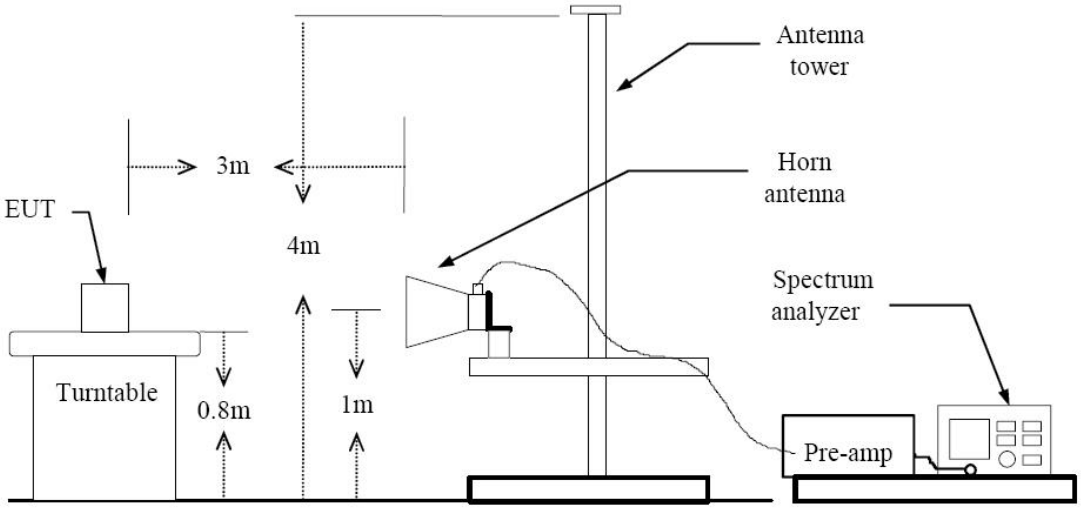
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
㎒	dB㎶	dB /m	dB	(H/V)	dB㎶/m	dB㎶/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
4. Limit line = specific Limits (dBuV) + Distance extrapolation factor

TEST RESULTS

Below 1 GHz

Operation Mode: Normal Mode (Channel : 2441)

Frequency MHz	Reading dBuV	Ant. Factor dB/m	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
37.6	7.6	11.9	0.8	V	20.3	40.0	19.7
67.1	8.6	10.9	1.0	V	20.5	40.0	19.5
73.6	9.3	9.7	1.1	H	20.1	40.0	19.9
127.9	11.7	11.9	1.4	V	25.0	43.5	18.5
172.0	16.3	12.4	1.7	H	30.4	43.5	13.1
466.9	9.8	16.9	2.8	H	29.5	46.0	16.5

Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
3. We have done Normal Mode and EDR Mode test. Worst case of EUT is Normal Mode.

Above 1 GHz

Operation Mode: CH Low(GFSK)

Frequency [MHz]	Reading dBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4804	44.00	1.06	V	45.06	74	28.94	PK
4804	31.23	1.06	V	32.29	54	21.71	AV
7206	42.95	10.37	V	53.32	74	20.68	PK
7206	30.79	10.37	V	41.16	54	12.84	AV
9608	44.41	15.16	V	59.57	74	14.43	PK
9608	34.18	15.16	V	49.34	54	4.66	AV
4804	44.18	1.06	H	45.24	74	28.76	PK
4804	31.73	1.06	H	32.79	54	21.21	AV
7206	43.26	10.37	H	53.63	74	20.37	PK
7206	31.82	10.37	H	42.19	54	11.81	AV
9608	44.10	15.16	H	59.26	74	14.74	PK
9608	33.75	15.16	H	48.91	54	5.09	AV

※ A·F: ANTENNA FACTOR
C·L: CABLE LOSS
AMP GAIN: AMPLIFIER GAIN

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
   a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
   b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
5. We have done Normal Mode and EDR Mode test. Worst case of EUT is Normal Mode.

