Test Report on

Dual-Band CDMA Cellular Phone with Bluetooth

Certification
FCC Part 15.247 IC RSS-210
FCC ID: **V65SCP-27H**
Model: **SCP-2700**

STATEMENT OF CERTIFICATION

The data, data evaluation and equipment configuration represented herein are a true and accurate representation of the measurements of the sample's radio frequency interference emissions characteristics as of the dates and at the times of the test under the conditions herein specified.

STATEMENT OF COMPLIANCE

This product has been shown to be capable of compliance with the applicable technical standards as indicted in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C-63.4-2001.

Report No:	KWC-V65-15C-1208-R0
Report Prepared for:	KYOCERA Corporation KYOCERA SANYO Telecom, Inc. 21605 Plummer Street Chatsworth, CA 91311 United States
Test performed by:	Kyocera Wireless Corp. 10300 Campus Point Drive San Diego, CA 92121 United States
Date of Test:	December 8 – December 12, 2008
Report Prepared by:	Ngoc-Thi Nguyen, Regulatory Engineer
Report Reviewed by:	C. K. Li, Director of Regulatory Engineering

CCS USA, Inc. performed the tests that required an OATS site.

TABLE OF CONTENTS

1 General Information

Applicant:	KYOCERA Corporation KYOCERA SANYO Telecom, Inc. 21605 Plummer Street Chatsworth California United States 91311
FCC ID:	V65SCP-27H
Product:	Dual-Band CDMA Cellular Phone with Bluetooth
Model Numbers:	SCP-2700
EUT Serial Number:	2700D309
Type:	[X] Prototype, [ ] Pre-Production, [ ] Production
Equipment Category:	Portable
TX Frequency (MHz):	2402 to 2480
Channel Number:	79
Channel Spacing (MHz):	1
Bluetooth version:	☐ 1.1 ☐ 1.2 ☒ 2.0 ☐ 2.0 + EDR
Modulation:	Frequency Hopping Spread Spectrum (FHSS)
Max. Output Power (dBm)	1.32 dBm
Antenna:	Internal
Antenna Gain (dBi):	-2.0
FCC Rule Parts:	§15.247

2 Description of Bluetooth Transmitter

The V65SCP-27H phones offer Bluetooth as a feature. The Bluetooth transmitter uses Frequency Hopping Spread Spectrum (FHSS) technique and operates in the 2400 – 2483 MHz band. The transmitter is a Class 2 Bluetooth device and designed to communicate with other Bluetooth devices as per the industrial standard. The gain of the internal Bluetooth antenna is measured to be –2.0 dBi.

3 20 dB Bandwidth

FCC: § 15.247 a1	IC:	RSS-210 §6.2.2(o) a1

Measurement Procedure:

The Bluetooth RF output port of the EUT was directly connected to the input of the spectrum analyzer with sufficient attenuation. Subsequently, the low, mid and high channels of Bluetooth transmitter were enabled separately to investigate the 20dB-bandwidth for each channel. A fully charged battery was used as supply voltage.

Frequencies of Interest: Spectrum was investigated from 2400 MHz – 2483.5 MHz.

List of Figures:

Figure	Channel	Plot Description
3-1	0	20dB Bandwidth Basic rate
3-2	39	20dB Bandwidth Basic rate
3-3	78	20dB Bandwidth Basic rate

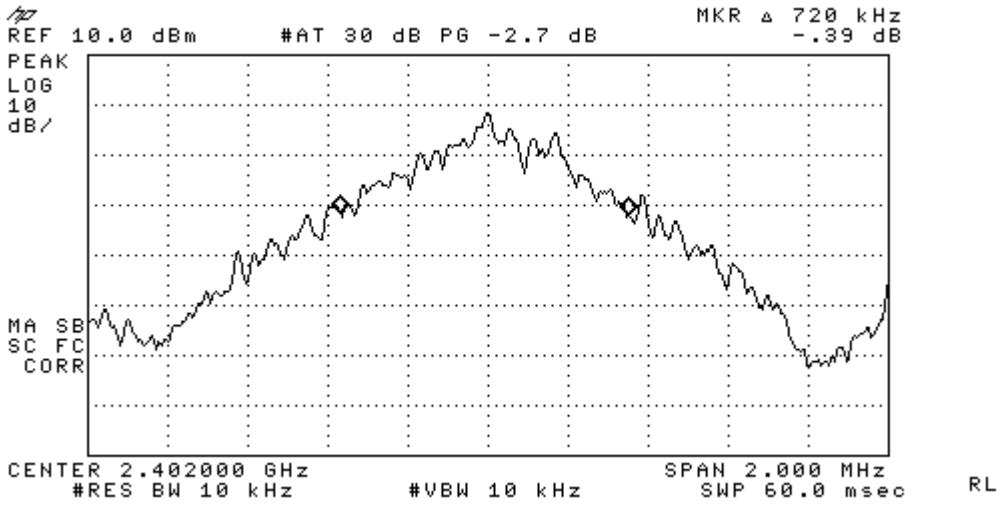

Figure 3-1: 20dB Bandwidth basic rate, Channel 0.

