



## STC Test Report

**Date** : 2012-05-03  
**No.** : DM107777

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**Applicant (C01430):** Ocean Star Electronics Limited.  
Unit D, 6/F., Valiant Industrial Centre, 2-12 Au Pui Wan Street, Fo Tan, Hong Kong

**Manufacturer:** DONGGUAN OCEAN SOUND TECHNOLOGY LTD  
Dai Hong Industrial Park, Chajiao Village, Zhongtang Zhen, Dongguan City, Guangdong, CHINA. Zip Code: 523231

**Description of Sample(s):** Product: Bluetooth speaker  
Brand Name: Acoustic Research  
Model Number: ARS70  
FCC ID: LMZ-19033BT

**Date Sample(s) Received:** 2012-04-03

**Date Tested:** 2012-04-05 to 2012-04-28

**Investigation Requested:** Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2010 and ANSI C63.4:2009 for FCC Certification.

**Conclusion(s):** The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

**Remark(s):** For additional model(s) details, see page 3

  
  
LONG Yun Jian, Along  
Authorized Signatory  
ElectroMagnetic Compatibility Department  
For and on behalf of  
STC (Dongguan) Company Limited

### STC (Dongguan) Company Limited

68 Fumin Nan Road, Dalang, Dongguan, China. (Zip Code : 523 770)  
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### **1.0 General Details**

#### **1.1 Test Laboratory**

STC (Dongguan) Company Limited  
EMC Laboratory  
68 Fumin Nan Road, Dalang, Dongguan, China

Telephone: (86 769) 81119888

Fax: (86 769) 81116222

#### **1.2 Equipment Under Test [EUT] Description of Sample(s)**

Product: Bluetooth speaker  
Manufacturer: DONGGUAN OCEAN SOUND TECHNOLOGY LTD  
Brand Name: Acoustic Research  
Model Number: ARS70  
Additional Brand Name(s): OCEAN  
Additional Model Number(s): 19033,20009  
Input Voltage: 12Vd.c. with Jack  
The AC/DC adapter was provided by the applicant with following details:  
Brand name: Ktec; Model no.: KSAS0241200200HU; Input: 100-240Va.c. 50/60Hz 0.6A;  
Output: 12Vd.c. 2.0A.

##### **1.2.1 Description of EUT Operation**

The Equipment Under Test (EUT) is an Ocean Star Electronics Limited., Bluetooth speaker. Is bluetooth 2.1+EDR. modulation by IC; and type is GFSK,  $\pi/4$  DQPSK , 8DPSK modulation.

#### **1.3 Date of Order**

2012-04-03

#### **1.4 Submitted Sample(s):**

1 Sample

#### **1.5 Test Duration**

2012-04-05 to 2012-04-28

#### **1.6 Country of Origin**

China

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## 2.0 Technical Details

### 2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2010 Regulations and ANSI C63.4:2009 for FCC Certification.

### 2.2 Test Standards and Results Summary Tables

EMISSION Results Summary						
Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Fail	N/A
Output Power of Fundamental Emissions	FCC 47CFR 15.247(b)(1)	ANSI C63.4:2009	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated Spurious Emissions	FCC 47CFR 15.209	ANSI C63.4:2009	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AC Mains Conducted Emissions	FCC 47CFR 15.207	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Number of Operating Channel	FCC 47CFR 15.247(a)(2)(b)(1)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Band-edge compliance of Conducted Emission	FCC 47CFR 15.247©	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Channel Separation	FCC 47CFR 15.247(a)(1)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pseudorandom Hopping Algorithm	FCC 47CFR 15.247(a)(1)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Time of Occupancy	FCC 47CFR 15.247(a)(1)(iii)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20dB Bandwidth	FCC 47CFR 15.247(a)(1)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: N/A - Not Applicable

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### 3.0 Test Results

#### **3.1 Emission**

##### **3.1.1 Maximum Peak Output Power**

Test Requirement:	FCC 47CFR 15.247(b)(1)
Test Method:	N/A
Test Date:	2012-04-13
Ambient Temperature:	21 °C
Relative Humidity:	49 %
Atmospheric Pressure (kPa):	101
Mode of Operation:	Tx mode

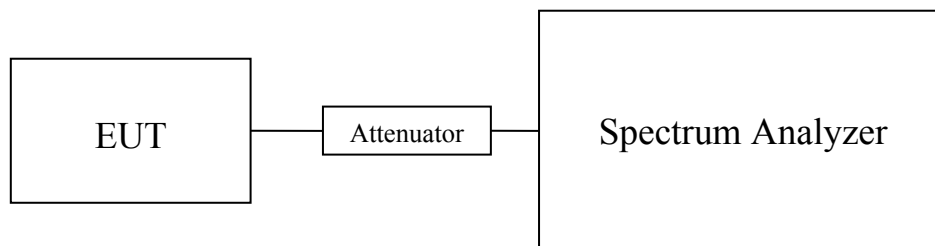
#### **Test Method:**

The RF output of the EUT was connected to the spectrum analyzer. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in mW.

#### **Spectrum Analyzer Setting:**

RBW = 3 MHz, VBW= 3MHz, Sweep = Auto, Span = 10MHz  
Detector = Peak, Trace = Max. hold

#### **Test Setup:**



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### Limits for Peak Output Power of Fundamental & Harmonics Emissions [FCC 47CFR 15.247]:

The maximum peak output power shall not exceeded the following limits:  
For frequency hopping systems employing at least 75 hopping channels: 1 Watt  
For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watts  
For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt

**Results of Tx Mode (2402.0 MHz to 2480.0MHz) : Pass (TX Unit)**

**Type of Modulation: GFSK**

**Maximum conducted output power**

Transmitter Frequency (MHz)	Maximum conducted output power (dBm)
2402	1.20

Transmitter Frequency (MHz)	Maximum conducted output power (dBm)
2441	1.37

Transmitter Frequency (MHz)	Maximum conducted output power (dBm)
2480	0.83

Limit: 0.125W (125.0mW)

Calculated measurement uncertainty : 30MHz to 1GHz 1.7dB  
1GHz to 18GHz 1.7dB

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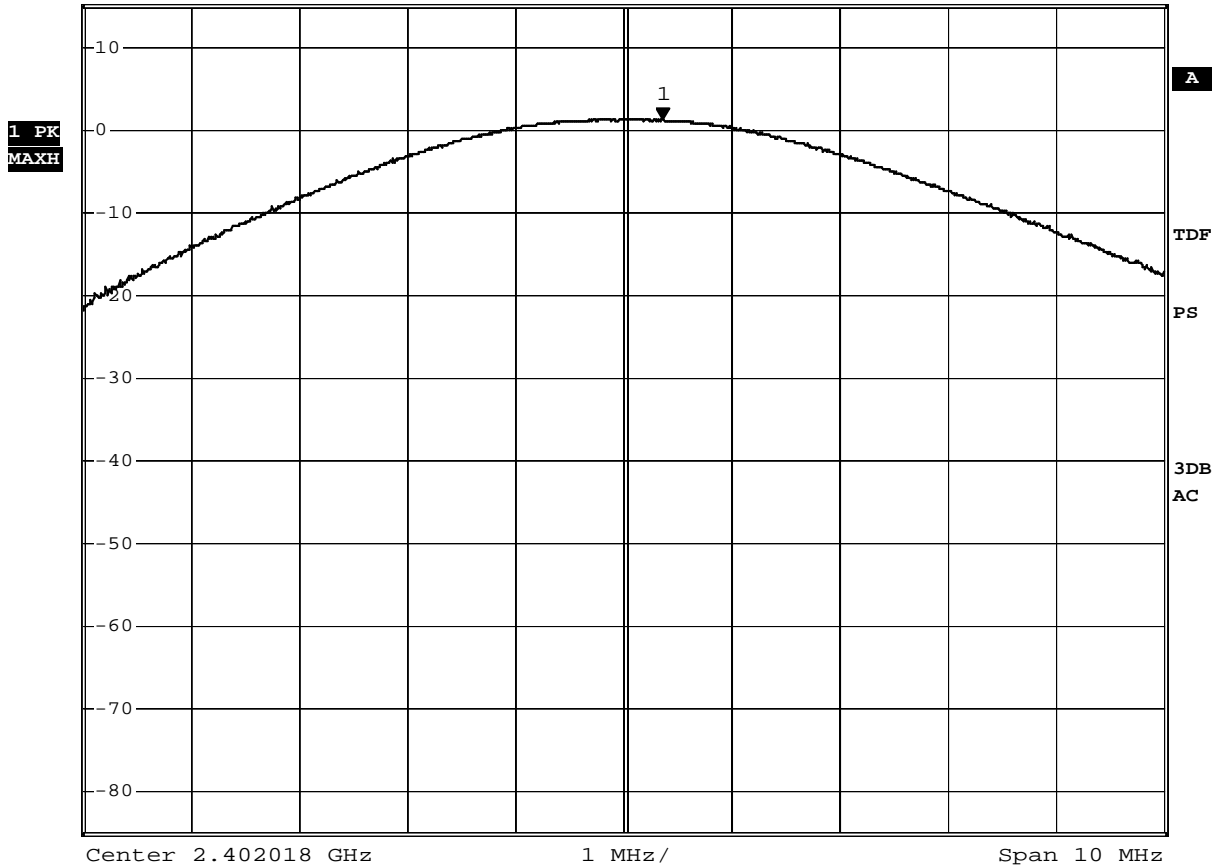
Tx: 2402MHz



\*RBW 3 MHz      Marker 1 [T1 ]  
\*VBW 3 MHz      1.20 dBm  
SWT 5 ms      2.402368000 GHz

Ref 15 dBm

\*Att 30 dB



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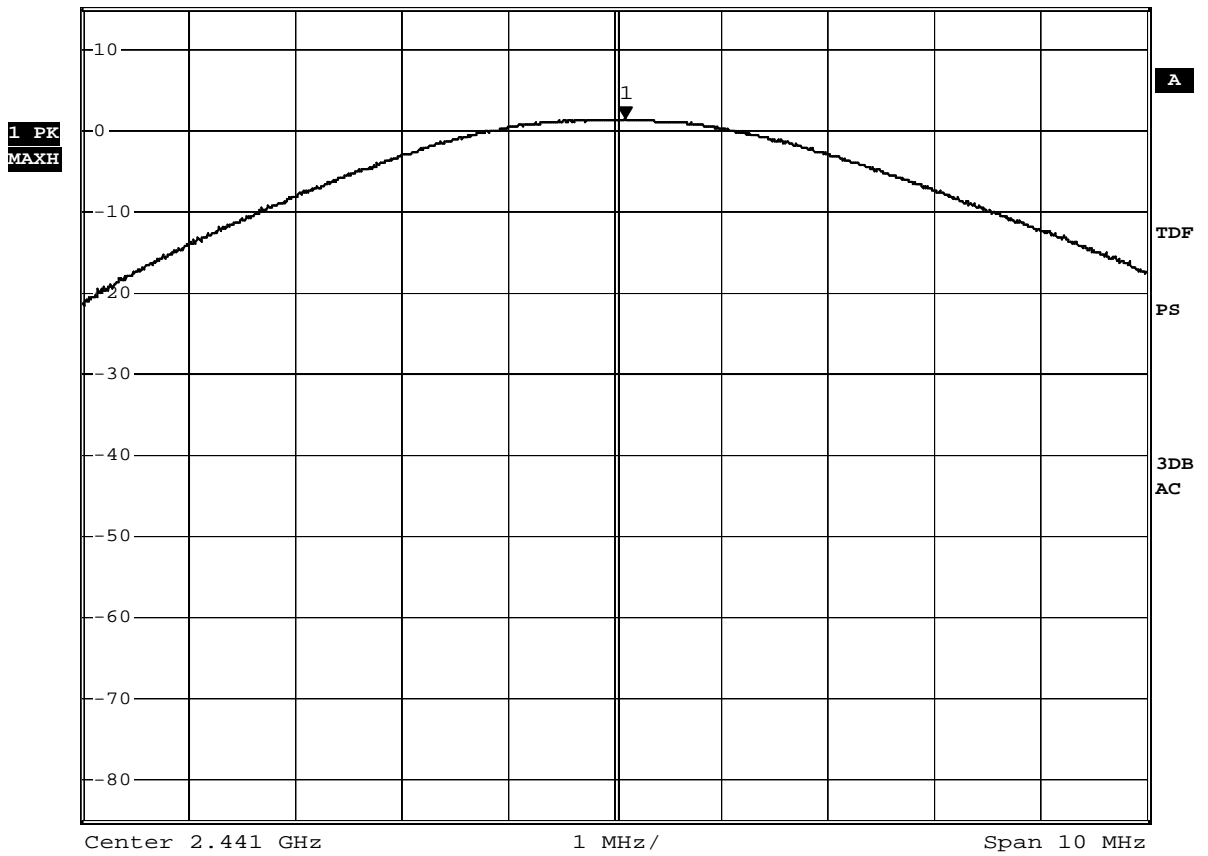
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Tx: 2441MHz



\*RBW 3 MHz      Marker 1 [T1 ]  
\*VBW 3 MHz      1.37 dBm  
Ref 15 dBm      \*Att 30 dB      SWT 5 ms      2.441100000 GHz



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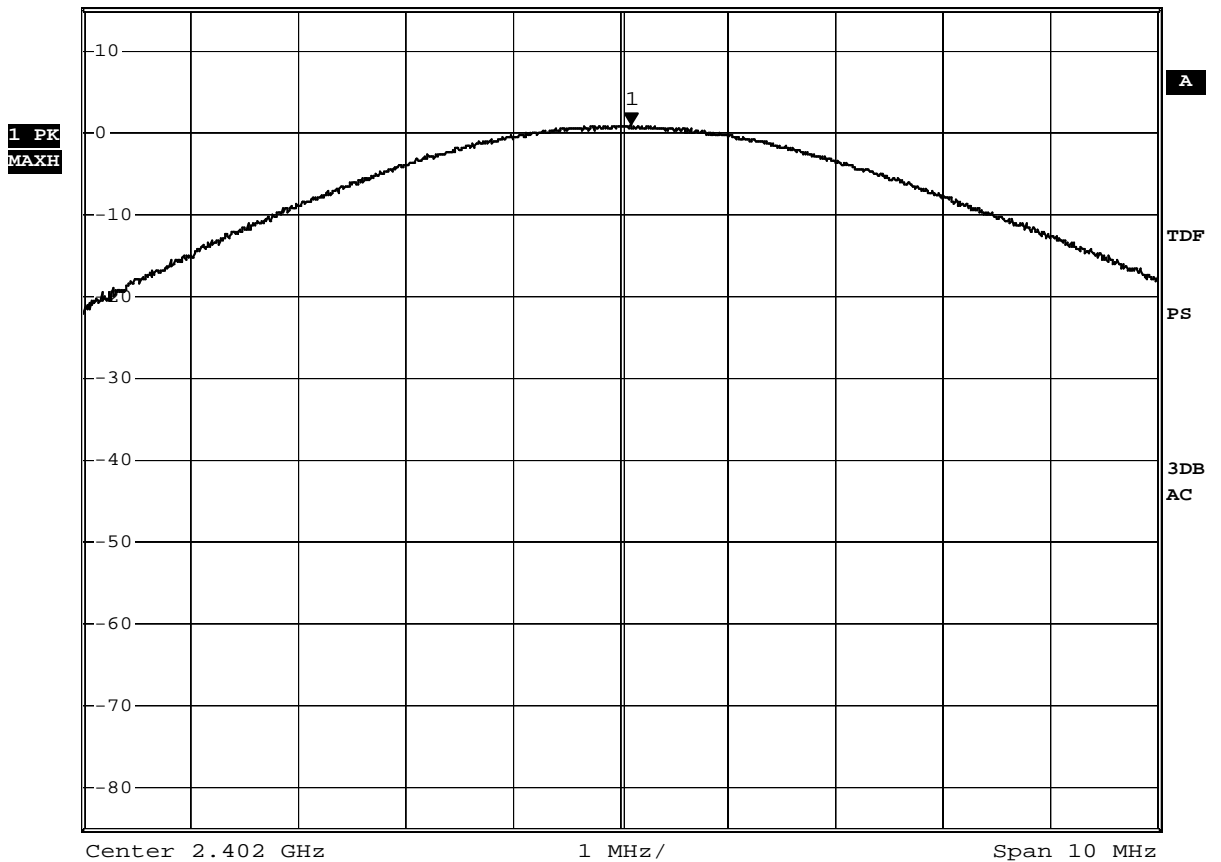
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Tx: 2480MHz



Ref 15 dBm      \*Att 30 dB      \*RBW 3 MHz      Marker 1 [T1]      \*VBW 3 MHz      0.83 dBm  
SWT 5 ms      2.402100000 GHz



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### Limits for Peak Output Power of Fundamental & Harmonics Emissions [FCC 47CFR 15.247]:

The maximum peak output power shall not exceeded the following limits:  
For frequency hopping systems employing at least 75 hopping channels: 1 Watt  
For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watts  
For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt

### Results of Tx Mode (2402.0 MHz to 2480.0MHz) : Pass (TX Unit)

Type of Modulation:  $\pi/4$  DQPSK

Maximum conducted output power

Transmitter Frequency (MHz)	Maximum conducted output power (dBm)
2402	1.54

Transmitter Frequency (MHz)	Maximum conducted output power (dBm)
2441	1.56

Transmitter Frequency (MHz)	Maximum conducted output power (dBm)
2480	1.06

Limit: 0.125W (20.97dBm)

Calculated measurement uncertainty : 30MHz to 1GHz 1.7dB  
1GHz to 18GHz 1.7dB

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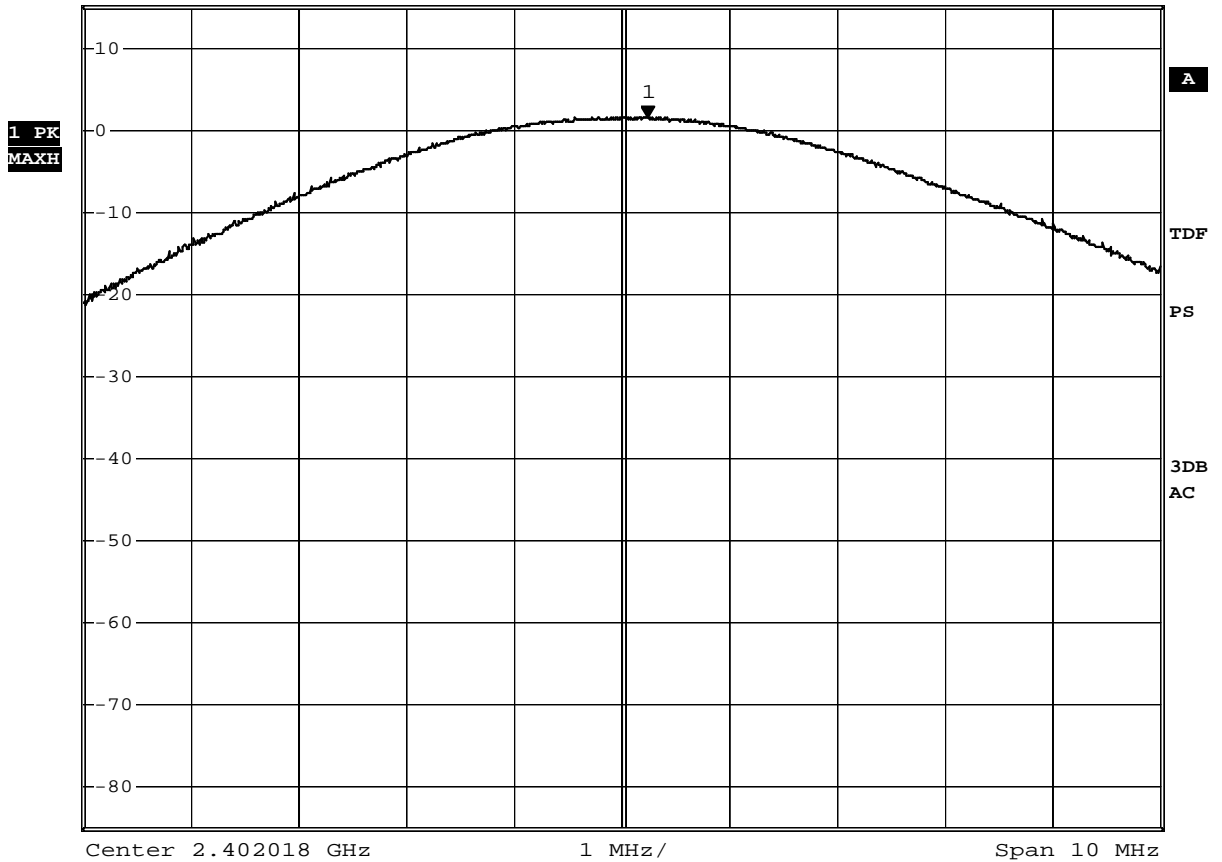
Tx: 2402MHz