Operation Mode: CH Mid(GFSK)

Frequency [MHz]	Reading dBuV	※A.F+CL-AMP GAIN. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4882	43.09	1.82	V	44.90	74	29.10	PK
4882	29.59	1.82	V	31.40	54	22.60	AV
7323	43.35	10.54	V	53.90	74	20.10	PK
7323	30.45	10.54	V	41.00	54	13.00	AV
9764	41.85	14.26	H	56.11	74	17.89	PK
9764	29.30	14.26	H	43.56	54	10.44	AV
4882	42.69	1.82	H	44.50	74	29.50	PK
4882	28.79	1.82	H	30.60	54	23.40	AV
7323	43.56	10.54	H	54.11	74	19.89	PK
7323	31.19	10.54	H	41.74	54	12.26	AV
9764	43.55	14.26	H	57.81	74	16.19	PK
9764	33.12	14.26	H	47.38	54	6.62	AV

※ A·F: ANTENNA FACTOR
C·L: CABLE LOSS
AMP GAIN: AMPLIFIER GAIN

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
   a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
   b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
5. We have done Normal Mode and EDR Mode test. Worst case of EUT is Normal Mode.

Operation Mode: CH High(GFSK)

Frequency [MHz]	Reading dBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4960	43.84	1.64	V	45.48	74	28.52	PK
4960	29.85	1.64	V	31.49	54	22.51	AV
7440	43.08	11.46	V	54.55	74	19.45	PK
7440	29.97	11.46	V	41.44	54	12.56	AV
9920	40.69	15.63	H	56.32	74	17.68	PK
9920	28.62	15.63	H	44.25	54	9.75	AV
4960	43.77	1.64	H	45.41	74	28.59	PK
4960	30.43	1.64	H	32.07	54	21.93	AV
7440	43.18	11.46	H	54.65	74	19.35	PK
7440	31.76	11.46	H	43.23	54	10.77	AV
9920	44.43	15.63	H	60.06	74	13.94	PK
9920	32.99	15.63	H	48.62	54	5.38	AV

※ A·F: ANTENNA FACTOR

C·L: CABLE LOSS

AMP GAIN: AMPLIFIER GAIN

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
   a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
   b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
5. We have done Normal Mode and EDR Mode test. Worst case of EUT is Normal Mode.

8.6.3 RADIATED RESTRICTED BAND EDGE MEASUREMENTS

Test Requirements and limit, §15.247(d), §15.205, §15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c).

Operation Mode	GFSK(Normal)
Operating Frequency	2402 MHz, 2480 MHz
Channel No	CH 0, CH 78

Frequency [MHz]	Reading dBuV	※ A.F.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.00	16.00	37.52	H	53.52	74	20.48	PK
2390.00	2.81	37.52	H	40.33	54	13.67	AV
2390.00	15.37	37.52	V	52.89	74	21.11	PK
2390.00	2.72	37.52	V	40.24	54	13.76	AV
2483.50	16.00	39.69	H	55.69	74	18.31	PK
2483.50	10.04	39.69	H	49.73	54	4.27	AV
2483.50	15.75	39.69	V	55.44	74	18.56	PK
2483.50	7.10	39.69	V	46.79	54	7.21	AV

※ A·F: ANTENNA FACTOR
C·L: CABLE LOSS

Notes:

1. Spectrum setting:
   a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
   b. AV Setting 1 GHz – 26 GHz, RBW=1 MHz, VBW= 10 Hz.
2. We have done Normal Mode and EDR Mode test. Worst case of EUT is Normal Mode.

8.7 POWERLINE CONDUCTED EMISSIONS

LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolt (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

▣ RESULT PLOTS

Conducted Emissions (Line 1)