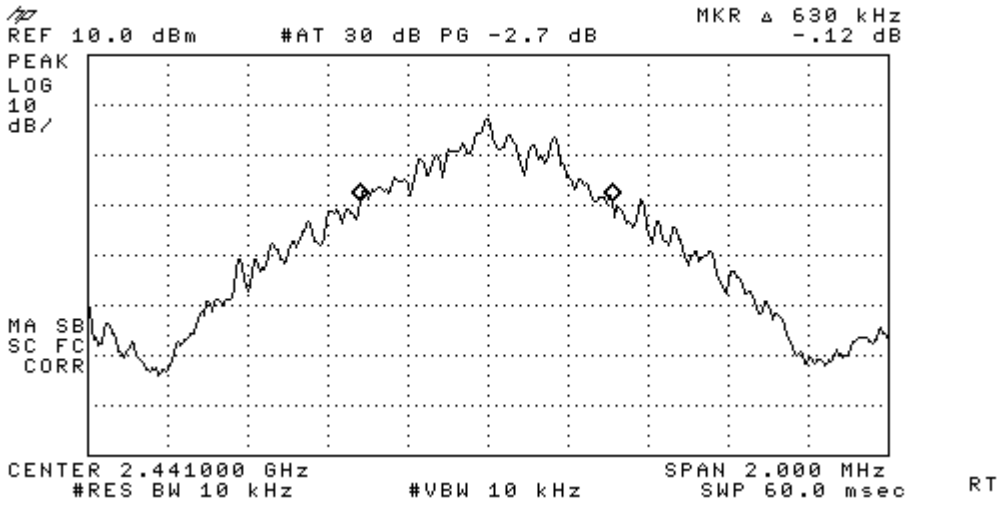

Figure 3-2: 20dB Bandwidth basic rate, Channel 39.

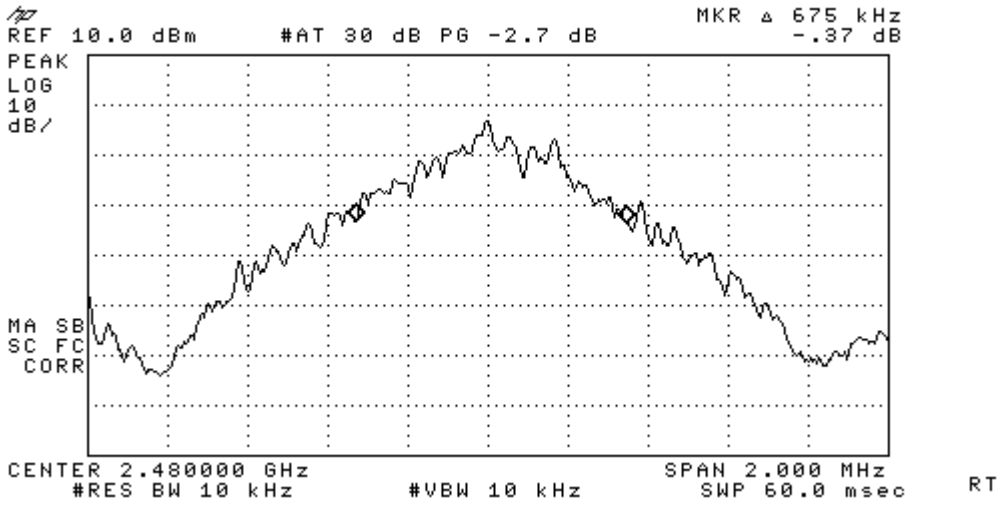

Figure 3-3: 20dB Bandwidth basic rate, Channel 78.

Results:

Channel	Modulation	Results	Comments
0	Basic Rate	720 KHz	Delta marker on the spectrum analyzer was moved from the center frequency until –20dBc to measure the 20dB-bandwidth.
39	Basic Rate	630 KHz	
78	Basic Rate	675 KHz	

4 Carrier Frequency Separation

FCC: § 15.247 a1	IC:	RSS-210 §A8.1(2)

Measurement Procedure:

The Bluetooth RF output port of the EUT was directly connected to the input of the spectrum analyzer with sufficient attenuation. Subsequently, the Bluetooth transmitter was set in hopping mode to investigate the carrier frequency separation between mid-channel and its adjacent channels. A fully charged battery was used as supply voltage.

Frequencies of Interest: Spectrum was investigated from 2400 MHz – 2483.5 MHz.

Comments:
The carrier frequency separation is independent of modulation and packet length (DH1, DH3, etc.).

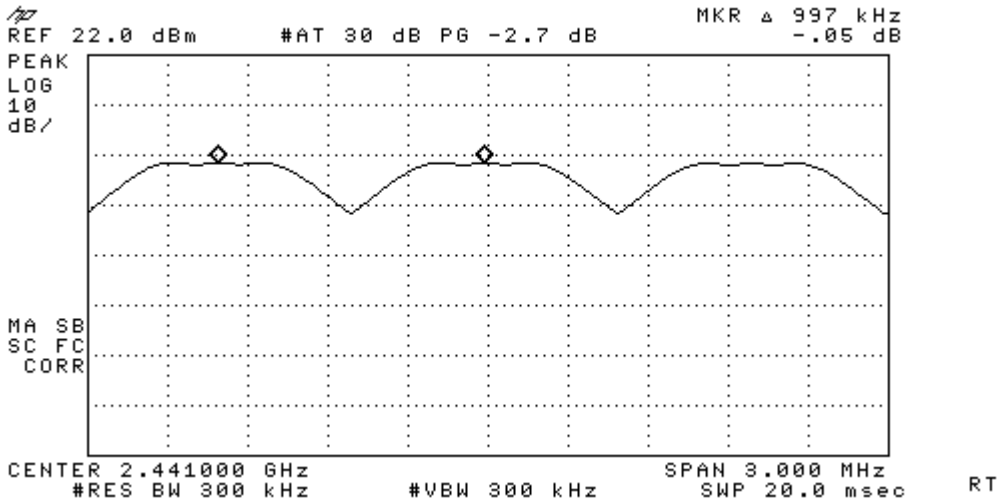

Figure 4: Carrier Frequency Separation between channels 38, 39 (mid-channel) & 40.

Results and Limits:

Limits	Frequency Separation	2/3 of 20 dB Bandwidth	Result
a) ≥ 25 kHz or 20 dB Bandwidth, whichever is greater b) For FH systems operating in 2400-2483.5MHz and with output power less than 125mW the carrier frequency separation should be greater than 25kHz or 2/3 of 20dB Bandwidth.	997 KHz	480 KHz	Pass

[1] (2/3) * 720 KHz = 480 KHz.