\*RBW 3 MHz      Marker 1 [T1 ]  
\*VBW 3 MHz      1.54 dBm  
SWT 5 ms      2.402258000 GHz

Ref 15 dBm

\*Att 30 dB



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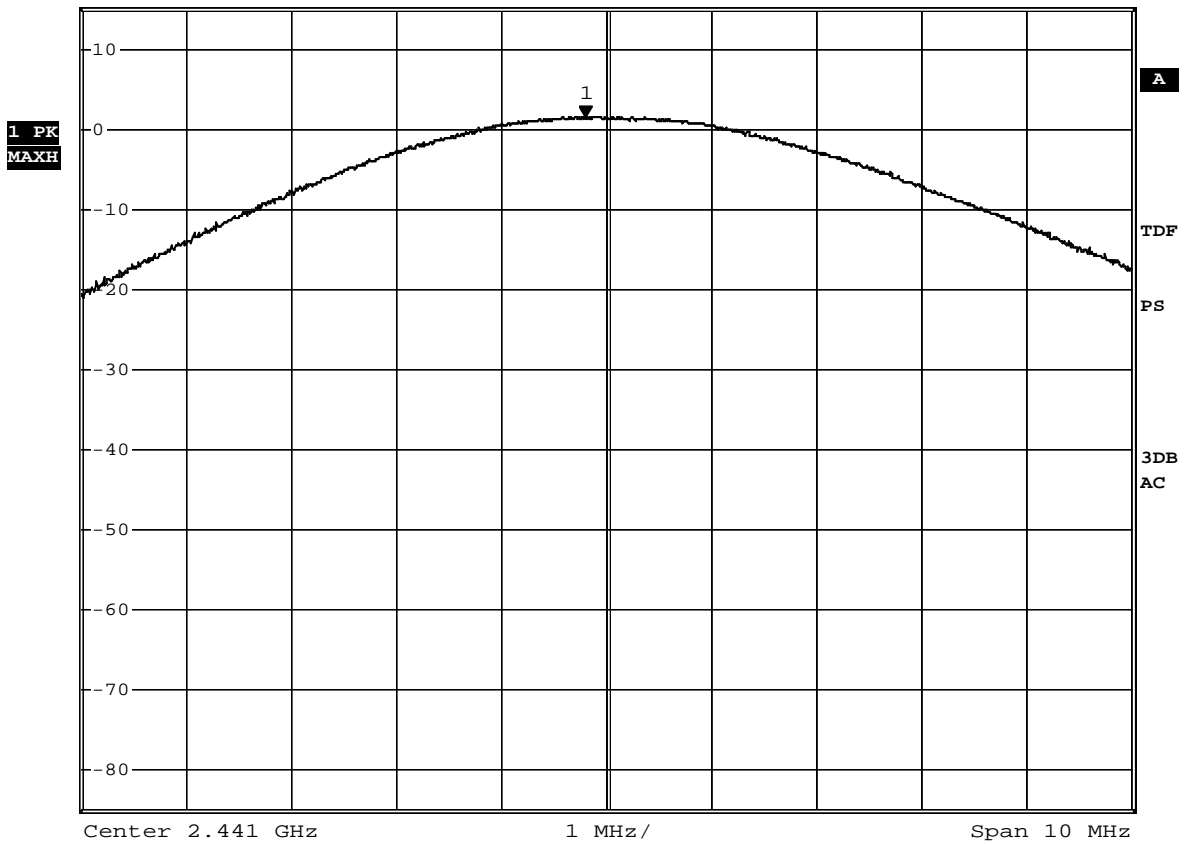
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Tx: 2441MHz



\*RBW 3 MHz      Marker 1 [T1 ]  
\*VBW 3 MHz      1.56 dBm  
Ref 15 dBm      \*Att 30 dB      SWT 5 ms      2.440800000 GHz



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Tx: 2480MHz



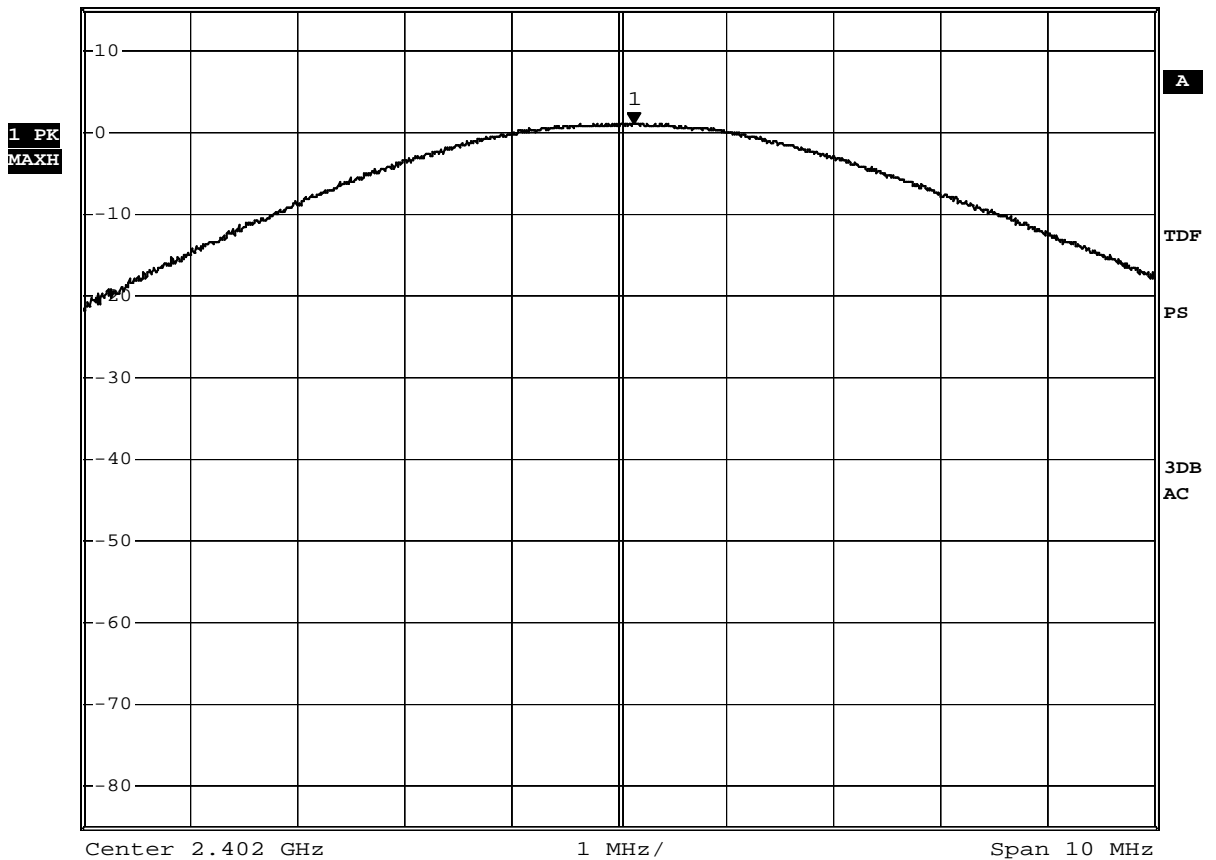
\*RBW 3 MHz      Marker 1 [T1 ]  
\*VBW 3 MHz      1.06 dBm  
SWT 5 ms      2.402130000 GHz

Ref 15 dBm

\*Att 30 dB

SWT 5 ms

2.402130000 GHz



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### Limits for Peak Output Power of Fundamental & Harmonics Emissions [FCC 47CFR 15.247]:

The maximum peak output power shall not exceeded the following limits:  
For frequency hopping systems employing at least 75 hopping channels: 1 Watt  
For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watts  
For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt

### Results of Tx Mode (2402.0 MHz to 2480.0MHz) : Pass (TX Unit)

Type of Modulation: 8DPSK

Maximum conducted output power

Transmitter Frequency (MHz)	Maximum conducted output power (dBm)
2402	1.50

Transmitter Frequency (MHz)	Maximum conducted output power (dBm)
2441	1.66

Transmitter Frequency (MHz)	Maximum conducted output power (dBm)
2480	0.83

Limit: 0.125W (20.97dBm)

Calculated measurement uncertainty : 30MHz to 1GHz 1.7dB  
1GHz to 18GHz 1.7dB

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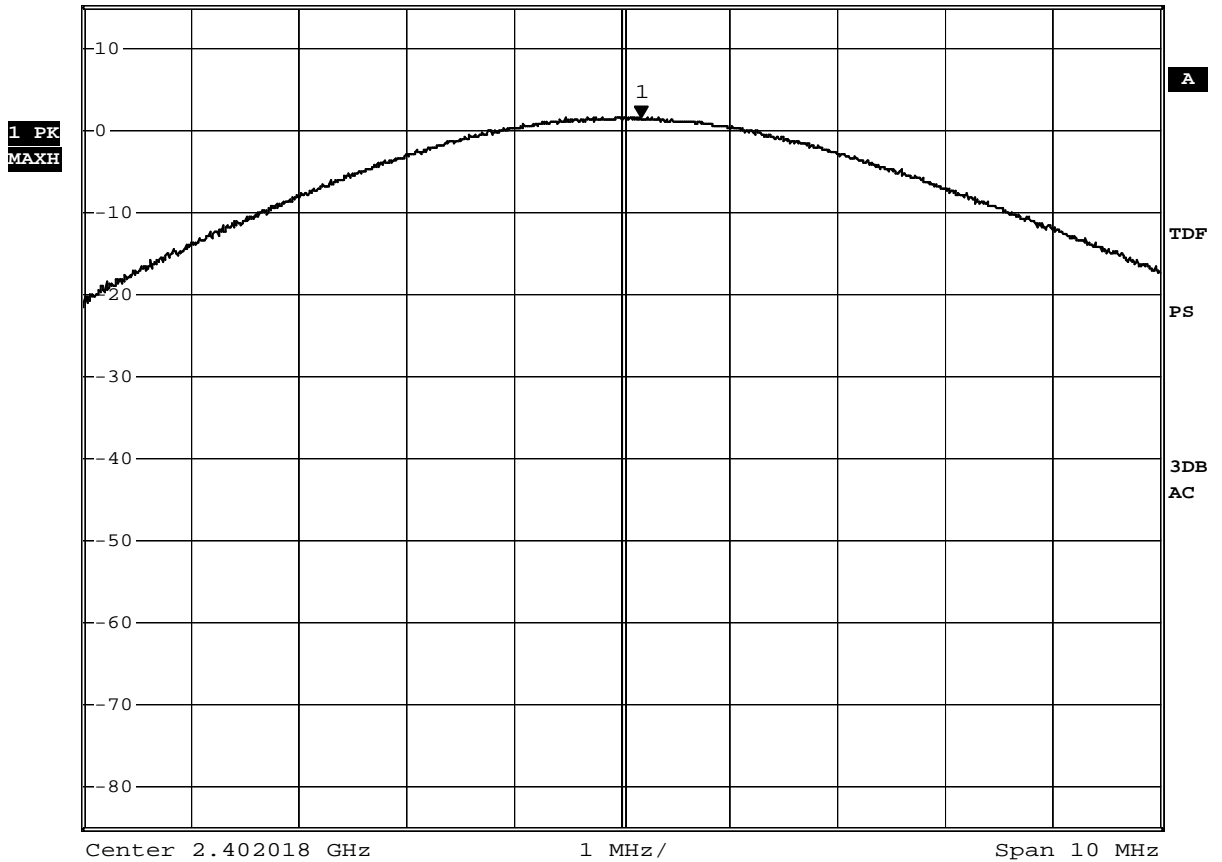
Tx: 2402MHz



\*RBW 3 MHz      Marker 1 [T1 ]  
\*VBW 3 MHz      1.50 dBm  
SWT 5 ms      2.402188000 GHz

Ref 15 dBm

\*Att 30 dB



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Tx: 2441MHz



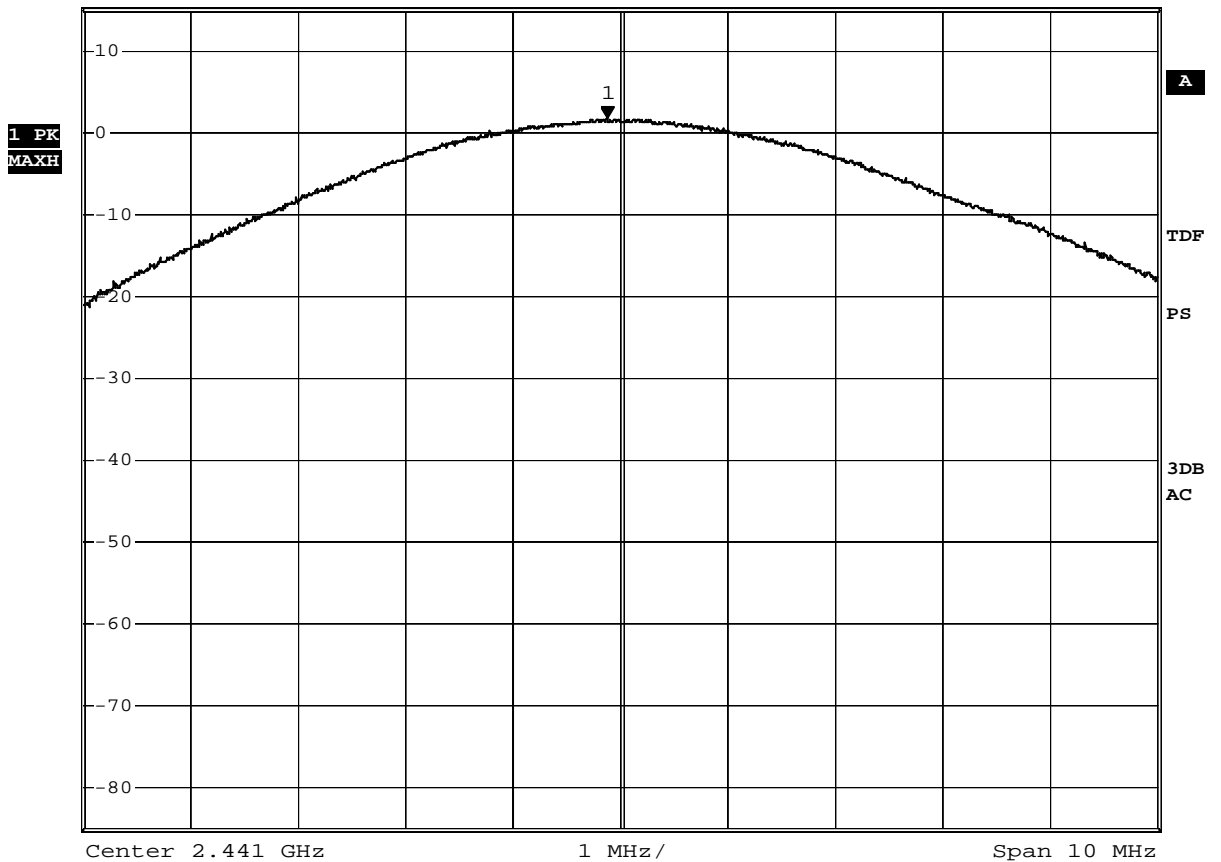
\*RBW 3 MHz      Marker 1 [T1 ]  
\*VBW 3 MHz      1.66 dBm  
SWT 5 ms      2.440880000 GHz

Ref 15 dBm

\*Att 30 dB

SWT 5 ms

2.440880000 GHz



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Tx: 2480MHz



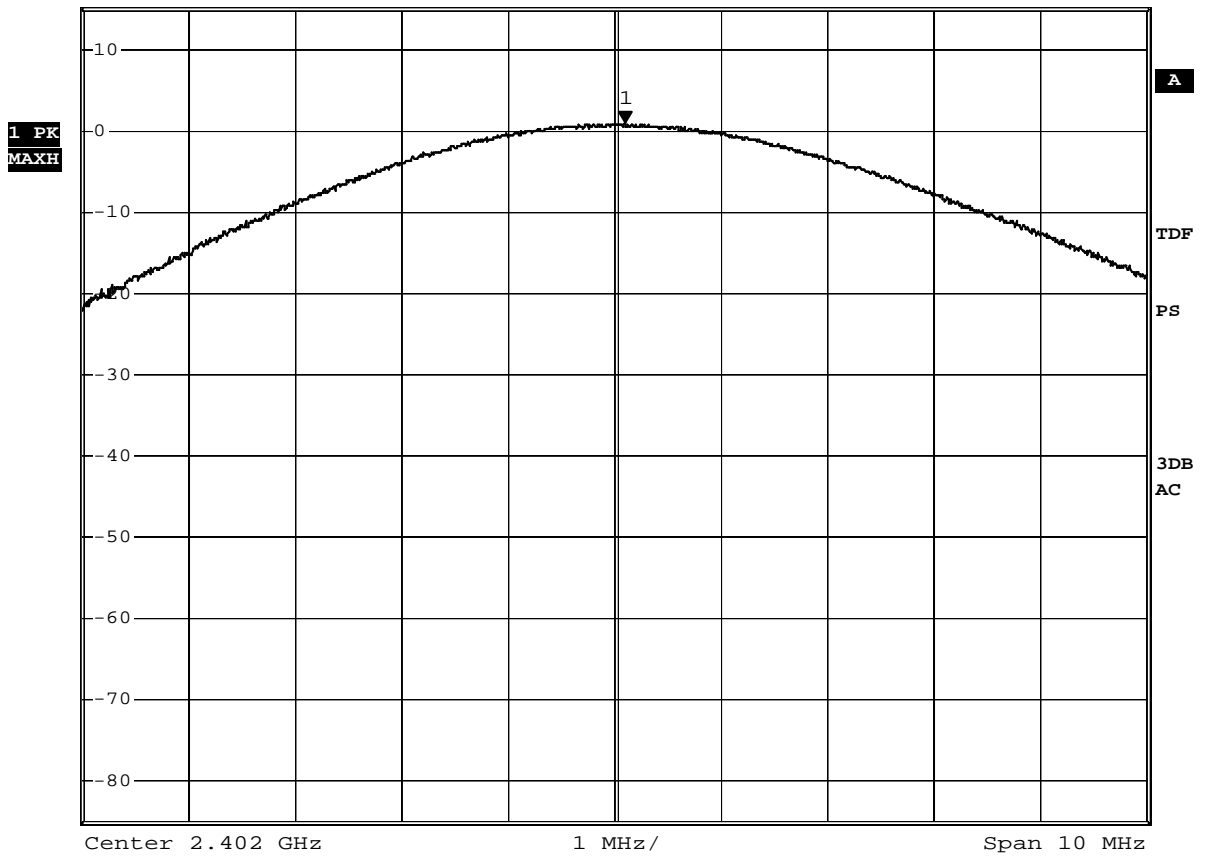
\*RBW 3 MHz      Marker 1 [T1 ]  
\*VBW 3 MHz      0.83 dBm  
SWT 5 ms      2.402100000 GHz

Ref 15 dBm

\*Att 30 dB

SWT 5 ms

2.402100000 GHz



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### 3.1.2 Radiated Emissions

Test Requirement:	FCC 47CFR 15.209
Test Method:	ANSI C63.4:2009
Test Date:	2012-04-28
Ambient Temperature:	21 °C
Relative Humidity:	48 %
Atmospheric Pressure (kPa):	101
Mode of Operation:	Tx mode

#### Test Method:

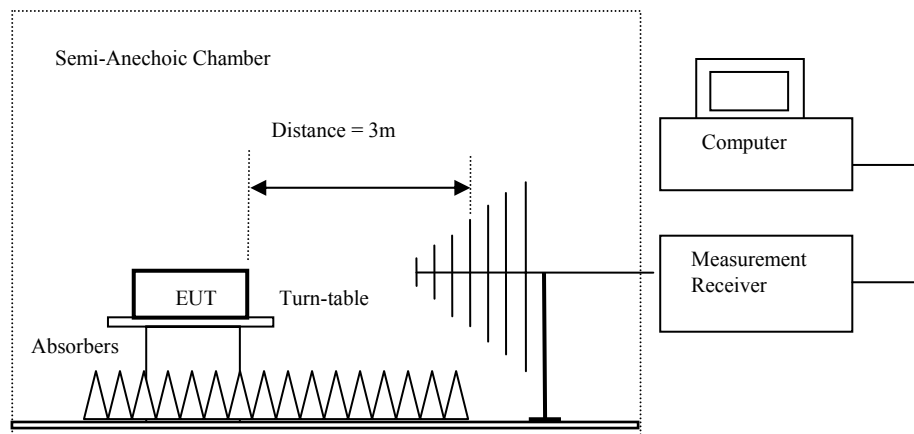
The sample was placed 0.8m above the ground plane of semi-anechoic Chamber\*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

\* Semi-anechoic chamber located on the G/F of “STC (Dongguan) Company Limited” with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 629686.