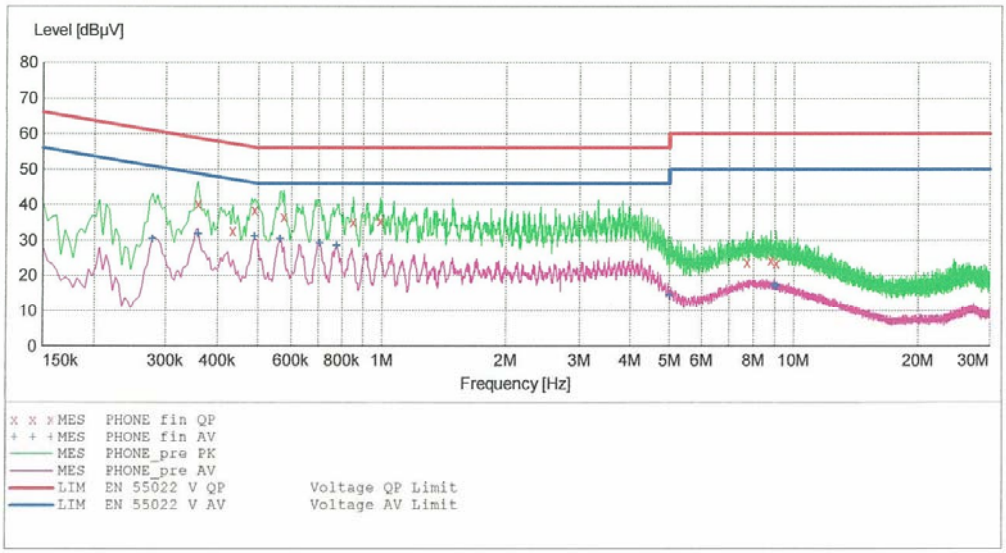
HCT

EMC

```
EUT:                  ADS1
Manufacturer:         SHARP
Operating Condition:  BT MODE
Test Site:            SHIELD ROOM
Operator:             JS LEE
Test Specification:   CISPR22 CLASS B
Comment:              N
```

SCAN TABLE: "CISPR22 CLASS B"

```
  Short Description:              CISPR 22 CLASS B
  Start      Stop       Step      Detector  Meas.     IF       Transducer
  Frequency  Frequency  Width               Time      Bandw.
  150.0 kHz  500.0 kHz  4.0 kHz   MaxPeak   10.0 ms   9 kHz    None
                                  Average
  500.0 kHz  5.0 MHz    4.0 kHz   MaxPeak   10.0 ms   9 kHz    None
                                  Average
  5.0 MHz    30.0 MHz   4.0 kHz   MaxPeak   10.0 ms   9 kHz    None
                                  Average
```



MEASUREMENT RESULT: "PHONE_fin QP"

2/10/2011 2:45PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.358010	40.30	10.1	59	18.5	---	---
0.434010	32.80	10.1	57	24.4	---	---
0.490010	38.60	10.1	56	17.6	---	---
0.576000	36.60	10.1	56	19.4	---	---
0.852000	35.20	10.2	56	20.8	---	---
0.992000	35.60	10.2	56	20.4	---	---
7.728000	23.90	10.7	60	36.1	---	---
8.808000	24.50	10.7	60	35.5	---	---
9.072000	23.60	10.7	60	36.4	---	---

MEASUREMENT RESULT: "PHONE_fin AV"

2/10/2011 2:45PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.278010	30.40	10.1	51	20.4	---	---
0.358010	31.90	10.1	49	16.8	---	---
0.490010	31.20	10.1	46	15.0	---	---
0.564000	30.40	10.1	46	15.6	---	---
0.704000	29.20	10.1	46	16.8	---	---
0.776000	28.60	10.1	46	17.4	---	---
5.000000	14.60	10.5	46	31.4	---	---
9.004000	17.50	10.7	50	32.5	---	---
9.096000	17.10	10.7	50	32.9	---	---

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Conducted Emissions (Line 2)

HCT

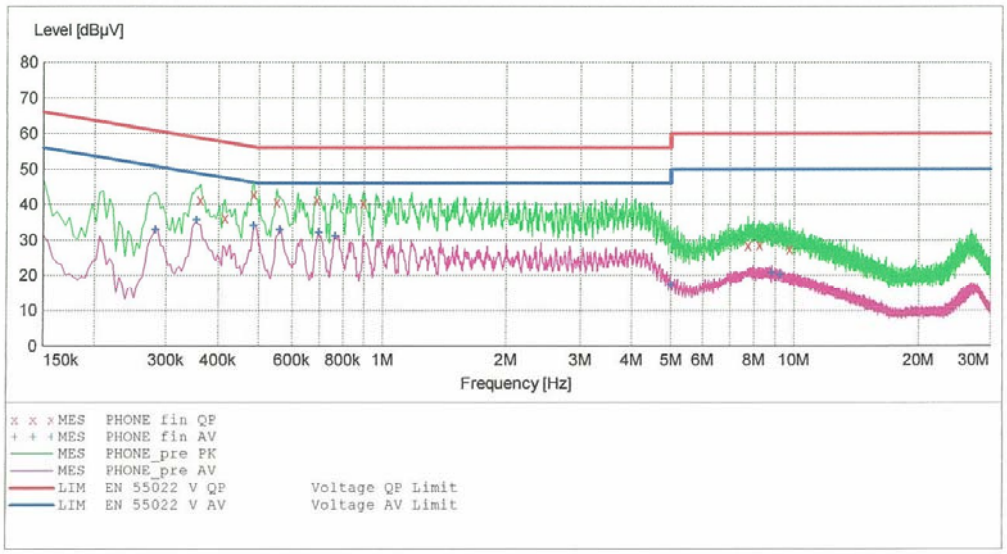
EMC

```
EUT:                  ADS1
Manufacturer:         SHARP
Operating Condition:  BT MODE
Test Site:            SHIELD ROOM
Operator:             JS LEE
Test Specification:   CISPR22 CLASS B
Comment:              H
```