5 Number of Hopping Frequencies

FCC: § 15.247 a1 iii	IC:	RSS-210 §A8.1 (4)

Measurement Procedure:

The Bluetooth RF output port of the EUT was directly connected to the input of the spectrum analyzer with sufficient attenuation. Subsequently, the Bluetooth transmitter was set in hopping mode to investigate the number of hopping frequencies. A fully charged battery was used as supply voltage.

Frequencies of Interest: Spectrum was investigated from 2400 MHz – 2483.5 MHz.

Comments:
The number of frequency hopping is independent of modulation and packet length (DH1,
DH3, etc.).

List of Figures:

Figure	Channel	Plot Description
5a	Hopping	Number of Hopping Frequencies (Channels 0-39)
5b		Number of Hopping Frequencies (Channels 39-78)

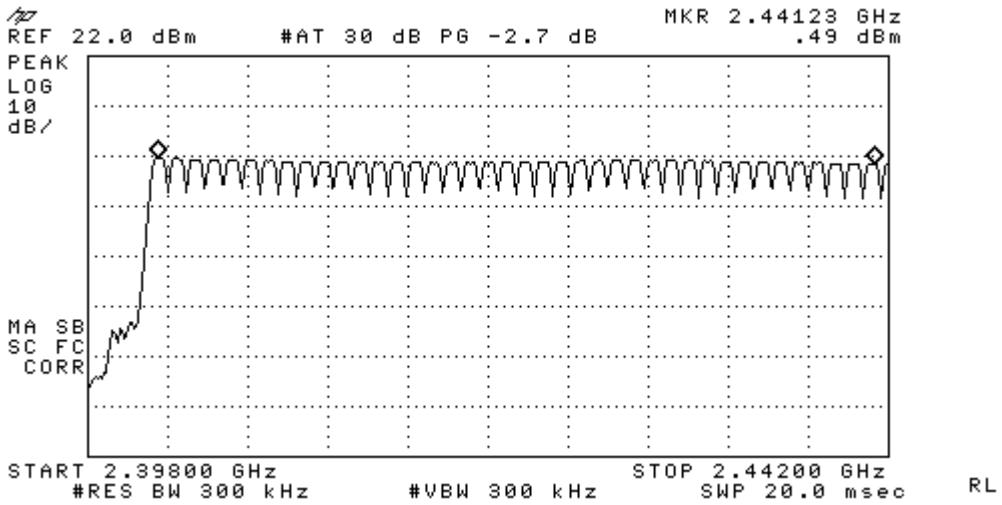

Figure 5a: Number of Hopping Frequencies (Channels 0-39)

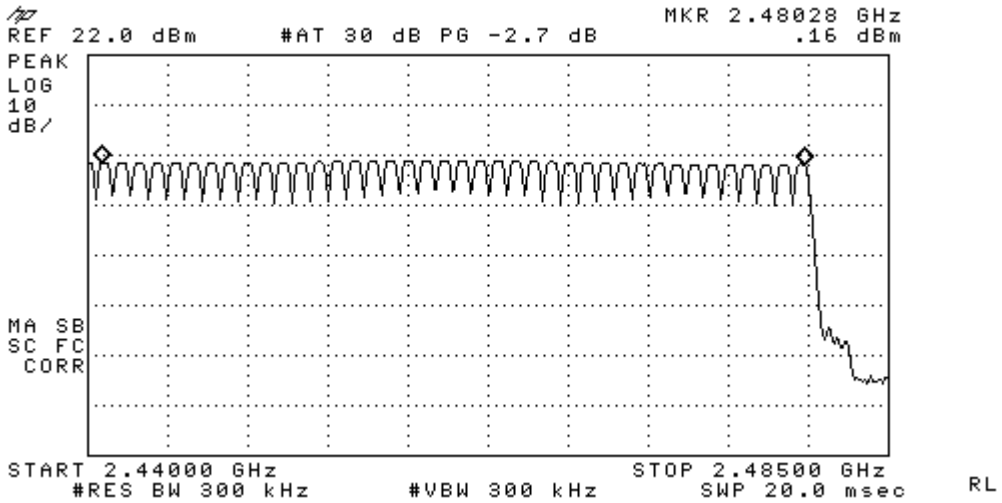

Figure 5b: Number of Hopping Frequencies (Channels 39-78)

Results and Limits:

Limits	Channel	Results	Comments
At least 15 non-overlapping channels	Hopping	79 (Channels 0-78)	Pass

6 Time of Occupancy (Dwell Time)

FCC: § 15.247 a1 iii, § 15.247 f	IC:	RSS-210 §A8.1 (4)

Measurement Procedure:

The Bluetooth RF output port of the EUT was directly connected to the input of the spectrum analyzer with sufficient attenuation. Subsequently, the Bluetooth transmitter was set in hopping mode to capture one of the transmissions of mid-channel. A fully charged battery was used as supply voltage.

Comments:
The dwell time is independent of modulation and packet length (DH1, DH3, etc.).

According to the Bluetooth Core Specification v1.1, we have 1600 hops in a second for a one slot packet type. One frequency hop lasts 625 μs; this increment is called a time slot. In a period of 31.6 seconds, the time of occupancy for any given channel is calculated as follows:

Duration of one transmission*(1600 hops/sec)/(No. of time-slots)/(79 channels)*31.6 sec

For a DH1 (1 time-slot) packet type, ideally the duration of one transmission is 625 μs. Therefore, the dwell time is given by:

625 μs*1600/s/(1 time-slot)/79*31.6 s= 0.4 s.

Spectrum Analyzer Parameters:
The measurement is conducted with zero span centered at mid-channel (2441 MHz) with sweep time sufficient enough to capture one transmission (in this case, ≥ 625 μs).