#### Spectrum Analyzer Setting:

Above 1GHz – RBW = 1MHz, VBW= 3MHz, Detector = Peak / Average,  
Below 1GHz to 30MHz – RBW = 120kHz, VBW = 120kHz Detector = Quasi-Peak,  
Below 30MHz to 9kHz – RBW = 10kHz, VBW = 30kHz Detector = Quasi-Peak,  
Sweep = Auto, Span = Fully capture the emissions being measured,  
Trace = Max. hold

#### Test Setup:



Ground Plane  
STC (Dongguan) Company Limited

Absorbers placed on top of the ground plane are for measurements above 1000MHz only.



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### Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [ $\mu$ V/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### Result of Tx Mode (2402.0 MHz): Pass (Type of Modulation: GFSK)

Field Strength of Harmonic Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4804.0	7.8	41.5	49.3	74.0	-24.7	Horizontal
4804.0	11.6	41.5	53.1	74.0	-20.9	Vertical
Field Strength of Harmonic Emissions Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4804.0	-2.5	41.5	39.1	54.0	-15.0	Horizontal
4804.0	1.2	41.5	42.7	54.0	-11.3	Vertical

Remarks:

- \* Denotes restricted band of operation.  
Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty	:	30MHz to 1GHz	4.6dB
		1GHz to 18GHz	4.4dB

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### Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [ $\mu$ V/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### Result of Tx Mode (2441.0 MHz): Pass (Type of Modulation: GFSK)

Field Strength of Harmonic Emissions PeakValue						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4882.0	14.1	41.4	55.5	74.0	-18.5	Horizontal
4882.0	12.6	41.4	54.0	74.0	-20.0	Vertical
Field Strength of Harmonic Emissions AverageValue						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4882.0	2.3	41.4	43.7	54.0	-10.3	Horizontal
4882.0	-0.6	41.4	40.8	54.0	-13.2	Vertical

#### Remarks:

\* Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty	:	30MHz to 1GHz	4.6dB
		1GHz to 18GHz	4.4dB

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### Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [ $\mu$ V/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### Result of Tx Mode (2480.0 MHz): Pass (Type of Modulation: GFSK)

Field Strength of Harmonic Emissions PeakValue						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4960.0	14.8	41.4	56.2	74.0	-17.8	Horizontal
4960.0	15.9	41.4	57.3	74.0	-16.7	Vertical
Field Strength of Harmonic Emissions AverageValue						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4960.0	1.2	41.4	42.6	54.0	-11.4	Horizontal
4960.0	1.9	41.4	43.3	54.0	-10.7	Vertical

Remarks:

\* Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty	:	30MHz to 1GHz	4.6dB
		1GHz to 18GHz	4.4dB

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### Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [ $\mu$ V/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### Result of Tx Mode (2402.0 MHz) (Above 1GHz): Pass (Type of Modulation: $\pi/4$ DQPSK)

Field Strength of Harmonic Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4804.0	7.8	41.5	49.2	74.0	-24.8	Horizontal
4804.0	11.6	41.5	53.1	74.0	-20.9	Vertical
7206.0	5.8	48.8	54.6	74.0	-19.4	Horizontal
7206.0	4.5	48.8	53.3	74.0	-20.7	Vertical
Field Strength of Harmonic Emissions Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4804.0	-2.5	41.5	39.0	54.0	-15.0	Horizontal
4804.0	1.2	41.5	42.7	54.0	-11.3	Vertical
7206.0	-6.2	48.8	42.6	54.0	-11.4	Horizontal
7206.0	-7.5	48.8	41.3	54.0	-12.7	Vertical

Remarks:

\* Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty	:	30MHz to 1GHz	4.6dB
		1GHz to 18GHz	4.4dB

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### Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [ $\mu$ V/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### Result of Tx Mode (2441.0 MHz) (Above 1GHz): Pass (Type of Modulation: $\pi/4$ DQPSK)

Field Strength of Harmonic Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4882.0	12.3	41.4	53.7	74.0	-20.3	Horizontal
4882.0	11.5	41.4	52.9	74.0	-21.1	Vertical
7323.0	3.7	48.7	52.4	74.0	-21.6	Horizontal
7323.0	2.9	48.7	51.6	74.0	-22.4	Vertical
Field Strength of Harmonic Emissions Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4882.0	-7.7	41.4	33.7	54.0	-20.3	Horizontal
4882.0	-8.5	41.4	32.9	54.0	-21.1	Vertical
7323.0	-16.3	48.7	32.4	54.0	-21.6	Horizontal
7323.0	-17.1	48.7	31.6	54.0	-22.4	Vertical

Remarks:

\* Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty	:	30MHz to 1GHz	4.6dB
		1GHz to 18GHz	4.4dB

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### Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [ $\mu$ V/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### Result of Tx Mode (2480.0 MHz) (Above 1GHz): Pass (Type of Modulation: $\pi/4$ DQPSK)

Field Strength of Harmonic Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4960.0	14.1	41.4	55.5	74.0	-18.5	Horizontal
4960.0	12.4	41.4	53.8	74.0	-20.2	Vertical
7440.0	4.1	48.6	52.7	74.0	-21.3	Horizontal
7440.0	3.7	48.6	52.3	74.0	-21.7	Vertical
Field Strength of Harmonic Emissions Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB $\mu$ V/m	E-Field Polarity
4960.0	-5.9	41.4	35.5	54.0	-18.5	Horizontal
4960.0	-9.3	41.4	32.1	54.0	-21.9	Vertical
7440.0	-15.1	48.6	33.5	54.0	-20.5	Horizontal
7440.0	-16.1	48.6	32.5	54.0	-21.5	Vertical

Remarks:

\* Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty	:	30MHz to 1GHz	4.6dB
		1GHz to 18GHz	4.4dB

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**Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:**

Frequency Range [MHz]	Quasi-Peak Limits [μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

**Result of Tx Mode (2402.0 MHz) (Above 1GHz): Pass (Type of Modulation: 8DPSK)**

Field Strength of Harmonic Emissions PeakValue						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
4804.0	8.8	41.5	50.3	74.0	-23.7	Horizontal
4804.0	12.6	41.5	54.1	74.0	-19.9	Vertical
7206.0	7.5	48.8	56.3	74.0	-17.7	Horizontal
7206.0	4.1	48.8	52.9	74.0	-21.1	Vertical
Field Strength of Harmonic Emissions AverageValue						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
4804.0	-1.8	41.5	39.7	54.0	-14.3	Horizontal
4804.0	1.1	41.5	42.6	54.0	-11.4	Vertical
7206.0	-6.2	48.8	42.6	54.0	-11.4	Horizontal
7206.0	-4.4	48.8	44.4	54.0	-9.6	Vertical

Remarks:

- \* Denotes restricted band of operation.  
Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 4.6dB  
1GHz to 18GHz 4.4dB

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**Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:**

Frequency Range [MHz]	Quasi-Peak Limits [μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

**Result of Tx Mode (2441.0 MHz) (Above 1GHz): Pass(Type of Modulation: 8DPSK)**

Field Strength of Harmonic Emissions Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
4882.0	13.3	41.4	54.7	74.0	-19.3	Horizontal
4882.0	11.1	41.4	52.5	74.0	-21.5	Vertical
7323.0	4.8	48.7	53.5	74.0	-20.5	Horizontal
7323.0	2.9	48.7	51.6	74.0	-22.4	Vertical
Field Strength of Harmonic Emissions Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
4882.0	-6.7	41.4	34.7	54.0	-19.3	Horizontal
4882.0	-6.5	41.4	34.9	54.0	-19.1	Vertical
7323.0	-16.3	48.7	32.4	54.0	-21.6	Horizontal
7323.0	-15.1	48.7	33.6	54.0	-20.4	Vertical

Remarks:

\* Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 4.6dB  
1GHz to 18GHz 4.4dB

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### Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [ $\mu\text{V/m}$ ]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### Result of Tx Mode (2480.0 MHz) (Above 1GHz): Pass(Type of Modulation: 8DPSK)

Field Strength of Harmonic Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V}$	Correction Factor dB/m	Field Strength dB $\mu\text{V/m}$	Limit @3m dB $\mu\text{V/m}$	Margin dB $\mu\text{V/m}$	E-Field Polarity
4960.0	13.5	41.4	54.9	74.0	-19.1	Horizontal
4960.0	13.1	41.4	54.5	74.0	-19.5	Vertical
7440.0	5.8	48.6	54.4	74.0	-19.6	Horizontal
7440.0	3.0	48.6	51.6	74.0	-22.4	Vertical
Field Strength of Harmonic Emissions Average Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V}$	Correction Factor dB/m	Field Strength dB $\mu\text{V/m}$	Limit @3m dB $\mu\text{V/m}$	Margin dB $\mu\text{V/m}$	E-Field Polarity
4960.0	-4.9	41.4	36.5	54.0	-17.5	Horizontal
4960.0	-8.3	41.4	33.1	54.0	-20.9	Vertical
7440.0	-14.1	48.6	34.5	54.0	-19.5	Horizontal
7440.0	-7.1	48.6	41.5	54.0	-12.5	Vertical

Remarks:

\* Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty	:	30MHz to 1GHz	4.6dB
		1GHz to 18GHz	4.4dB

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### Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [ $\mu\text{V/m}$ ]
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

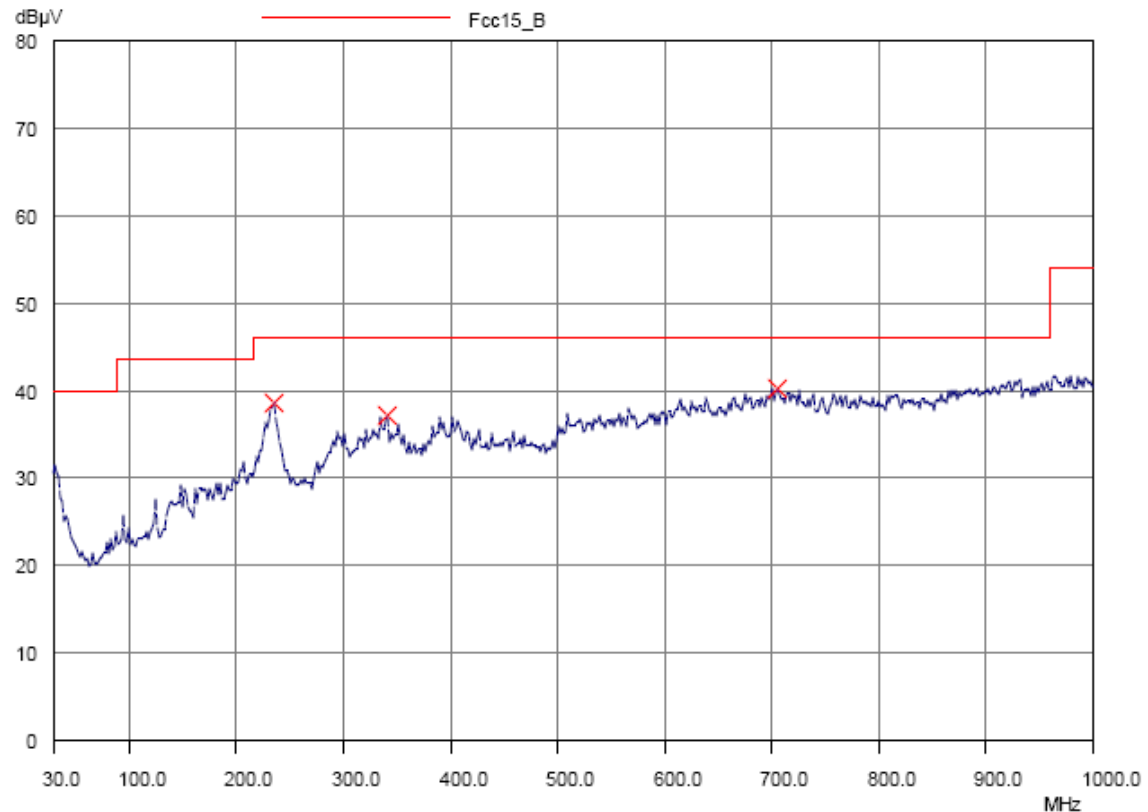
### Result of Bluetooth mode (Communication with mobile phone) (9kHz – 30MHz): PASS

Emissions detected are more than 20 dB below the limit line(s)

### Results of Bluetooth mode (Communication with mobile phone) (Above 30MHz): PASS

Please refer to the following table for result details

Horizontal



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Results of Bluetooth mode (Communication with mobile phone) (Above 30MHz): PASS

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Level @3m $\mu$ V/m	Limit @3m $\mu$ V/m
236.0	Horizontal	40.0	46.0	100.0	200
341.3	Horizontal	34.2	46.0	51.3	200
705.1	Horizontal	34.4	46.0	52.5	200

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 4.6dB  
1GHz to 18GHz 4.4dB

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### Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [ $\mu\text{V/m}$ ]
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

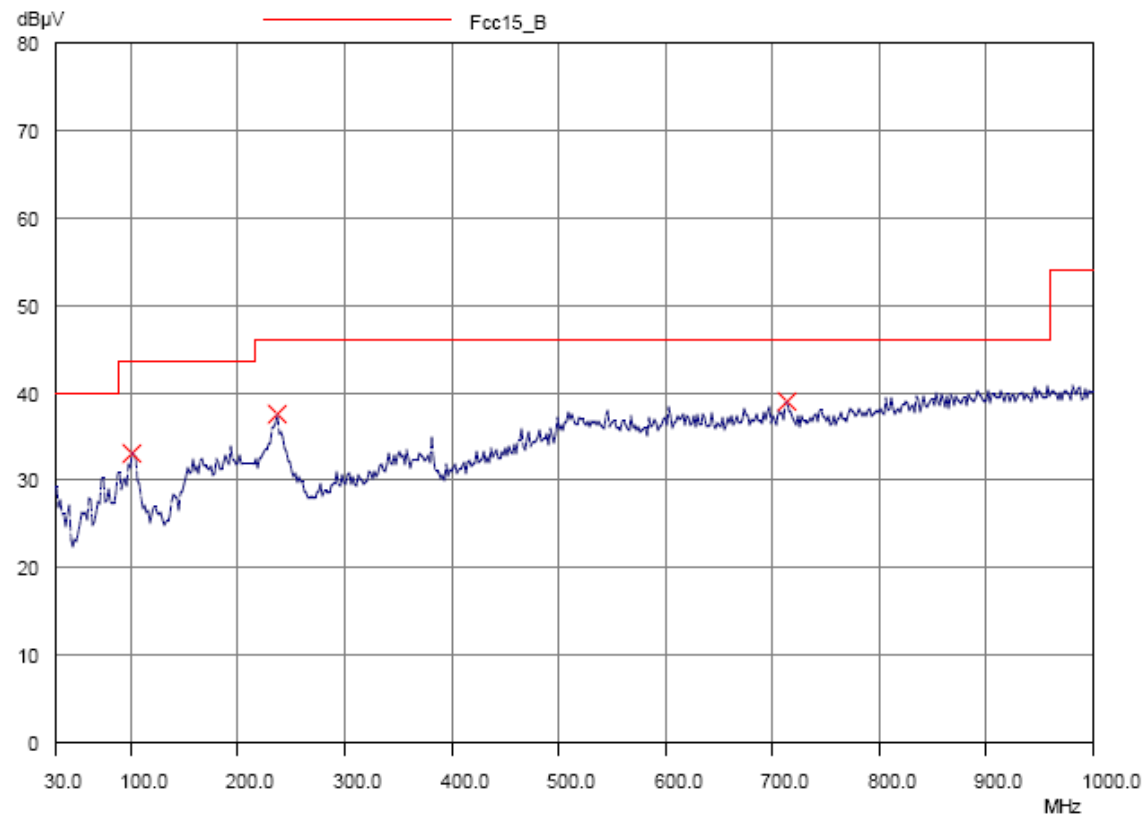
### Result of Bluetooth mode (Communication with mobile phone) (9kHz – 30MHz): PASS

Emissions detected are more than 20 dB below the limit line(s)

### Results of Bluetooth mode(Communication with mobile phone) (Above 30MHz): PASS

Please refer to the following table for result details

Vertical



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**Results of Bluetooth mode (Communication with mobile phone) (Above 30MHz): PASS**

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Level @3m $\mu$ V/m	Limit @3m $\mu$ V/m
101.1	Vertical	30.0	43.5	31.6	150
237.0	Vertical	34.6	46.0	53.7	200
713.9	Vertical	35.1	46.0	56.9	200

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 4.6dB  
1GHz to 18GHz 4.4dB