SCAN TABLE: "CISPR22 CLASS B"

Short Description: CISPR 22 CLASS B

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak Average	10.0 ms	9 kHz	None
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak Average	10.0 ms	9 kHz	None
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak Average	10.0 ms	9 kHz	None



MEASUREMENT RESULT: "PHONE_fin QP"

2/10/2011 2:33PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.362010	41.30	10.1	59	17.4	---	---
0.414010	36.30	10.1	58	21.3	---	---
0.486010	42.90	10.1	56	13.3	---	---
0.552000	40.70	10.1	56	15.3	---	---
0.688000	41.30	10.1	56	14.7	---	---
0.896000	40.50	10.2	56	15.5	---	---
7.752000	28.60	10.7	60	31.4	---	---
8.252000	28.70	10.7	60	31.3	---	---
9.764000	27.50	10.8	60	32.5	---	---

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MEASUREMENT RESULT: "PHONE_fin AV"

2/10/2011 2:33PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.282010	33.00	10.1	51	17.7	---	---
0.354010	35.70	10.1	49	13.2	---	---
0.486010	34.00	10.1	46	12.2	---	---
0.560000	33.00	10.1	46	13.0	---	---
0.696000	32.20	10.1	46	13.8	---	---
0.764000	31.10	10.1	46	14.9	---	---
5.000000	17.30	10.5	46	28.7	---	---
8.848000	20.80	10.7	50	29.2	---	---
9.248000	20.20	10.8	50	29.8	---	---

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9. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Interval	Calibration Due	Serial No.
Rohde & Schwarz	ESH2-Z5/ LISN	Annual	03/24/2011	861741/013
Rohde & Schwarz	ESH3-Z6/ LISN	Annual	03/05/2011	100329
Schwarzbeck	VULB 9160/ TRILOG Antenna	Biennial	07/15/2012	9160-3150
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12
Rohde & Schwarz	ESH3-Z2/ PULSE LIMITER	Annual	10/25/2011	375.8810.352
MITEQ	AFS44-00101800-35-20P-44-PS/AMP	Annual	04/05/2011	1119544
Rohde & Schwarz	SCU-18/ Signal Conditioning Unit	Annual	09/29/2011	10094
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	09/23/2011	296
Rohde & Schwarz	FSP30 / Spectrum Analyzer	Annual	03/25/2011	839117/011
Agilent	E4440A / Spectrum Analyzer	Annual	06/09/2011	US45303008
Agilent	E4416A /Power Meter	Annual	01/04/2012	GB41291412
Agilent	E9327A /POWER SENSOR	Annual	07/23/2011	MY4442009
Wainwright Instrument	WHF3.3/18G-10EF / High Pass Filter	Annual	06/25/2011	1
Wainwright Instrument	WRCJ2400/2483.5-2370/2520-60/14SS / Band Reject Filter	Annual	07/23/2011	1
Hewlett Packard	11636B/Power Divider	Annual	12/29/2011	11377
Hewlett Packard	11667B / Power Spliter	Annual	11/08/2011	10126
DIGITAL	EP-3010 /DC POWER SUPPLY	Annual	01/04/2012	3110117
ITECH	IT6720 / DC POWER SUPPLY	Annual	12/01/2011	010002156287001199
TESCOM	TC-3000A / BLUETOOTH TESTER	Annual	01/10/2012	3000A490112
Rohde & Schwarz	CBT / BLUETOOTH TESTER	Annual	06/24/2011	100422
EMCO	6502.LOOP ANTENNA	Biennial	01/13/2012	9009-2536