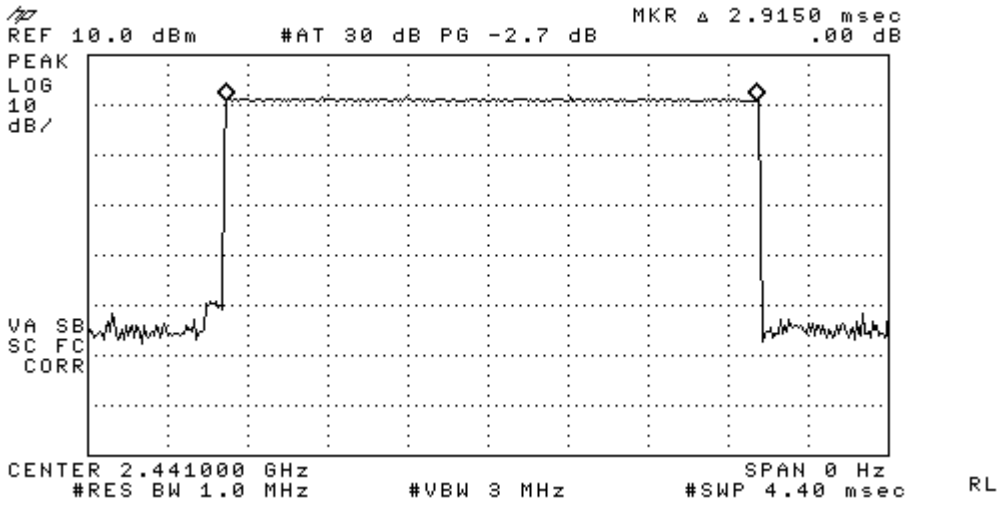

Figure 6: Duration of one transmission (Channel 39)

Results and Limits:

Limits	Channel	Results	Comments
≤ 0.4 s (in a period of 31.6 s)	Hopping	2.915 ms	Mid-channel (CH 39) was measured here.

7 Peak Output Power

FCC: § 15.247 b1	IC:	RSS-210 §A8.4 (2)

Measurement Procedure:

The Bluetooth RF output port of the EUT was directly connected to the input of the spectrum analyzer with sufficient attenuation. Subsequently, the low, mid and high channels of Bluetooth transmitter were enabled separately to investigate the peak output power for each channel. A fully charged battery was used as supply voltage.

Frequencies of Interest: Spectrum was investigated from 2400 MHz – 2483.5 MHz.

List of Figures:

Figure	Channel	Plot Description
7-1	0	Peak Output Power – Basic Rate
7-2	39	Peak Output Power – Basic Rate
7-3	78	Peak Output Power – Basic Rate

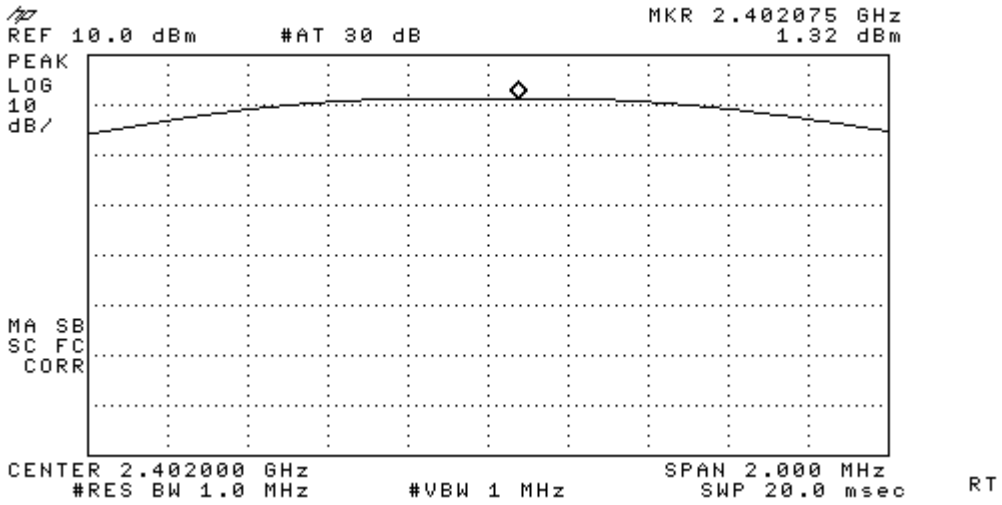

Figure 7-1: Peak Output Power, Channel 0.

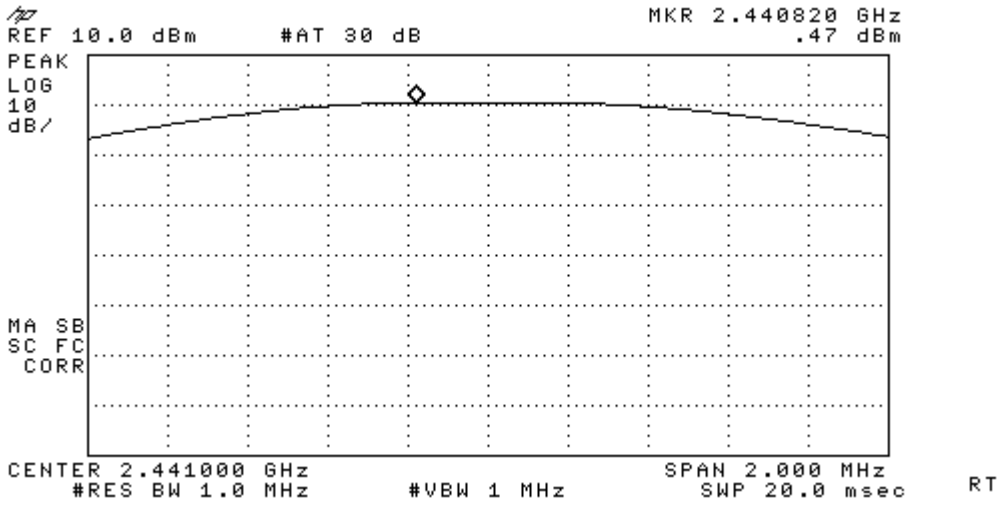

Figure 7-2: Peak Output Power, Channel 39.