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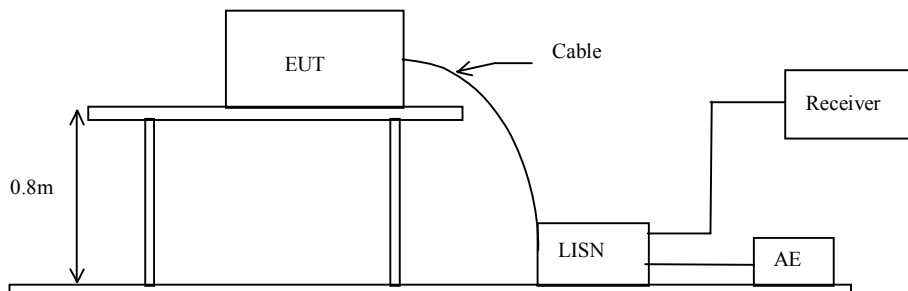
### 3.1.3 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.4:2009
Test Date:	2012-04-05
Ambient Temperature:	21 °C
Relative Humidity:	49 %
Mode of Operation:	Bluetooth mode(Communication with mobile phone)

#### Test Method:

The test was performed in accordance with ANSI C63.4: 2009, with the following: an initial measurement was performed in peak and average detection mode on the live line, any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

#### Test Setup:



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### Limit for Conducted Emissions (FCC 47 CFR 15.207):

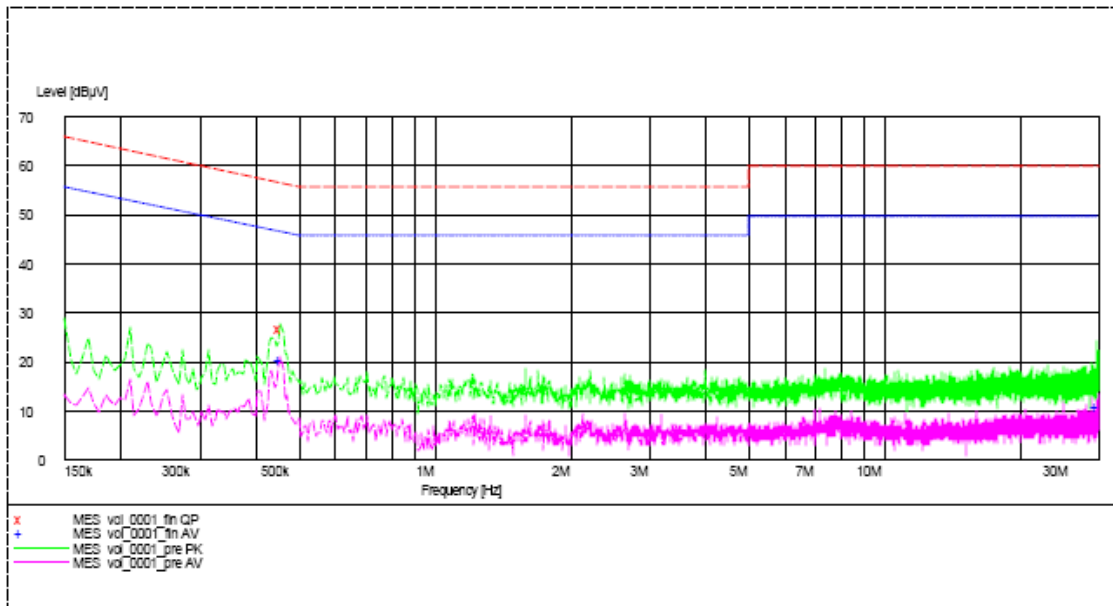
Frequency Range [MHz]	Quasi-Peak Limits [dB $\mu$ V]	Average [dB $\mu$ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

\* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

### Results of Bluetooth mode(Communication with mobile phone), (L): Pass

Please refer to the following diagram for individual results.



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### Results of Bluetooth mode(Communication with mobile phone), (L): Pass

Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB $\mu$ V	Limit dB $\mu$ V	Level dB $\mu$ V	Limit dB $\mu$ V
Live	0.455	27.0	57.0	20.5	47.0
Live	29.750	-*-	-*-	11.0	50.0

Remarks:

Calculated measurement uncertainty : 3.7dB

-\*- Emission(s) that is far below the corresponding limit line.

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### Limit for Conducted Emissions (FCC 47 CFR 15.207):

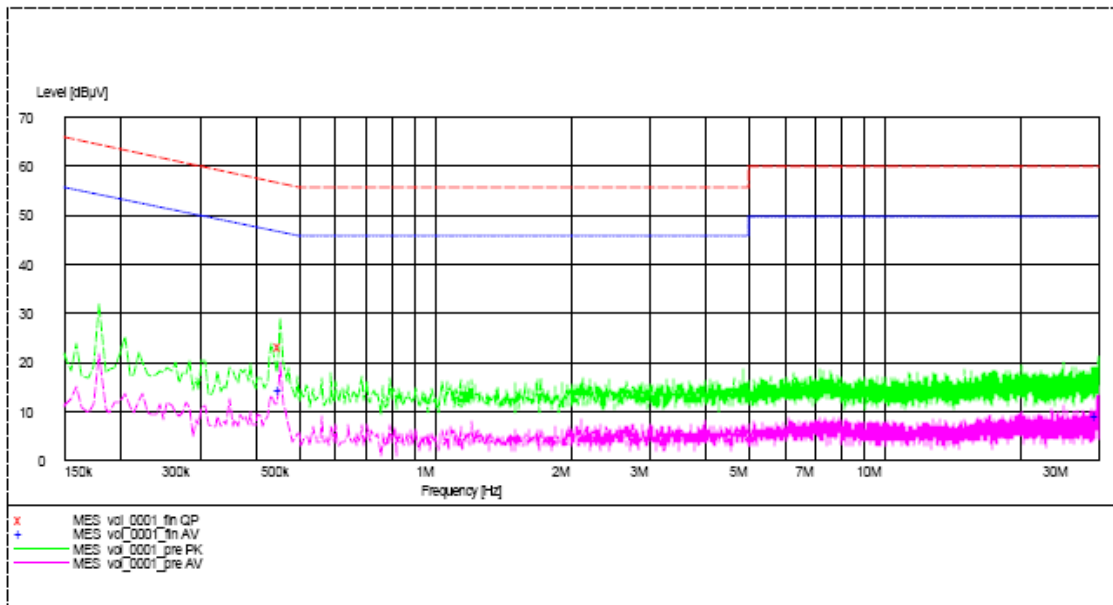
Frequency Range [MHz]	Quasi-Peak Limits [dB $\mu$ V]	Average [dB $\mu$ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

\* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

### Results of Bluetooth mode(Communication with mobile phone), (N): Pass

Please refer to the following diagram for individual results.



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### Results of Bluetooth mode(Communication with mobile phone, (N): Pass

Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB $\mu$ V	Limit dB $\mu$ V	Level dB $\mu$ V	Limit dB $\mu$ V
Neutral	0.455	23.3	57.0	14.5	47.0
Neutral	29.855	-*-	-*-	9.3	50.0

Remarks:

Calculated measurement uncertainty : 3.7dB

-\*- Emission(s) that is far below the corresponding limit line.

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### **3.1.4 20dB Bandwidth Measurement**

Test Requirement:	FCC 47CFR 15.247(a)(1)
Test Method:	ANSI C63.4:2009
Test Date:	2012-04-16
Ambient Temperature:	22 °C
Relative Humidity:	50 %
Atmospheric Pressure (kPa):	101
Mode of Operation:	Tx Mode

#### **Test Method:**

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

#### **Test Setup:**

As Test Setup of clause 3.1.1 in this test report.

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## Limits for 20dB Spectrum Bandwidth Measurement:

Center Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2402.0	1.07	Within 2400-2483.5

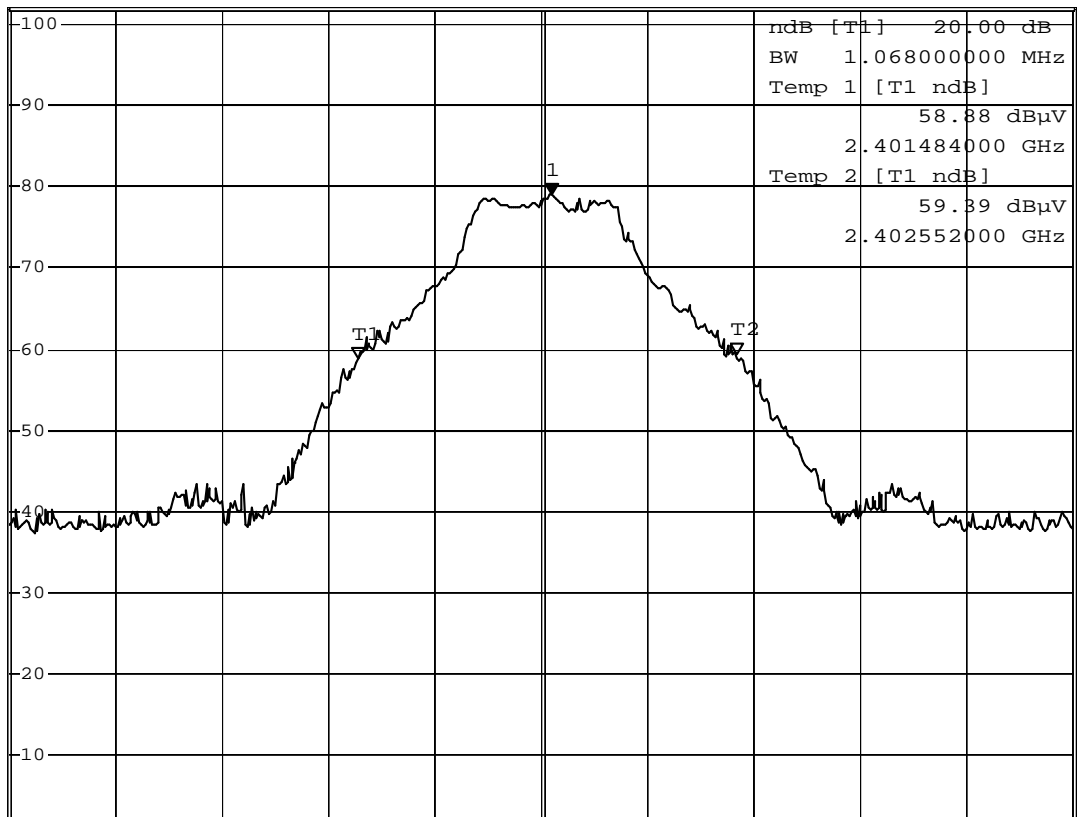
### 20dB Bandwidth of Fundamental Emission (2402MHz) (GFSK)



\*RBW 100 kHz Marker 1 [T1 ]  
 VBW 300 kHz 79.14 dBμV  
 \*Att 30 dB \*SWT 2.5 ms 2.402030000 GHz

Ref 102 dBμV

1 PK  
VIEW



Center 2.402 GHz

300 kHz/

Span 3 MHz

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## Limits for 20dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2441.0	1.07	Within 2400-2483.5

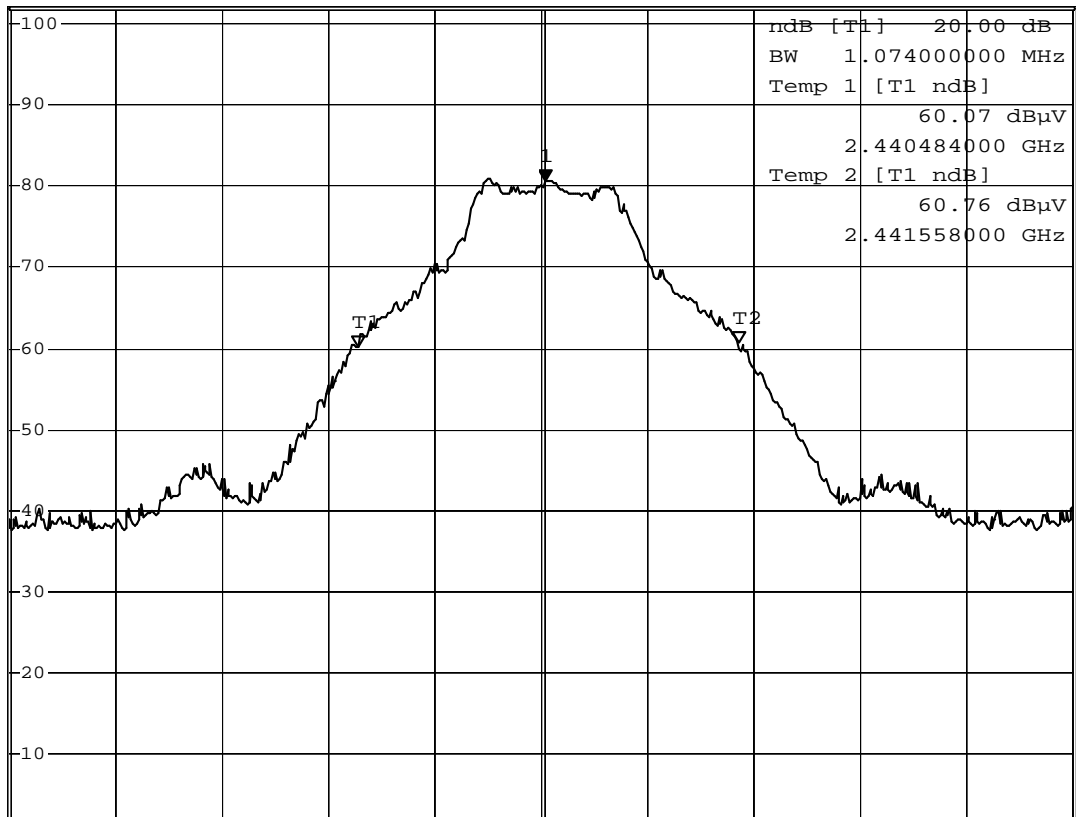
### 20dB Bandwidth of Fundamental Emission (2441MHz) (GFSK)



\*RBW 100 kHz Marker 1 [T1 ]  
 VBW 300 kHz 80.60 dBμV  
 \*Att 30 dB \*SWT 2.5 ms 2.441012000 GHz

Ref 102 dBμV

1 PK  
VIEW



Center 2.441 GHz

300 kHz/

Span 3 MHz

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## Limits for 20dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2480.0	1.10	Within 2400-2483.5

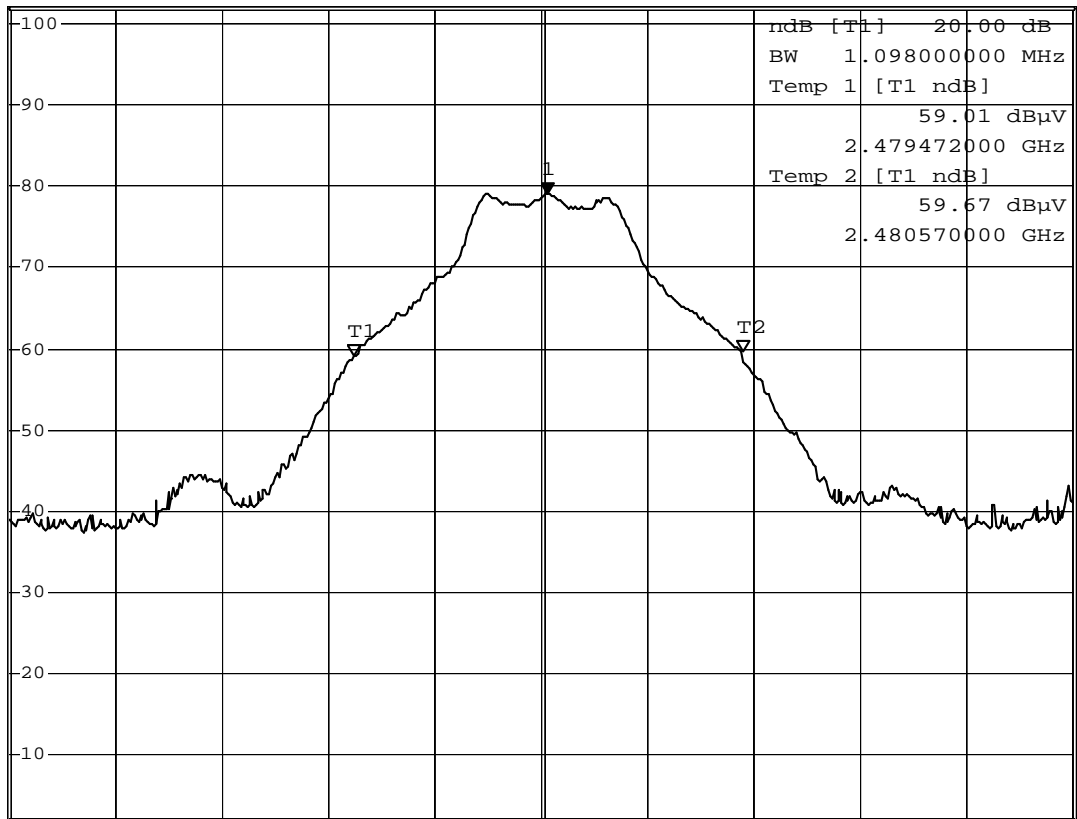
## 20dB Bandwidth of Fundamental Emission (2480MHz) (GFSK)



\*RBW 100 kHz Marker 1 [T1 ]  
 VBW 300 kHz 79.00 dBμV  
 \*Att 30 dB \*SWT 2.5 ms 2.480018000 GHz

Ref 102 dBμV

1 PK  
VIEW



Center 2.48 GHz

300 kHz/

Span 3 MHz

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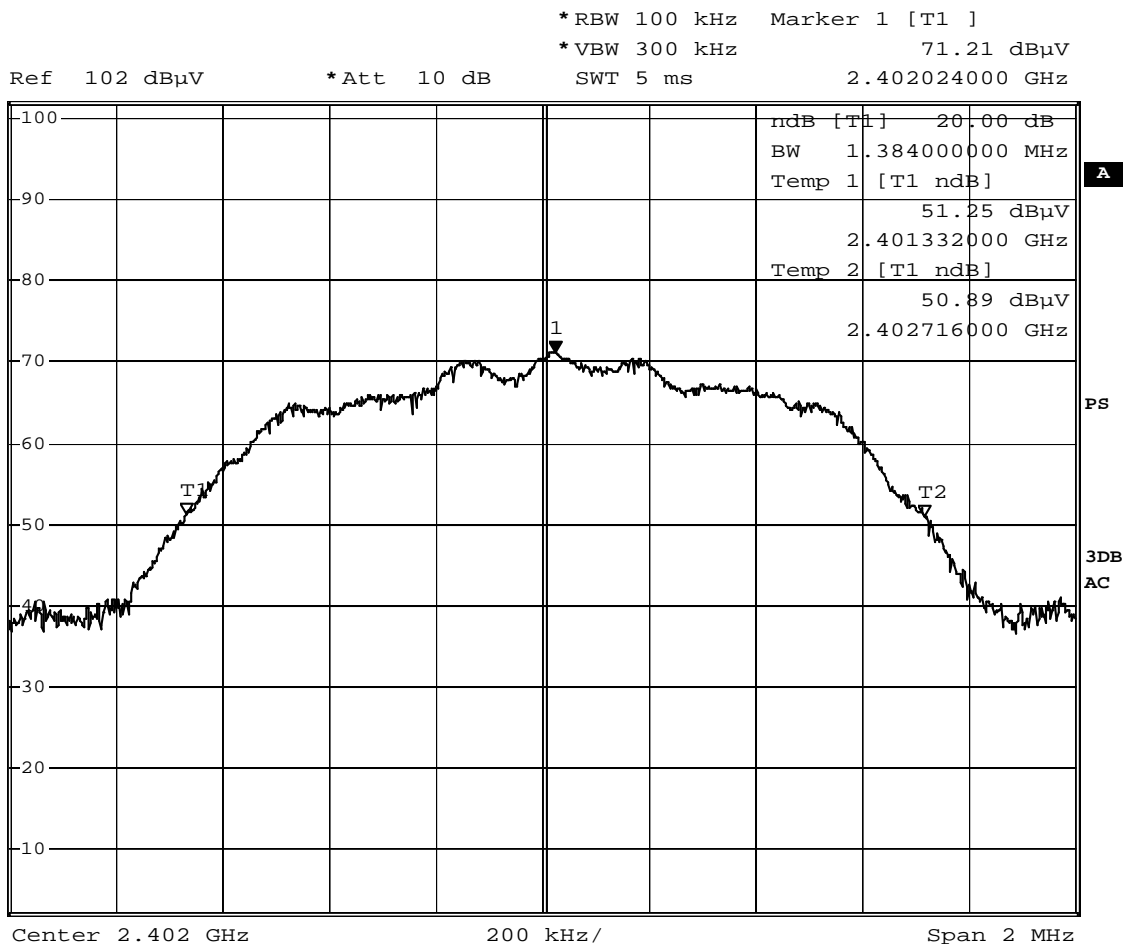
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### Limits for 20dB Spectrum Bandwidth Measurement:

Center Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [kHz]
2402.0	1.384	25.0

### 20dB Bandwidth of Fundamental Emission on 2402MHz ( $\pi/4$ DQPSK)



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## Limits for 20dB Spectrum Bandwidth Measurement:

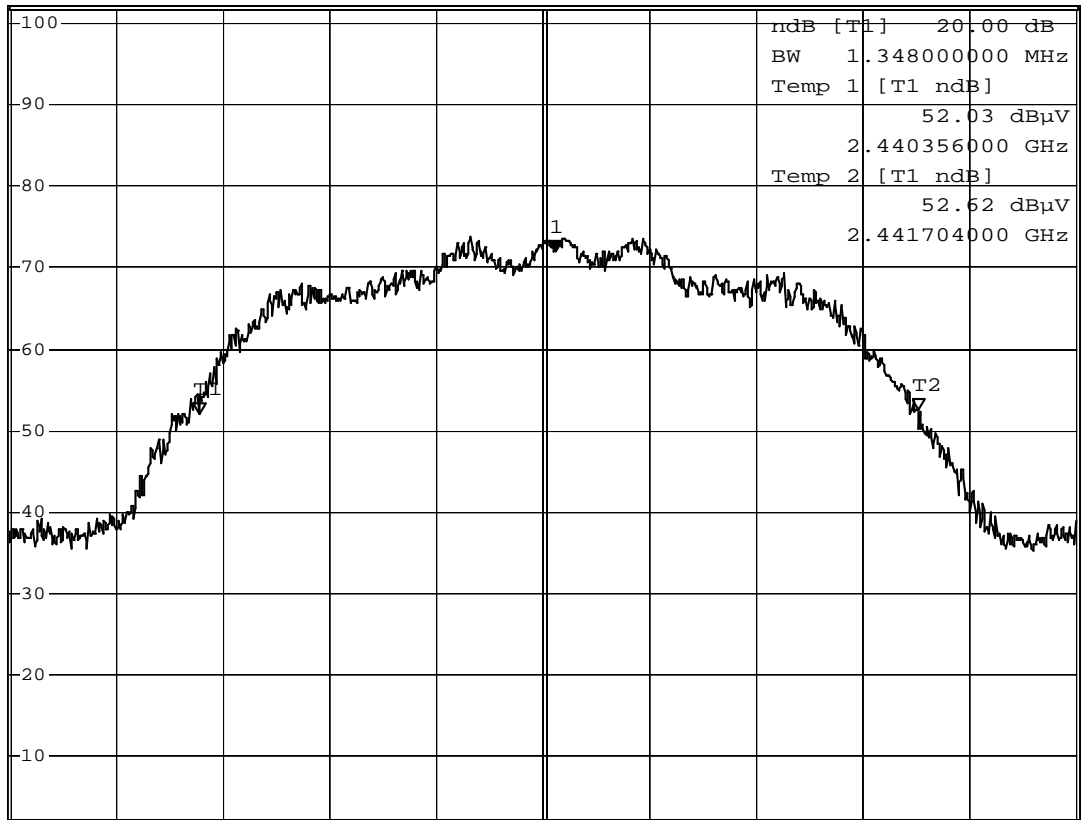
Frequency Range [MHz]	20dB Bandwidth [MHz]	FCC Limits [kHz]
2441.0	1.348	25.0

## 20dB Bandwidth of Fundamental Emission on 2441MHz (8DPSK)



\*RBW 100 kHz Marker 1 [T1 ]  
 \*VBW 300 kHz 72.05 dBμV  
 \*Att 10 dB  
 SWT 5 ms 2.441022000 GHz

Ref 102 dBμV



Center 2.441 GHz

200 kHz/

Span 2 MHz

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## Limits for 20dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	20dB Bandwidth [MHz]	FCC Limits [kHz]
2480.0	1.338	25.0

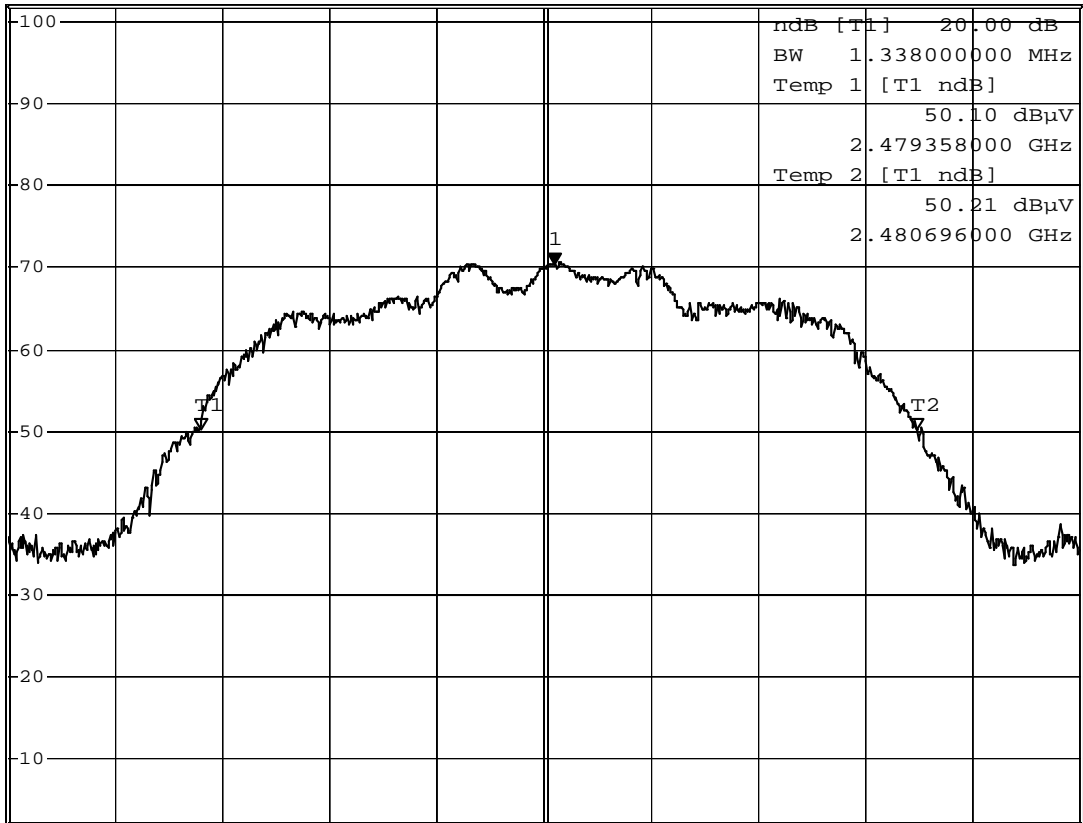
## 20dB Bandwidth of Fundamental Emission on 2480MHz (8DPSK)



\*RBW 100 kHz Marker 1 [T1 ]  
 \*VBW 300 kHz 70.31 dBμV  
 \*Att 10 dB  
 SWT 5 ms 2.480020000 GHz

Ref 102 dBμV

1 PK  
MAXH



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Number of Operating Channel

### Requirements:

Frequency hopping system in the 2400-2483.5MHz band shall use at least 15 non-overlapping channels.

Item	Frequency (MHz)	Item	Frequency (MHz)	Item	Frequency (MHz)
1	2402	31	2432	61	2462
2	2403	32	2433	62	2463
3	2404	33	2434	63	2464
4	2405	34	2435	64	2465
5	2406	35	2436	65	2466
6	2407	36	2437	66	2467
7	2408	37	2438	67	2468
8	2409	38	2439	68	2469
9	2410	39	2440	69	2470
10	2411	40	2441	70	2471
11	2412	41	2442	71	2472
12	2413	42	2443	72	2473
13	2414	43	2444	73	2474
14	2415	44	2445	74	2475
15	2416	45	2446	75	2476
16	2417	46	2447	76	2477
17	2418	47	2448	77	2478
18	2419	48	2449	78	2479
19	2420	49	2450	79	2480
20	2421	50	2451		
21	2422	51	2452		
22	2423	52	2453		
23	2424	53	2454		
24	2425	54	2455		
25	2426	55	2456		
26	2427	56	2457		
27	2428	57	2458		
28	2429	58	2459		
29	2430	59	2460		
30	2431	60	2461		

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## Channel Separation (Lowest) (GFSK)



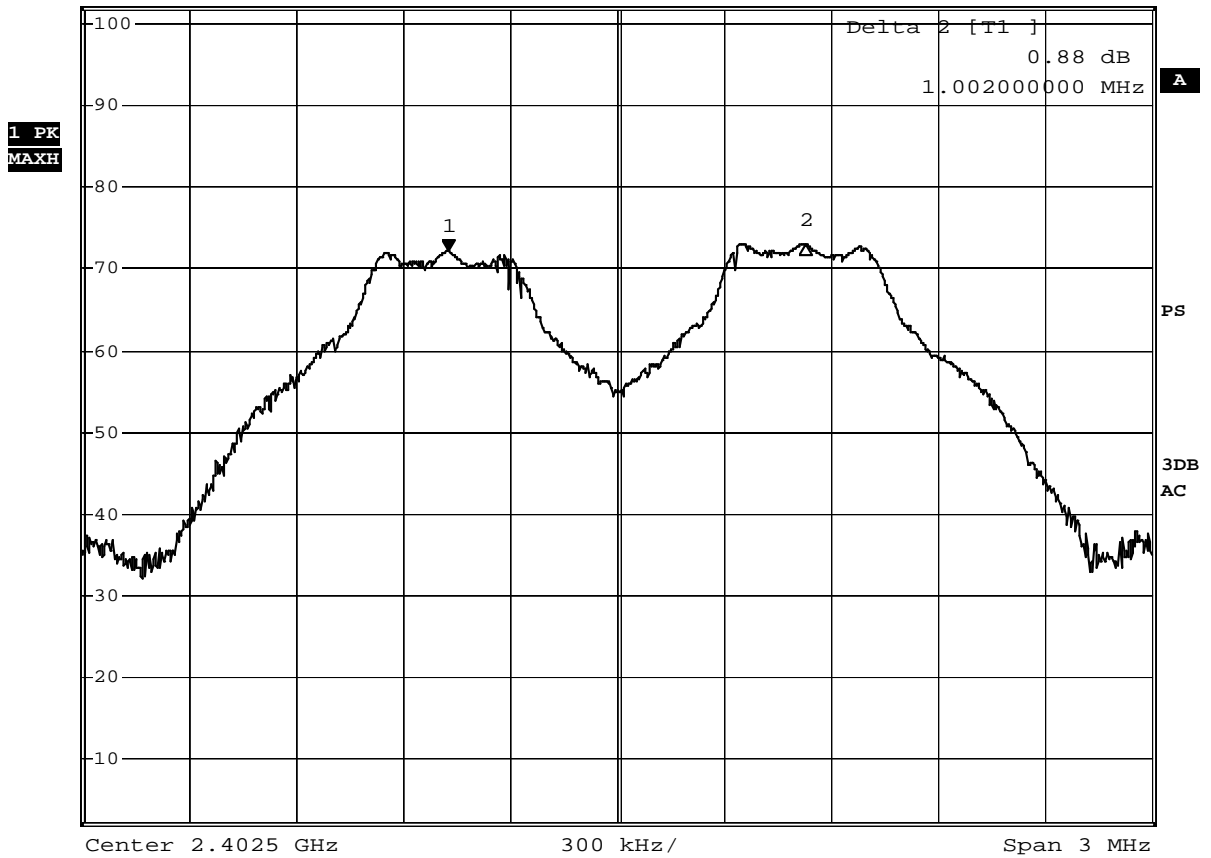
\*RBW 100 kHz Marker 1 [T1 ]  
\*VBW 300 kHz 72.16 dBμV  
SWT 5 ms 2.402026000 GHz

Ref 102 dBμV

\*Att 10 dB

SWT 5 ms

2.402026000 GHz



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## Channel Separation (Mid) (GFSK)



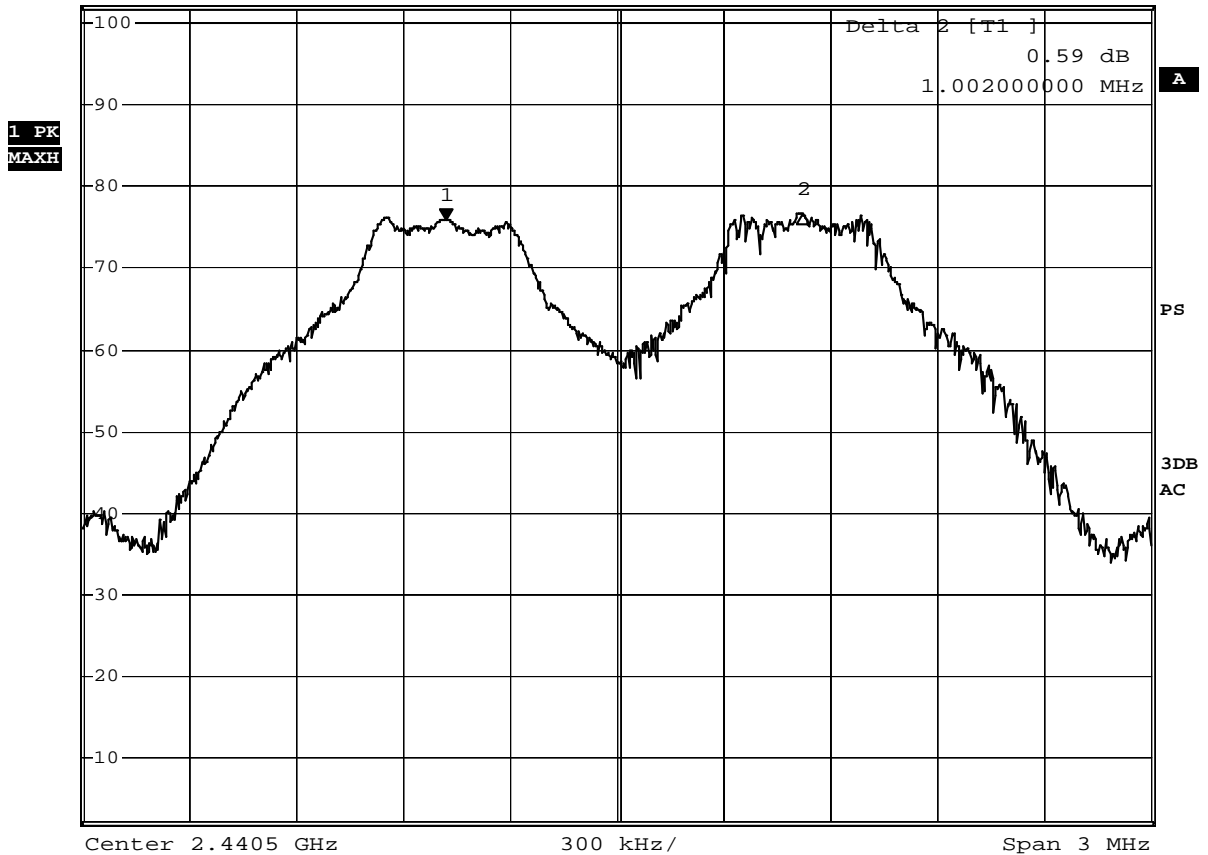
\*RBW 100 kHz Marker 1 [T1 ]  
 \*VBW 300 kHz 75.95 dBμV  
 \*Att 10 dB  
 SWT 5 ms 2.440020000 GHz

Ref 102 dBμV

\*Att 10 dB

SWT 5 ms

2.440020000 GHz



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## Channel Separation (Highest) (GFSK)



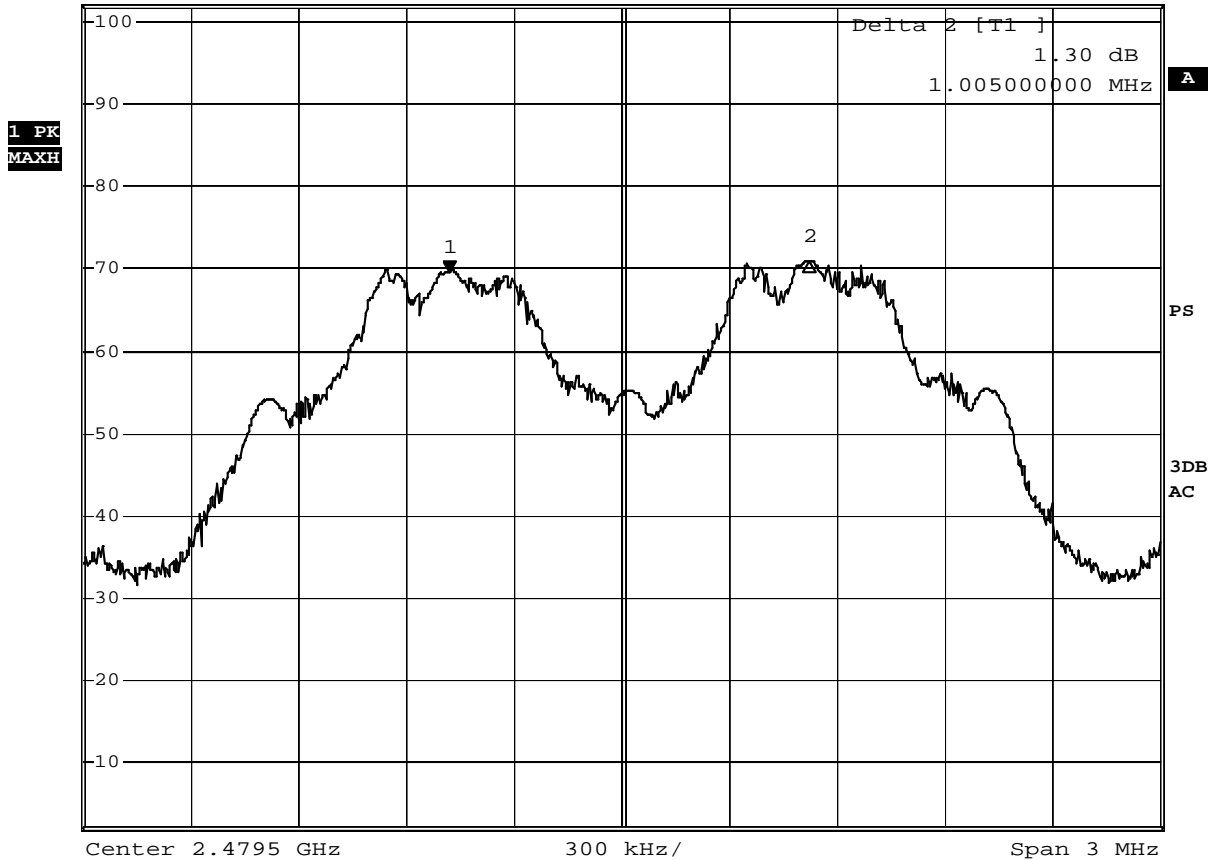
\*RBW 100 kHz Marker 1 [T1 ]  
 \*VBW 300 kHz 69.67 dBμV  
 \*Att 10 dB  
 SWT 5 ms 2.479017000 GHz