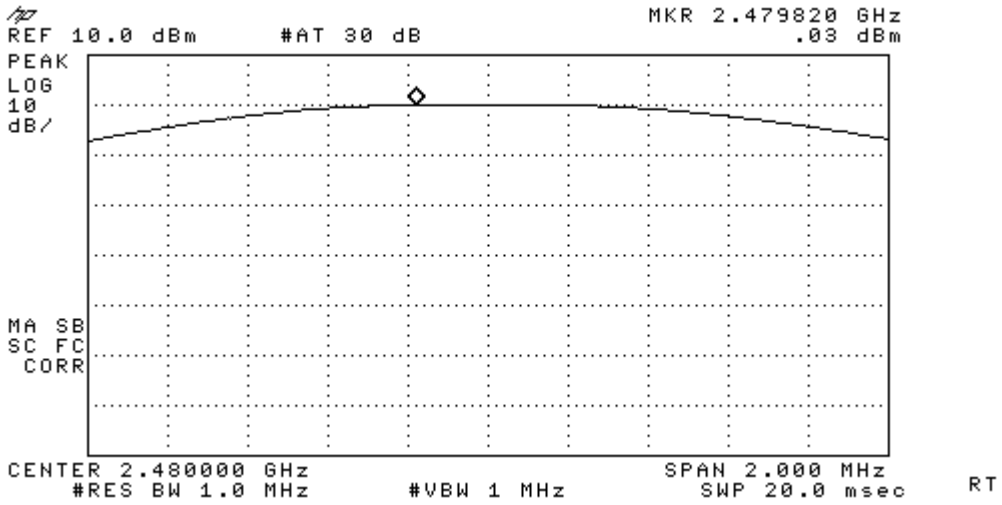

Figure 7-3: Peak Output Power, Channel 78.

Results and Limits:

Limits	Rate	Channel	Results	Comments
< 1 watt (for systems with at least 75 hopping channels)	Basic Rate	0	1.32 dBm	Within Bluetooth Power Class 2 limit
	Basic Rate	39	0.47dBm	
	Basic Rate	78	0.03 dBm	

8 Band-edge Compliance of Conducted Emissions

FCC: § 15.247 d	IC:	RSS-210 §A8.5

Measurement Procedure:

The Bluetooth RF output port of the EUT was directly connected to the input of the spectrum analyzer with sufficient attenuation. Subsequently, the low and high channels of Bluetooth transmitter were enabled separately to investigate the band-edge compliance of conducted emissions. To ensure the band-edge compliance when the channels are hopping, measurements were also conducted at low and high channels in this mode. A fully charged battery was used as supply voltage.

Frequencies of Interest: Spectrum was investigated from 2400 MHz – 2483.5 MHz.

List of Figures:

Figure	Channel/Edge	Modulation	Plot Description
8-1a	0 -- Low Band Edge	Basic Rate	Hopping disabled
8-1b			Hopping enabled
8-2a	78 -- High Band Edge	Basic Rate	Hopping disabled
8-2b			Hopping enabled

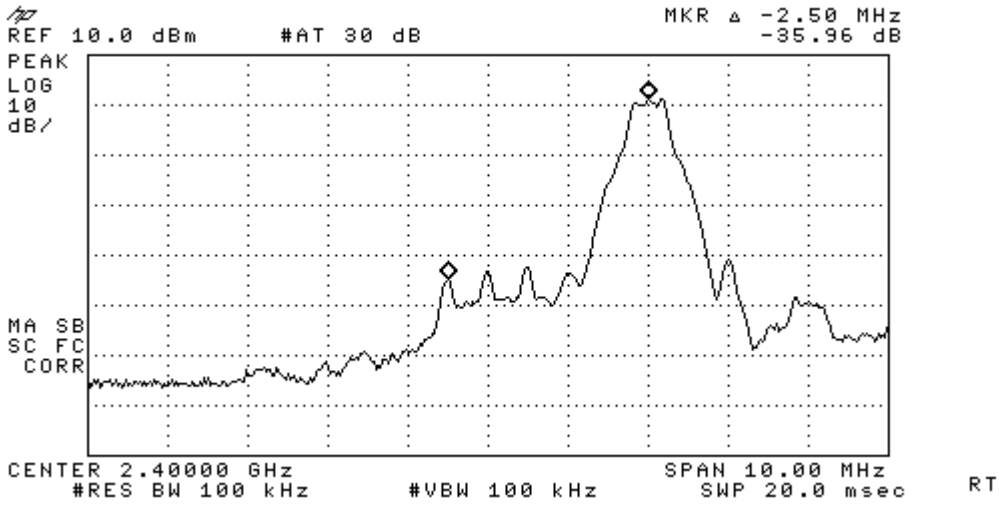

Figure 8-1a: Basic Rate Low band edge with hopping disabled.