Ref 102 dBμV

\*Att 10 dB

SWT 5 ms

2.479017000 GHz



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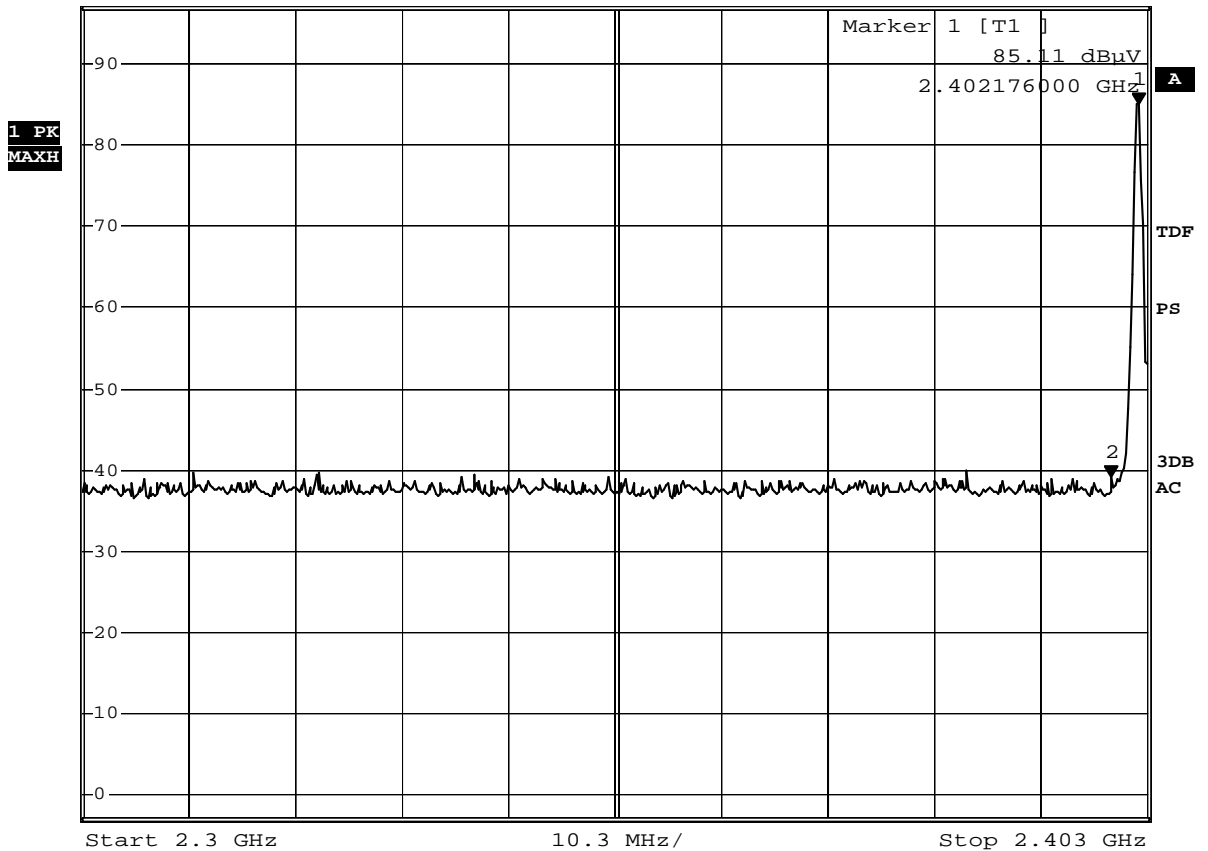
## Band-edge Compliance of RF Emissions – Lowest (GFSK)



\*RBW 100 kHz Marker 2 [T1 ]  
VBW 300 kHz 39.12 dBμV  
SWT 15 ms 2.399498000 GHz

Ref 87 dBμV

\*Att 10 dB



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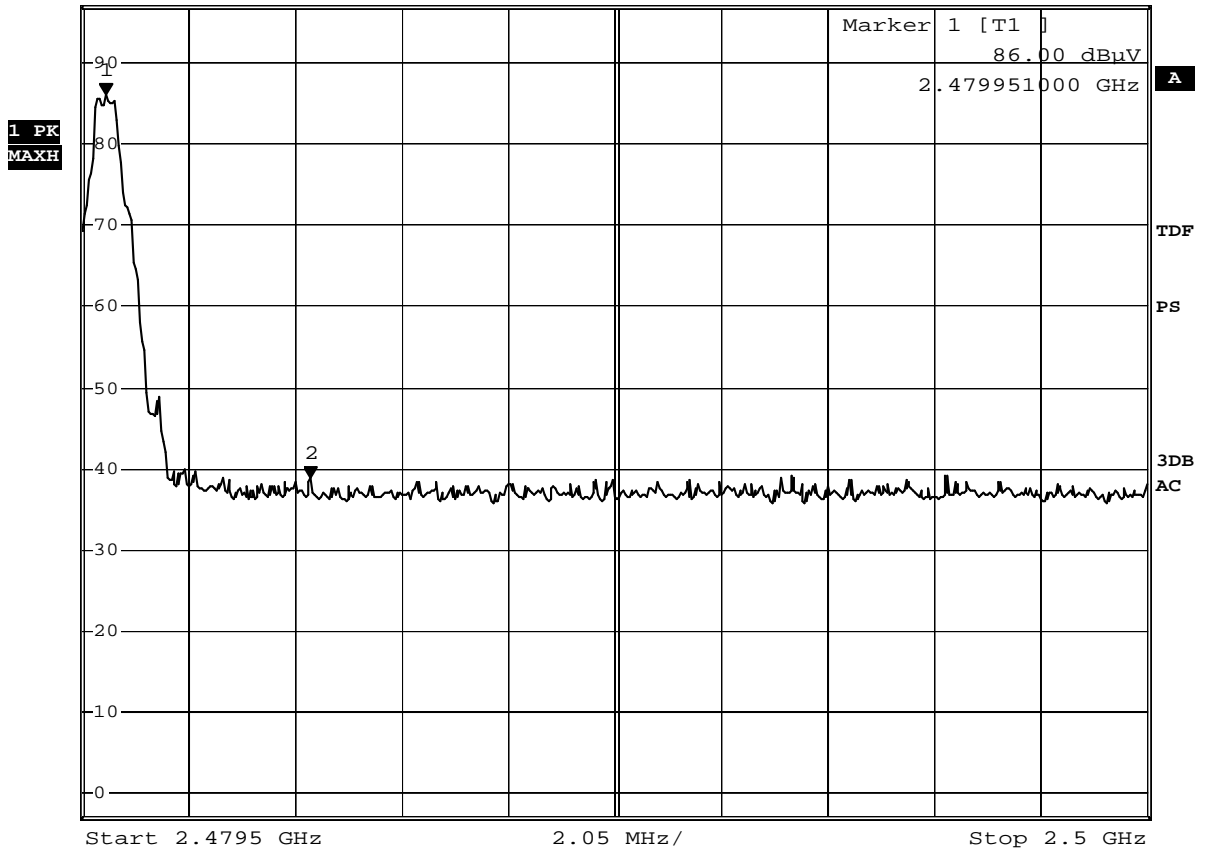
## Band-edge Compliance of RF Emissions - Highest(GFSK)



\*RBW 100 kHz Marker 2 [T1 ]  
VBW 300 kHz 38.77 dBμV  
SWT 2.5 ms 2.483887000 GHz

Ref 87 dBμV

\*Att 10 dB



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## Channel Separation (Lowest) ( $\pi/4$ DQPSK)

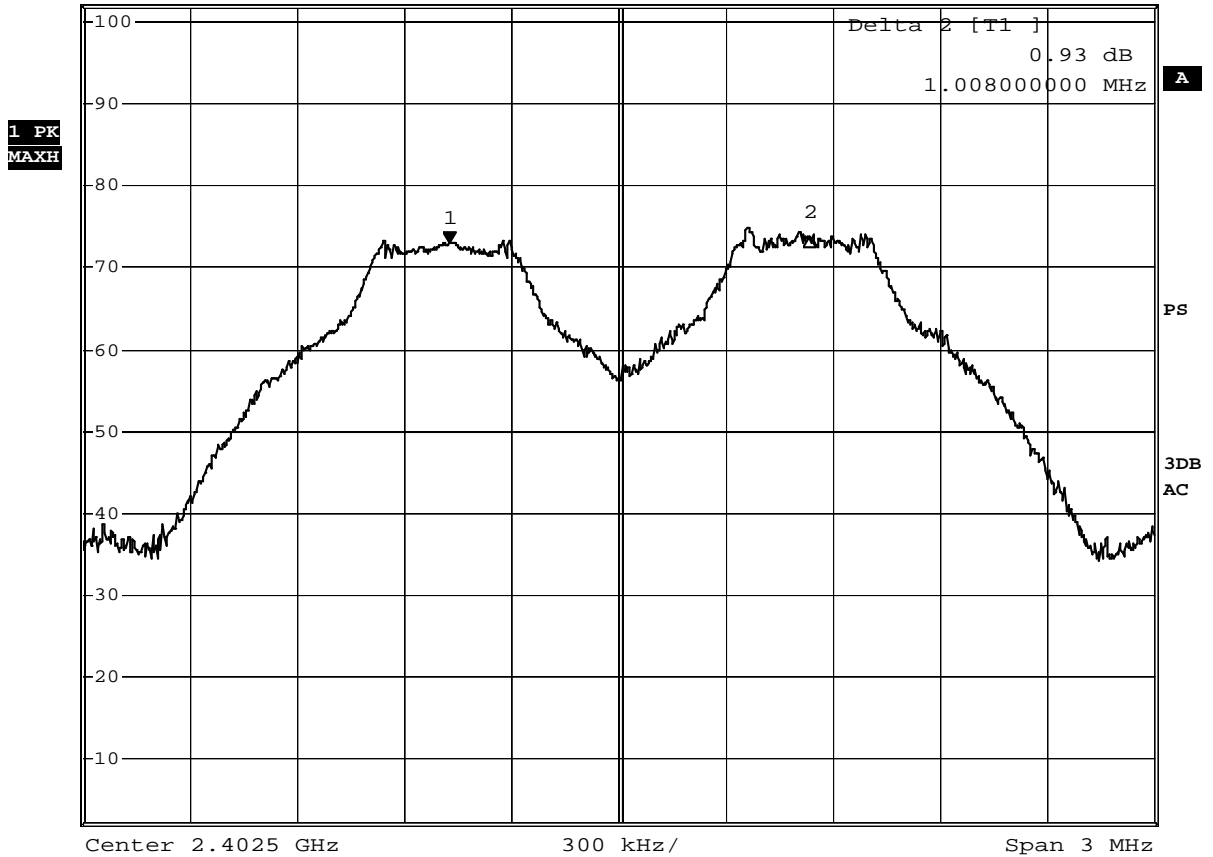


\*RBW 100 kHz Marker 1 [T1 ]  
\*VBW 300 kHz 72.89 dB $\mu$ V  
SWT 5 ms 2.402026000 GHz

Ref 102 dB $\mu$ V

\*Att 10 dB

2.402026000 GHz



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## Channel Separation (Mid) ( $\pi/4$ DQPSK)

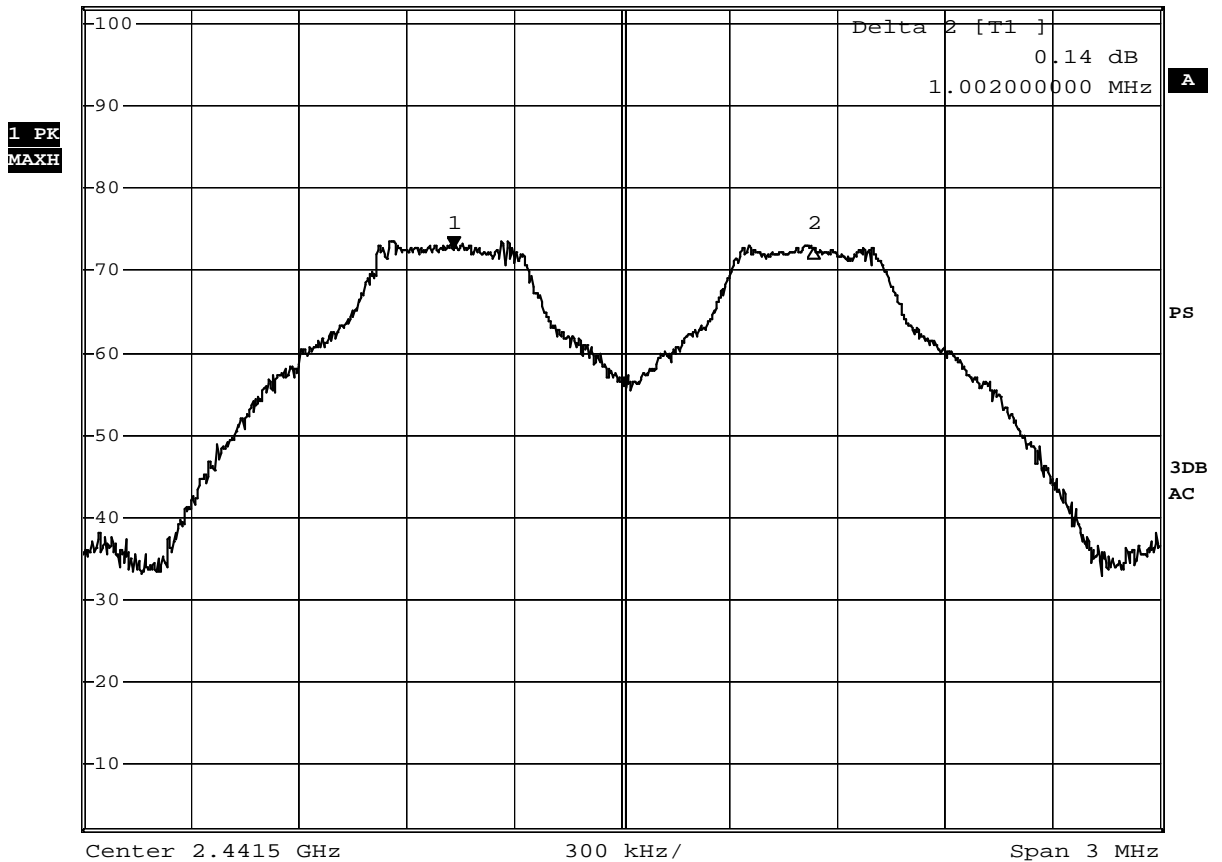


\*RBW 100 kHz Marker 1 [T1 ]  
\*VBW 300 kHz 72.68 dB $\mu$ V  
SWT 5 ms 2.441029000 GHz

Ref 102 dB $\mu$ V

\*Att 10 dB

2.441029000 GHz



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## Channel Separation (Highest) ( $\pi/4$ DQPSK)



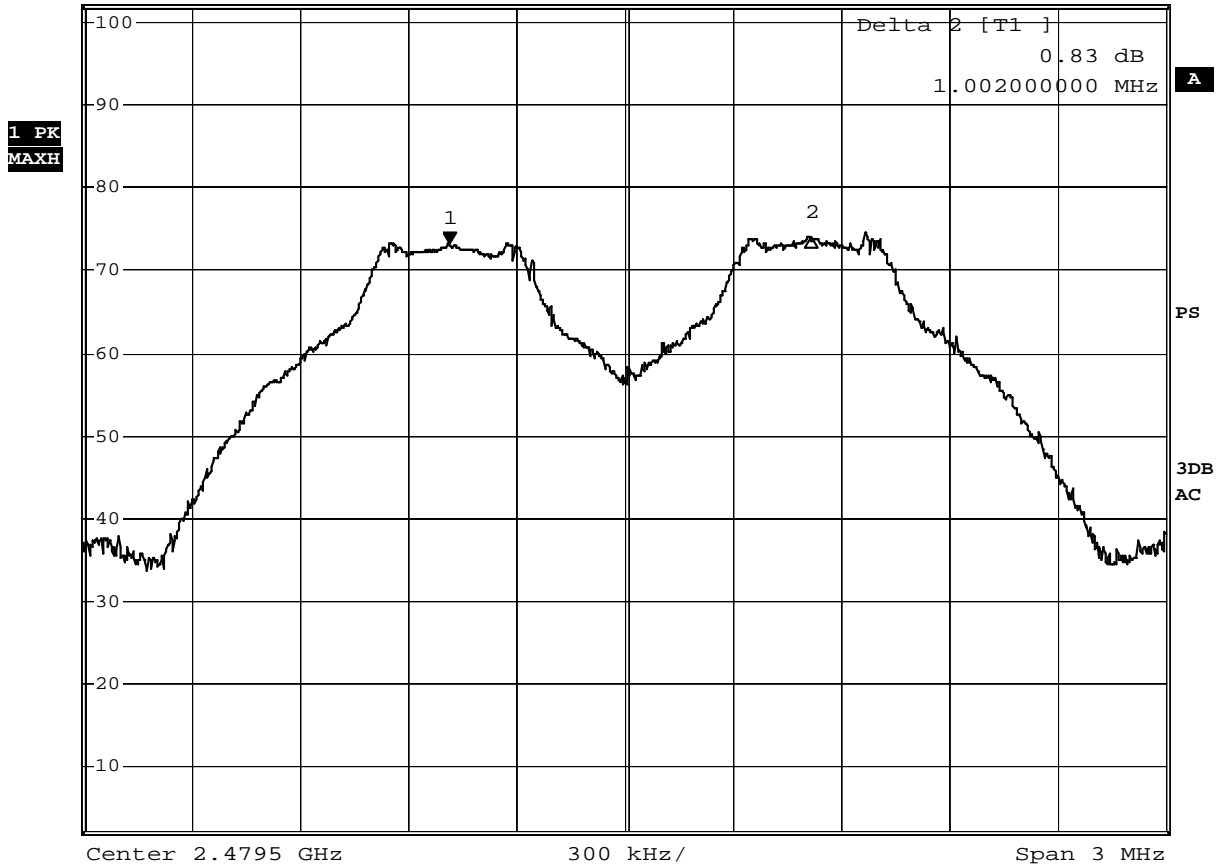
\*RBW 100 kHz Marker 1 [T1 ]  
\*VBW 300 kHz 73.13 dB $\mu$ V  
SWT 5 ms 2.479011000 GHz