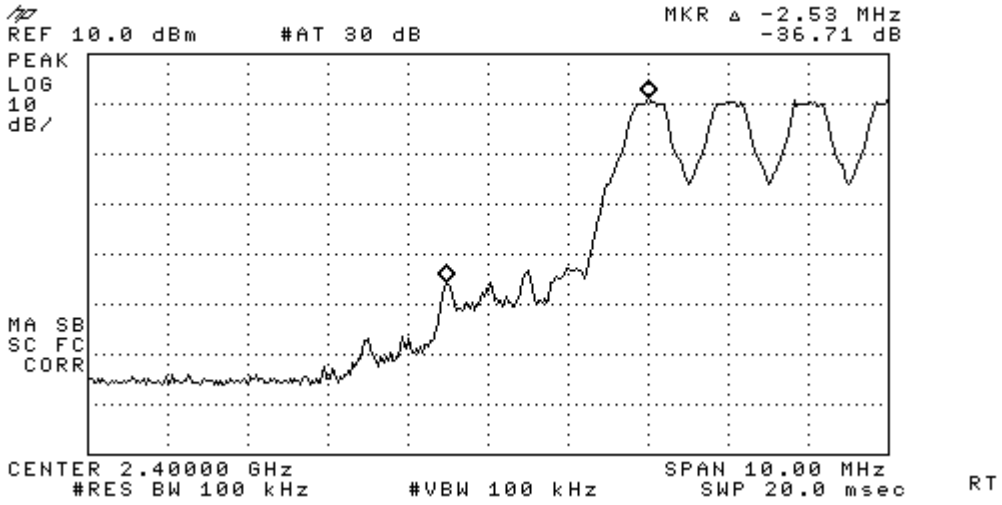

Figure 8-1b: Basic Rate Low band edge with hopping enabled.

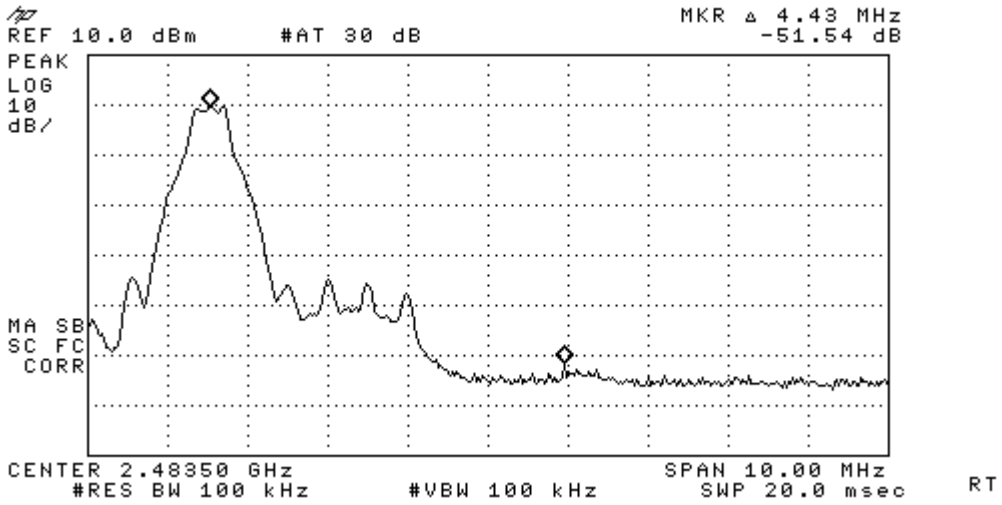

Figure 8-2a: Basic Rate High band edge with hopping disabled.

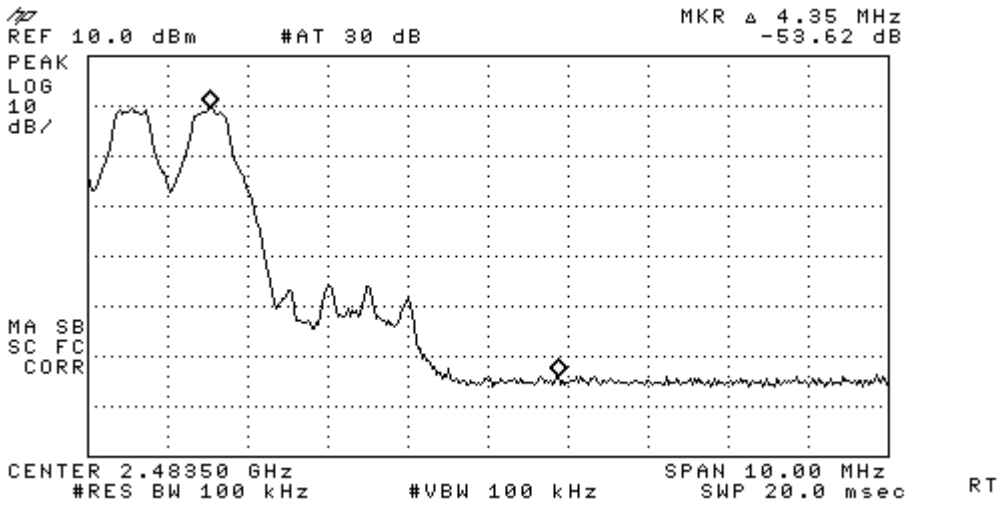

Figure 8-2b: Basic Rate High band edge with hopping enabled.

Results and Limits:

Limits	Edge	Modulation	Channel	Results	Comments
≤ -20 dBc	Low Band Edge	Basic Rate	0	-35.96 dBc	In any 100kHz band, the highest radio frequency power outside the band (2400-2483.5 MHz) is measured to be at least 20 dB below the desired power of intentional radiator within the band.
			Hopping	-36.71 dBc (Ch 0)	
	High Band Edge	Basic Rate	78	-51.54 dBc	
			Hopping	-53.62 dBc (Ch 78)	

9 Spurious RF Conducted Emissions

FCC: § 15.247 d	IC:	RSS-210 §A8.5

Measurement Procedure:

The Bluetooth RF output port of the EUT was directly connected to the input of the spectrum analyzer with sufficient attenuation. Subsequently, the low, mid and high channels of Bluetooth transmitter were enabled separately and the frequency spectrum was investigated for any spurious emissions. A fully charged battery was used as supply voltage.

Frequencies of Interest: Spectrum was investigated from 9kHz – 25 GHz.

Comments:
Spurious RF Conducted Emission testing was performed only with Basic Rate since the conducted power was highest in comparison with the other modulation.