Ref 102 dB $\mu$ V

\*Att 10 dB

SWT 5 ms

2.479011000 GHz



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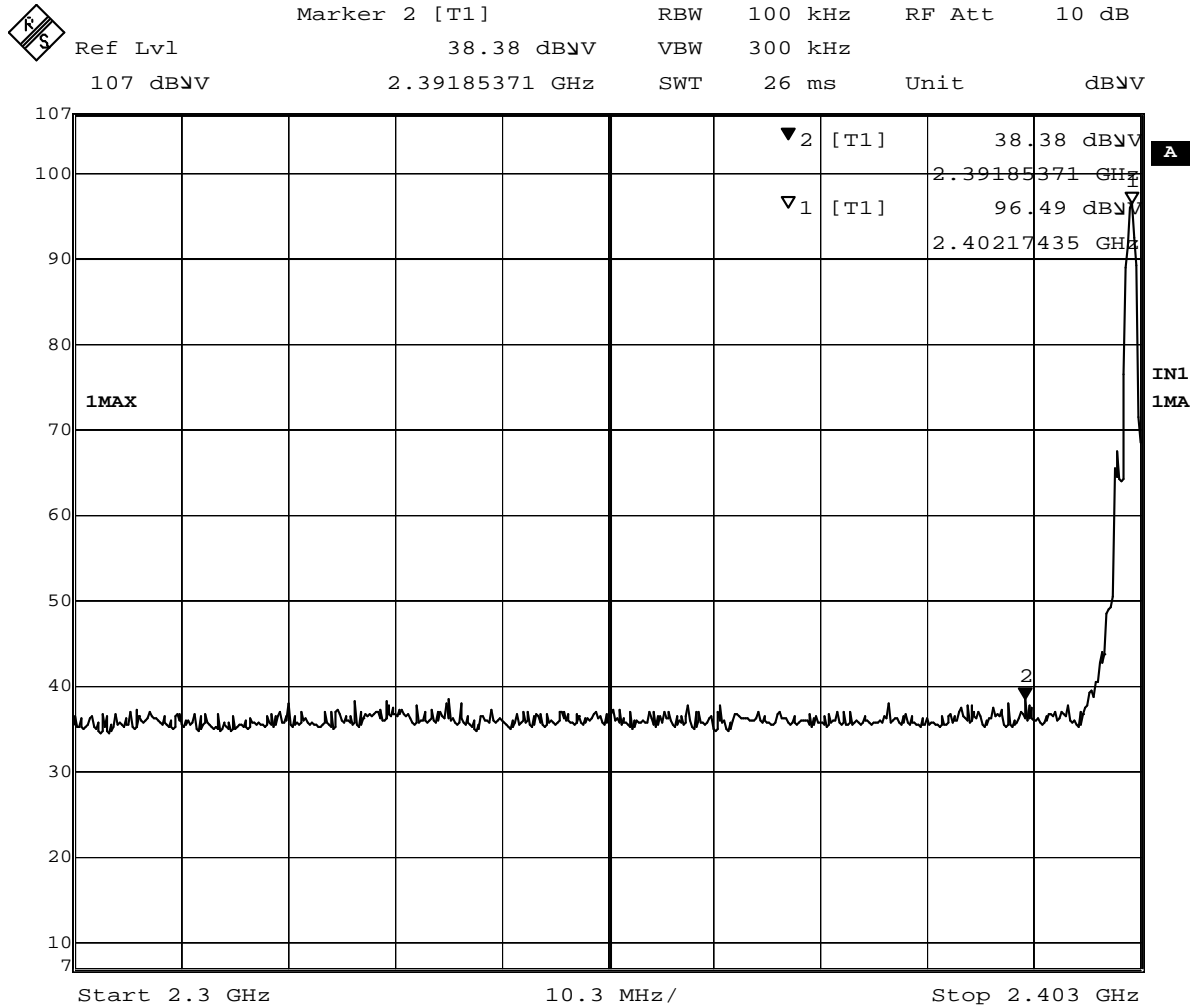
# STC Test Report

Date : 2012-05-03

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No. : DM107777

## Band-edge Compliance of RF Emissions – Lowest ( $\pi/4$ DQPSK)



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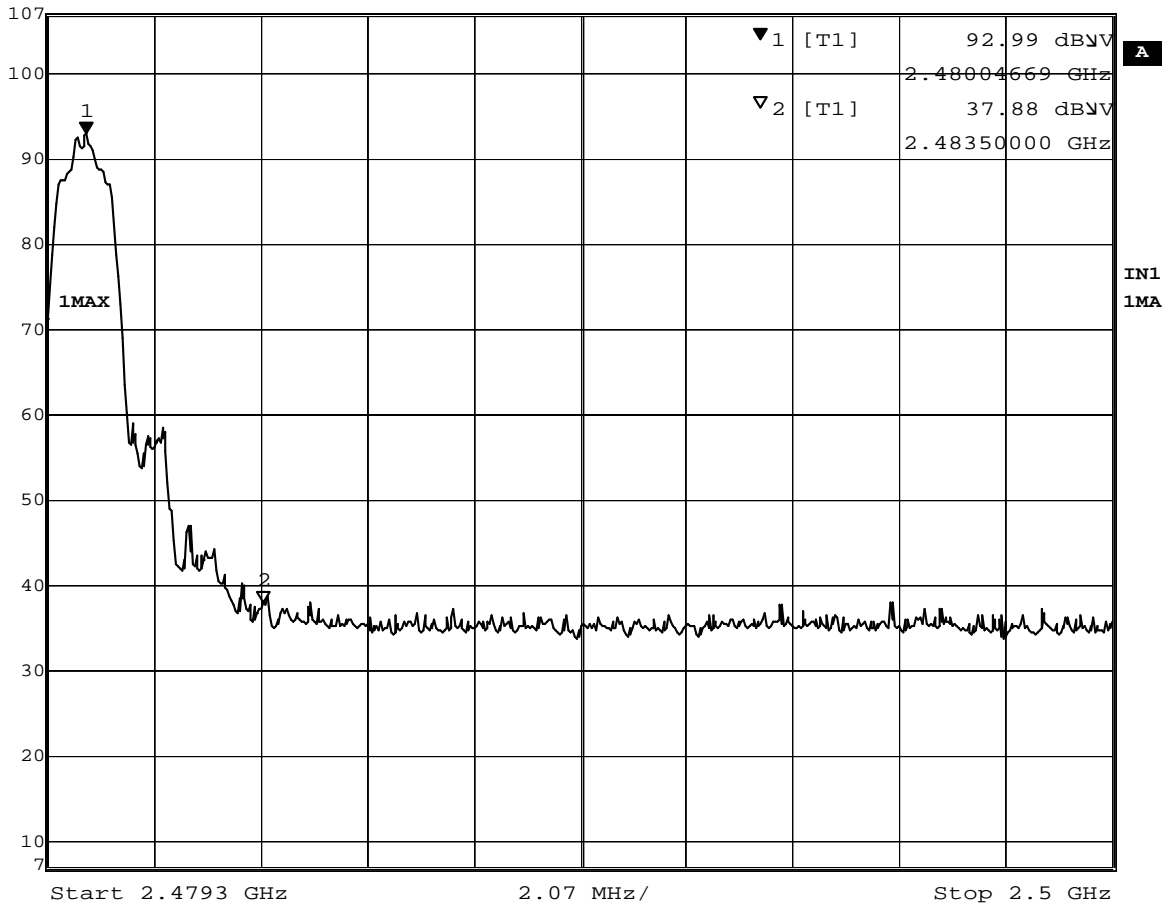
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## Band-edge Compliance of RF Emissions – Highest ( $\pi/4$ DQPSK)



Marker 1 [T1]	RBW	100 kHz	RF Att	10 dB
Ref Lvl	92.99 dB $\mu$ V	VBW	300 kHz	
107 dB $\mu$ V	2.48004669 GHz	SWT	5.5 ms	Unit dB $\mu$ V



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## Channel Separation (Lowest) (8DPSK)



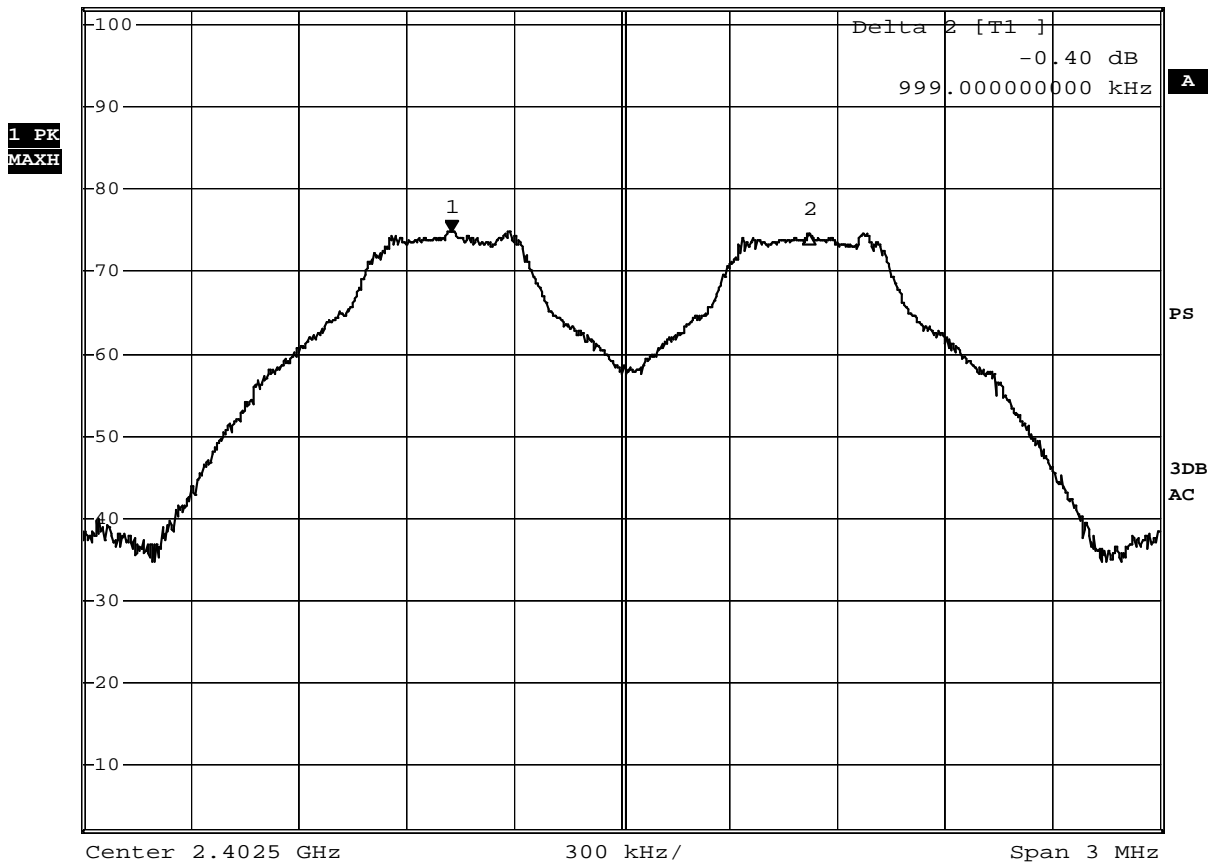
\*RBW 100 kHz Marker 1 [T1 ]  
\*VBW 300 kHz 74.86 dBμV  
SWT 5 ms 2.402023000 GHz

Ref 102 dBμV

\*Att 10 dB

SWT 5 ms

2.402023000 GHz



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## Channel Separation (Mid) (8DPSK)



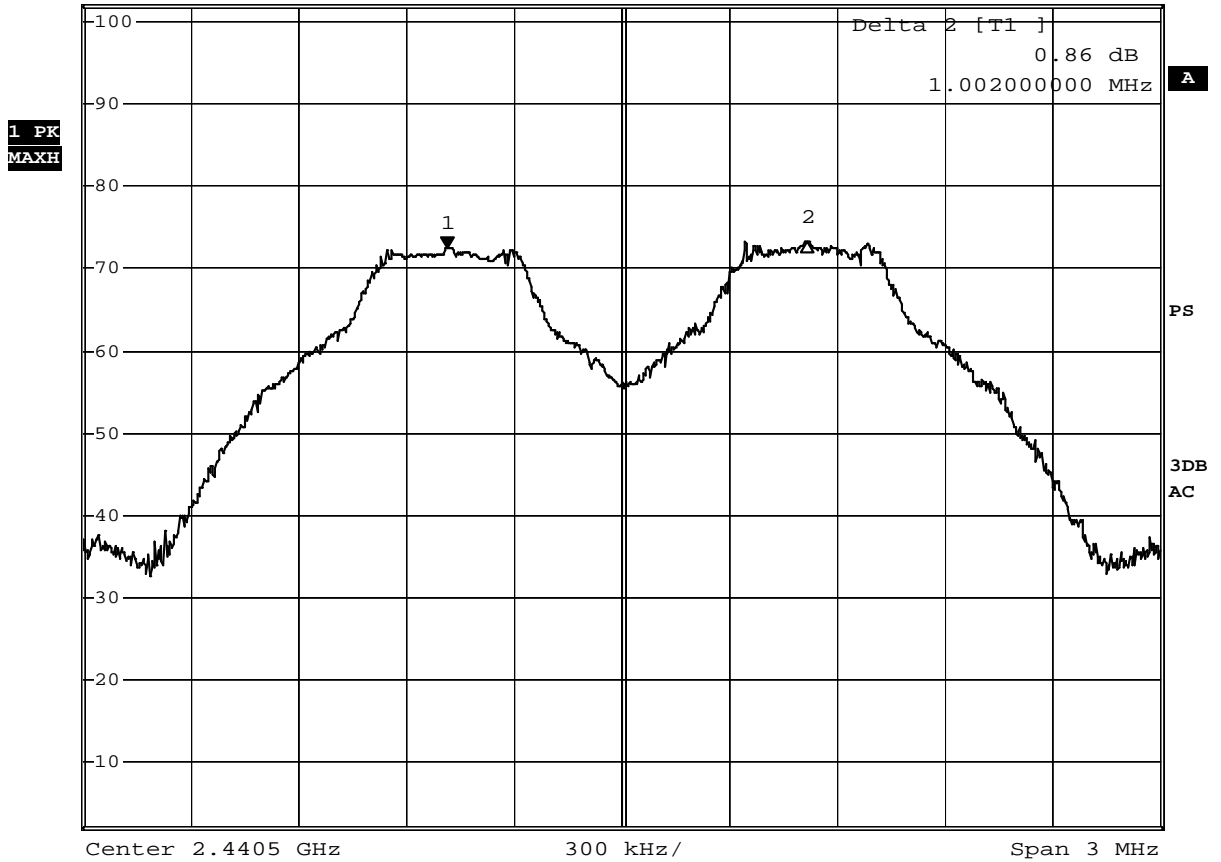
\*RBW 100 kHz    Marker 1 [T1 ]  
 \*VBW 300 kHz                    72.49 dBμV  
 SWT 5 ms                            2.440014000 GHz

Ref 102 dBμV

\*Att 10 dB

SWT 5 ms

2.440014000 GHz



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## Channel Separation (Highest) (8DPSK)



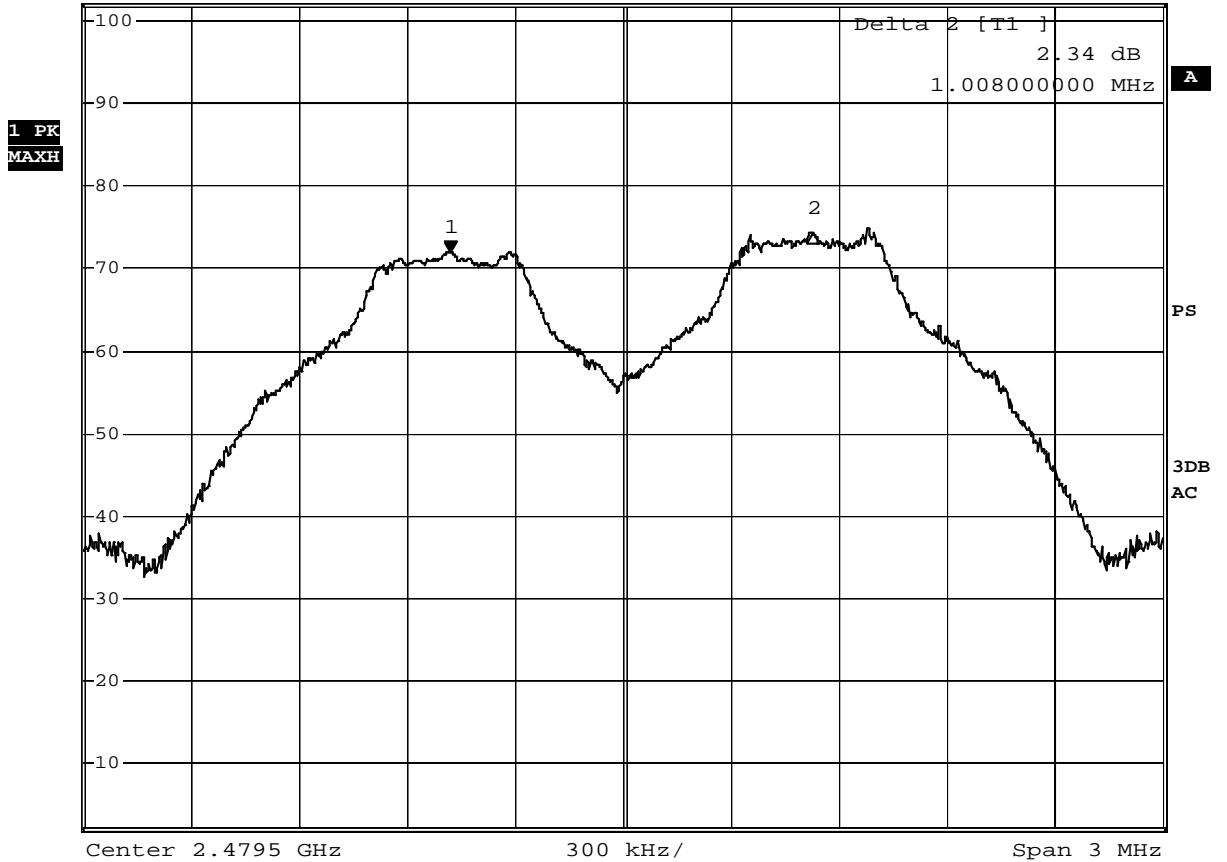
\*RBW 100 kHz Marker 1 [T1 ]  
 \*VBW 300 kHz 71.95 dBμV  
 SWT 5 ms 2.479017000 GHz