List of Figures:

Figure	Channel	Plot Description
9-1a	0	Conducted spurious emissions, 9kHz to 2.7GHz
9-1b		Conducted spurious emissions, 2.7GHz to 25GHz
9-2a	39	Conducted spurious emissions, 9kHz to 2.7GHz
9-2b		Conducted spurious emissions, 2.7GHz to 25GHz
9-3a	78	Conducted spurious emissions, 9kHz to 2.7GHz
9-3b		Conducted spurious emissions, 2.7GHz to 25GHz

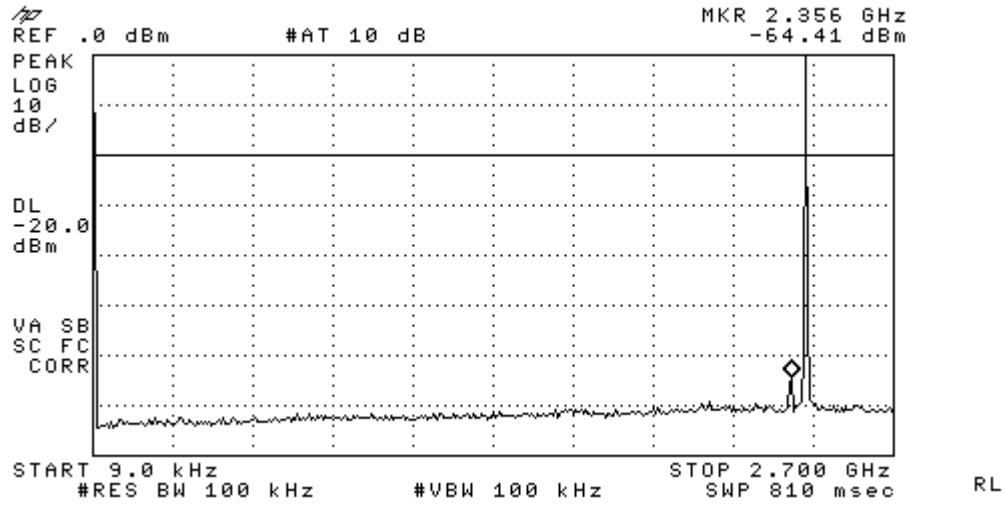

Figure 9-1a: Basic Rate Conducted Spurious Emissions (CH 0)

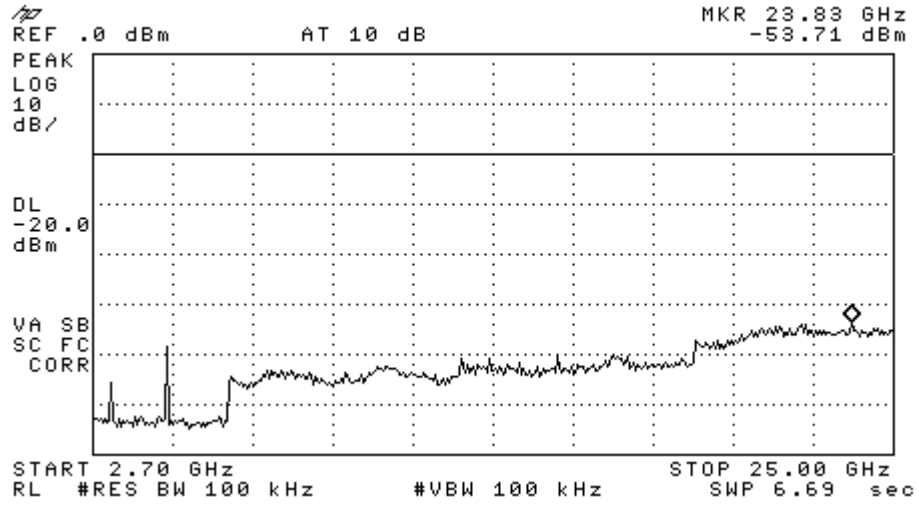

Figure 9-1b: Basic Rate Conducted Spurious Emissions (CH 0)

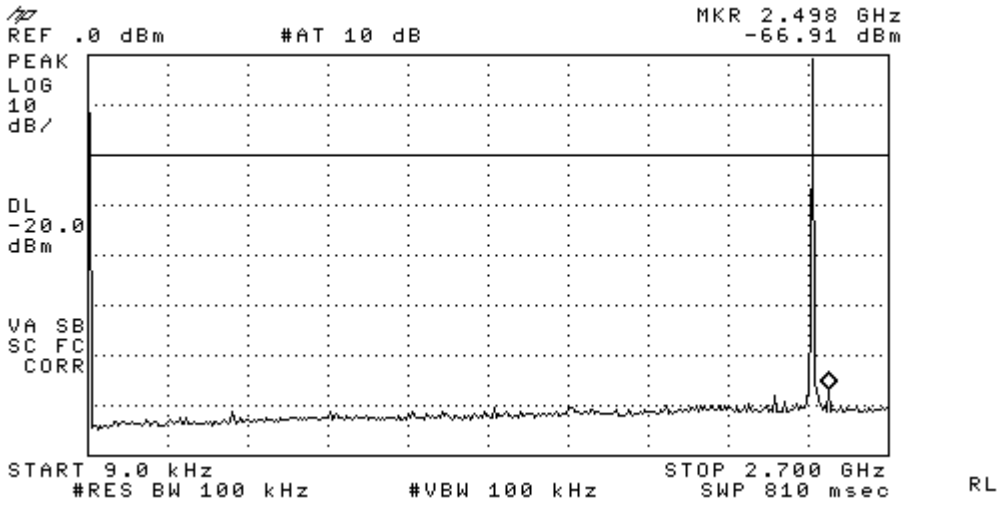

Figure 9-2a. Conducted Spurious Emissions (CH 39)

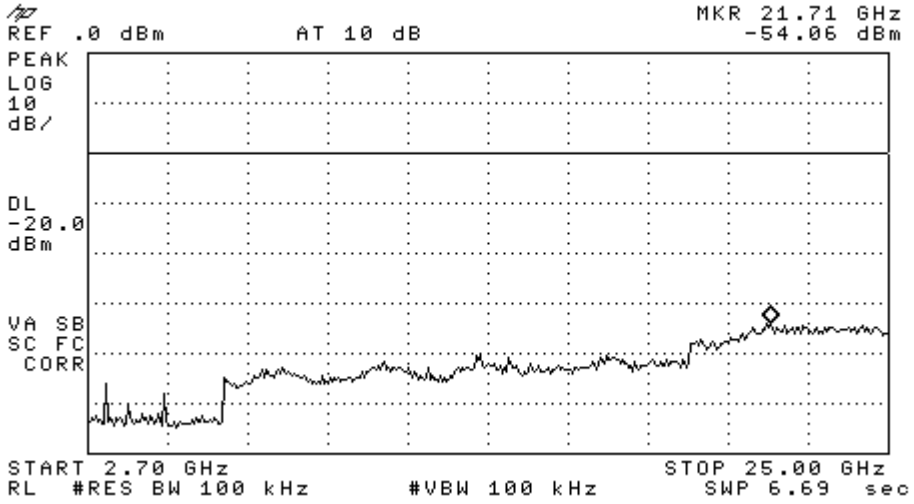

Figure 9-2b. Conducted Spurious Emissions (CH 39)

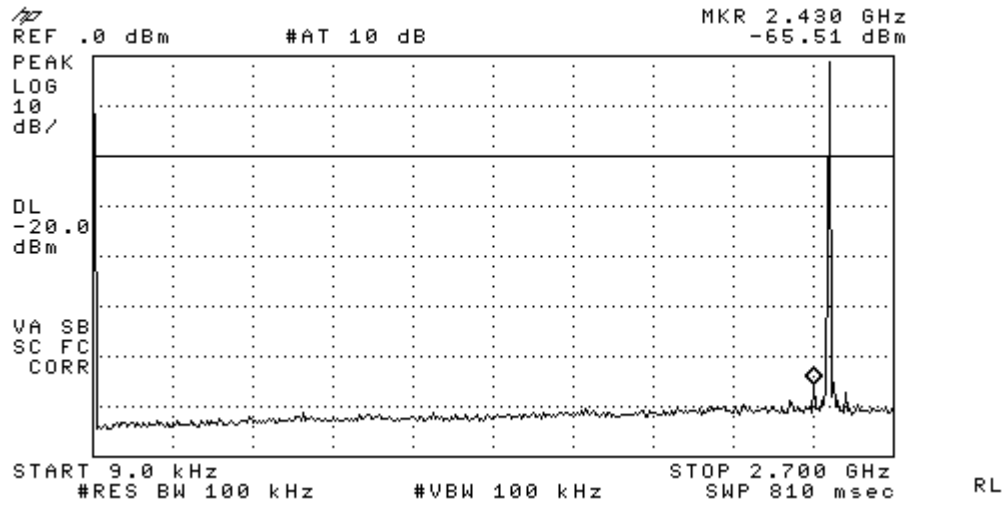

Figure 9-3a. Conducted Spurious Emissions (CH 78)

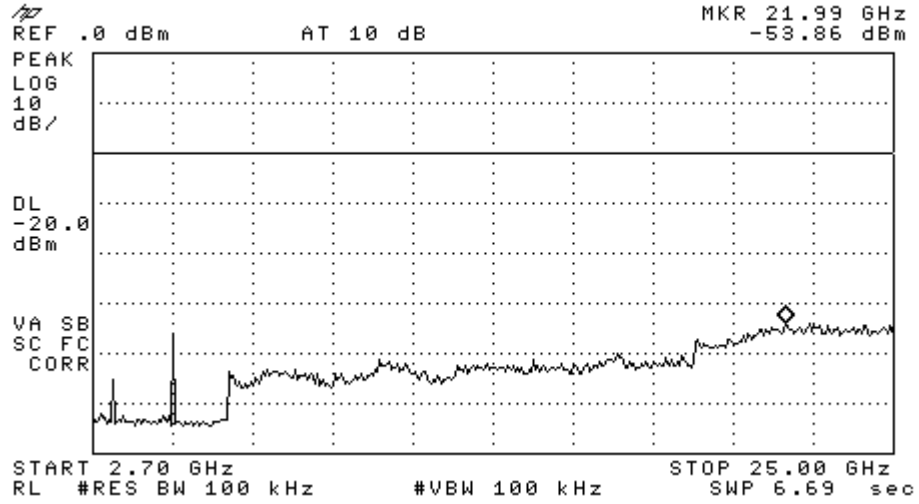

Figure 9-3b. Conducted Spurious Emissions (CH 78)

Results and Limits:

Limits	Channel	Result	Comments
-20 dBc	0	-53.71 dBm	Maximum of emissions is reported here, in the frequency spectrum 9kHz to 25GHz.
	39	-54.06 dBm	
	78	-53.86 dBm	

10 AC Power Line Conducted Emissions

FCC: § 15.107 § 15.207	IC:	RSS-210 §6.6
Measurement Procedures: The AC power line conducted emissions emission test was performed at Compliance Certification Service, California. The test report is attached as a separate document.		

11 Spurious Radiated Emissions

FCC: § 15.109, § 15.209	IC:	RSS-210 §A2.9 (2)
Measurement Procedures: The radiated spurious emission test was performed at Compliance Certification Service, California. The test report is attached as a separate document.		

12 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Cal Due Date
Spectrum Analyzer	Hewlett Packard	8593EM	3710A00203	03/04/10
Spectrum Analyzer	Hewlett Packard	8594E	3810A04238	04/03/10