Ref 102 dBμV

\*Att 10 dB

SWT 5 ms

2.479017000 GHz



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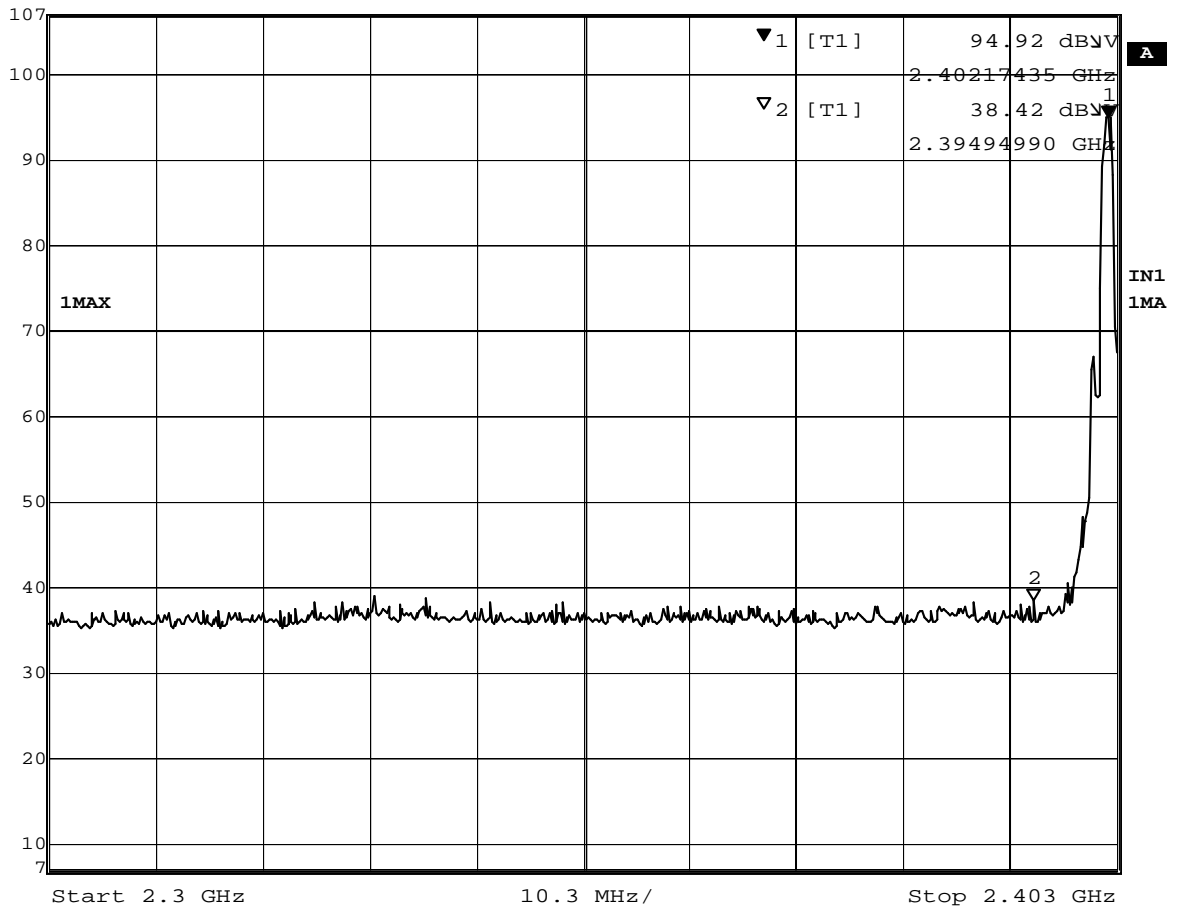
Date : 2012-05-03

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## Band-edge Compliance of RF Emissions – Lowest (8DPSK)

	Marker 1 [T1]	RBW	100 kHz	RF Att	10 dB
	Ref Lvl	94.92 dB $\mu$ V	VBW	300 kHz	
	107 dB $\mu$ V	2.40217435 GHz	SWT	26 ms	Unit dB $\mu$ V



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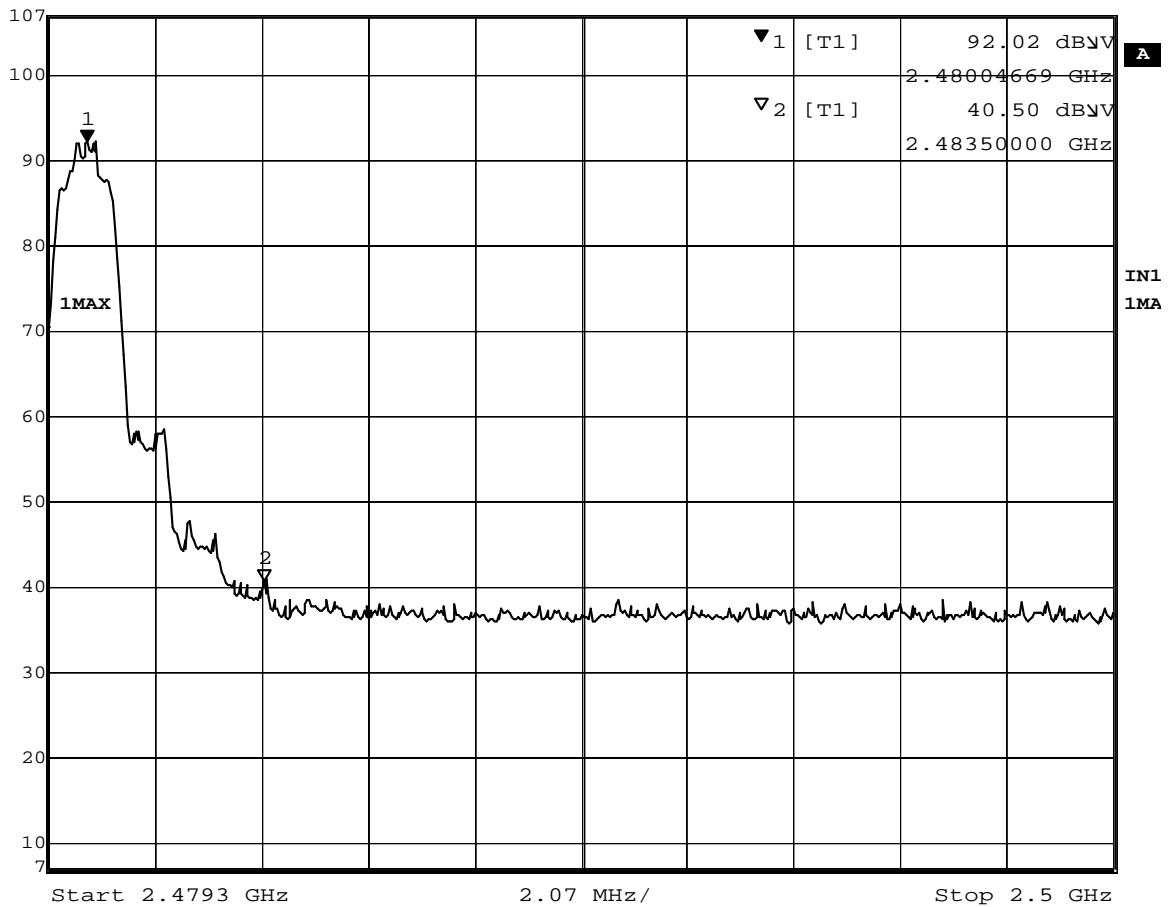
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## Band-edge Compliance of RF Emissions – Highest (8DPSK)

RS	Marker 1 [T1]	RBW	100 kHz	RF Att	10 dB
	Ref Lvl	92.02 dB $\mu$ V	VBW	300 kHz	
	107 dB $\mu$ V	2.48004669 GHz	SWT	5.5 ms	Unit dB $\mu$ V



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## **STC Test Report**

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### **Antenna Requirement**

**Test Requirements: § 15.203**

### **Test Specification:**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### **Test Results:**

The EUT has 1 Antenna which is permanently attached to the main unit and attached on PCB board, the antenna gain = 4.0dBi. All component install on inside of EUT. User unable to remove or changed the Antenna.

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## **STC Test Report**

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### **Pseudorandom Hopping Algorithm**

#### **Requirements:**

The channel frequencies shall be selected from a pseudorandom ordered list of hopping frequencies. Each frequency must be used equally by the transmitter.

#### Pseudorandom Frequency Hopping

The embedded FHSS engine uses 79 hopping frequencies. Each channel frequency is selected from a pseudorandom ordered list of hopping frequencies, from 2402.0MHz to 2480.0MHz with separating in 1000.0 kHz apart from each of the channels. A single data frame is transmitted on each frequency location before skipping to the next hopping frequency in the list. Each channel is occupied 8 milliseconds.

Typically, the initiation of an FHSS communication is as follows

1. The initiating party sends a request via a predefined frequency or control channel.
2. The receiving party sends a number, known as a seed back to the initiating party.
3. The initiating party sends a synchronization signal acknowledging to the receiving party as it has successfully established a transmission link.
4. The communication begins, and both the receiving and the sending party change their frequencies along an unpredictable hopping sequence with pseudorandom properties.

### **System Receiver Input Bandwidth**

The receiver bandwidth is equal to the receiver bandwidth in the 79 hopping channel mode, which is 1180.0 kHz. The receiver bandwidth was verified during RF hopping to the relative channel.

### **Receiver Hopping Capability**

The associated receiver has the ability to shift frequencies in synchronization with the transmitted signals, with they start connect with a same channel and then hop to next channel with a same formula among each other.

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Test Requirement:	FCC 47CFR 15.247(a)(1)
Test Method:	N/A
Test Date:	2012-04-28
Ambient Temperature:	24 °C
Relative Humidity:	58 %
Atmospheric Pressure (kPa):	101

### **Occupancy Time**

#### **Requirements:**

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 channel employed.  
No requirements for Digital Transmission System.

**Measurement Data:** Number of RF channel: 79  
Observed duration of occupancy:  $0.4 \times 79 = 31.6$  s  
Period observed: 2s  
Duration of short burst: 410 $\mu$ s

**Maximum Time of occupancy:**  $(7 \times 0.00291) / 2 \times 31.6 = 0.321846$  s

**See fig. A to F.**

**Remark:** The Occupancy Time of the Lowest, Middle and Highest operating frequency has been examined and the worst case test result is recorded in this test report.

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Fig. A Pulse Train (DH1)



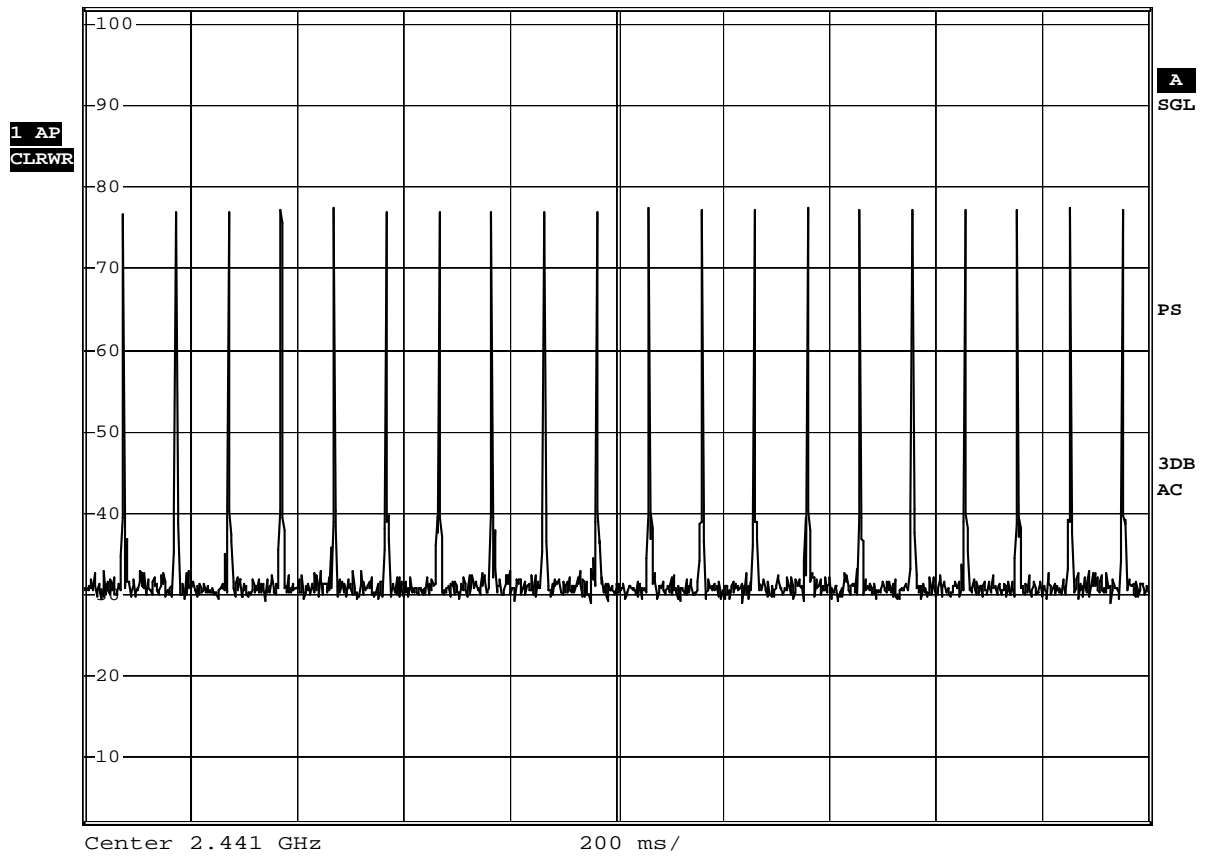
RBW 100 kHz

\*VBW 300 kHz

Ref 102 dB $\mu$ V

\*Att 10 dB

SWT 2 s



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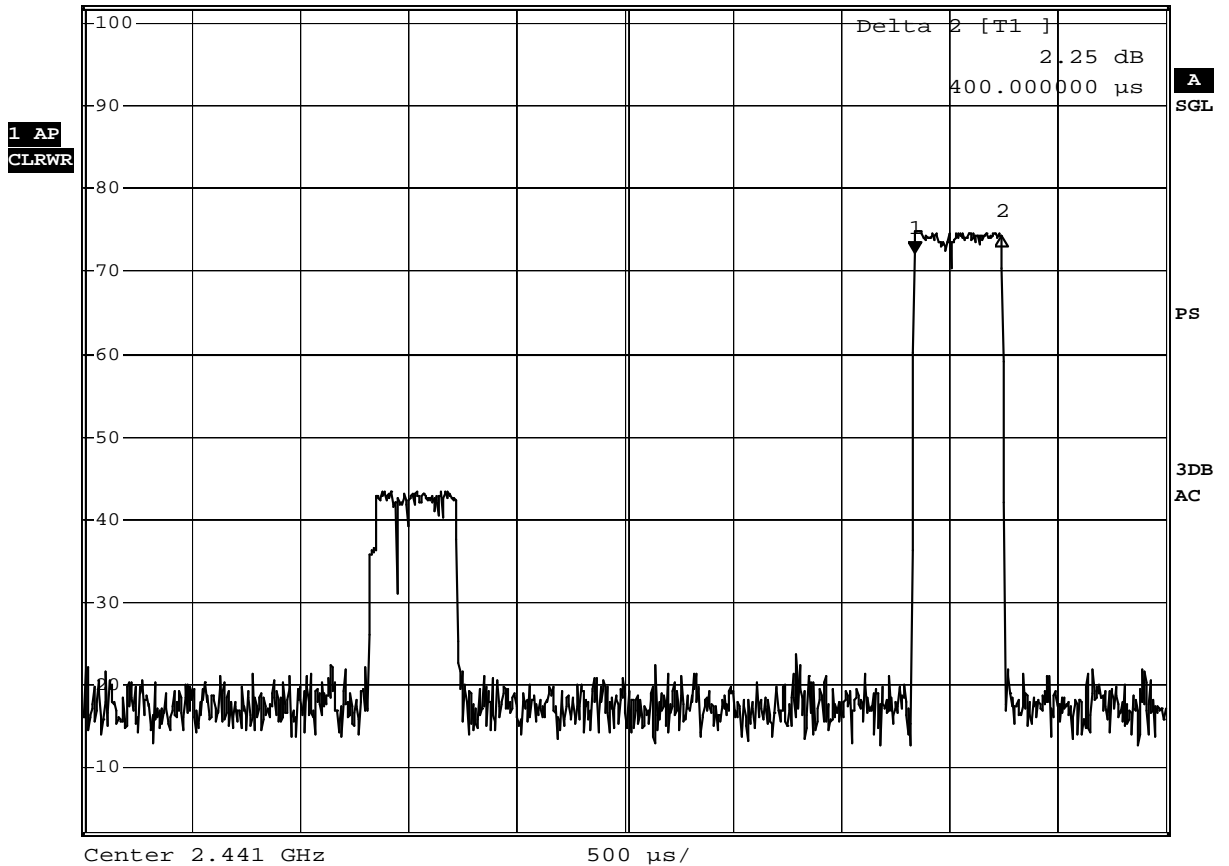
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### Fig B. Single Pulse (DH1)



Ref 102 dB $\mu$ V      \*Att 10 dB      RBW 300 kHz      Marker 1 [T1]      72.13 dB $\mu$ V  
 SWT 5 ms      3.840000 ms      \*VBW 300 kHz



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Fig. C Pulse Train (DH3)



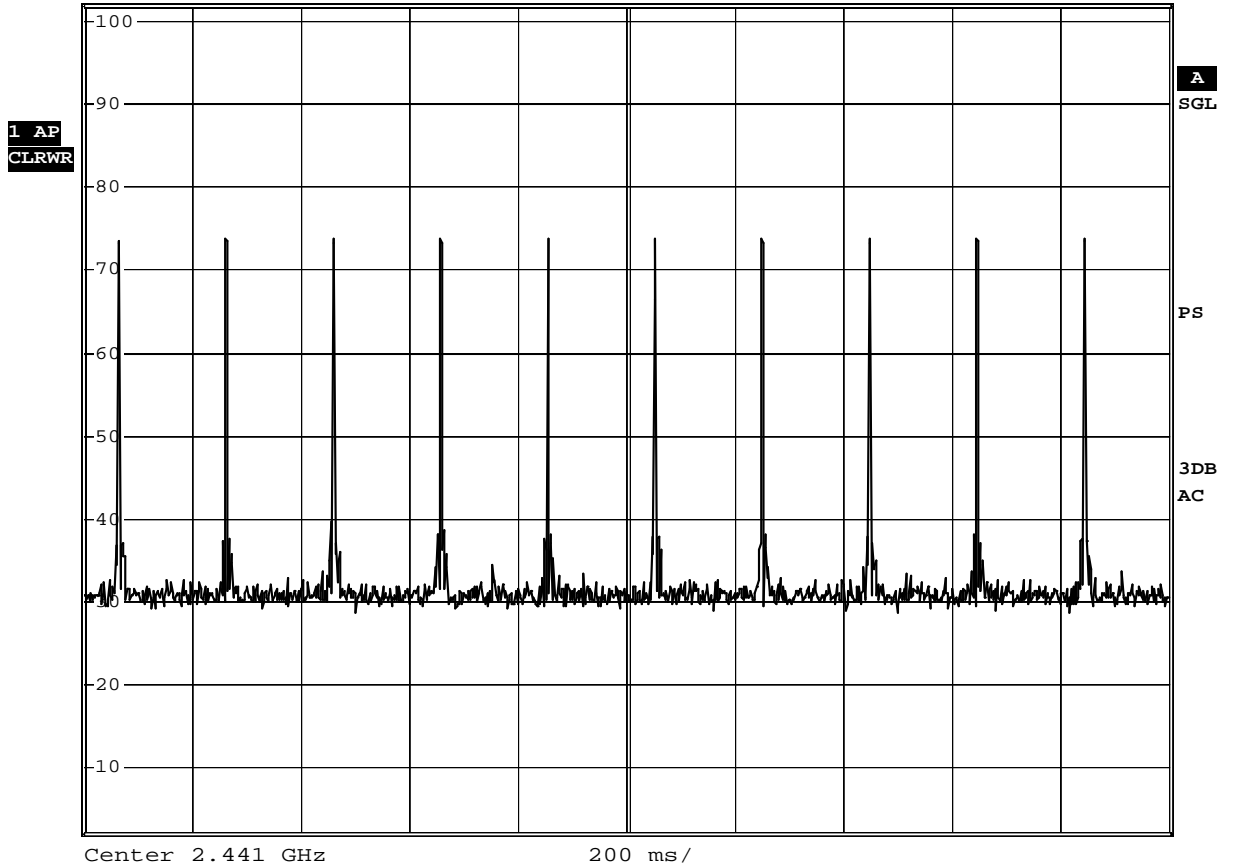
RBW 100 kHz

\*VBW 300 kHz

Ref 102 dB $\mu$ V

\*Att 10 dB

SWT 2 s



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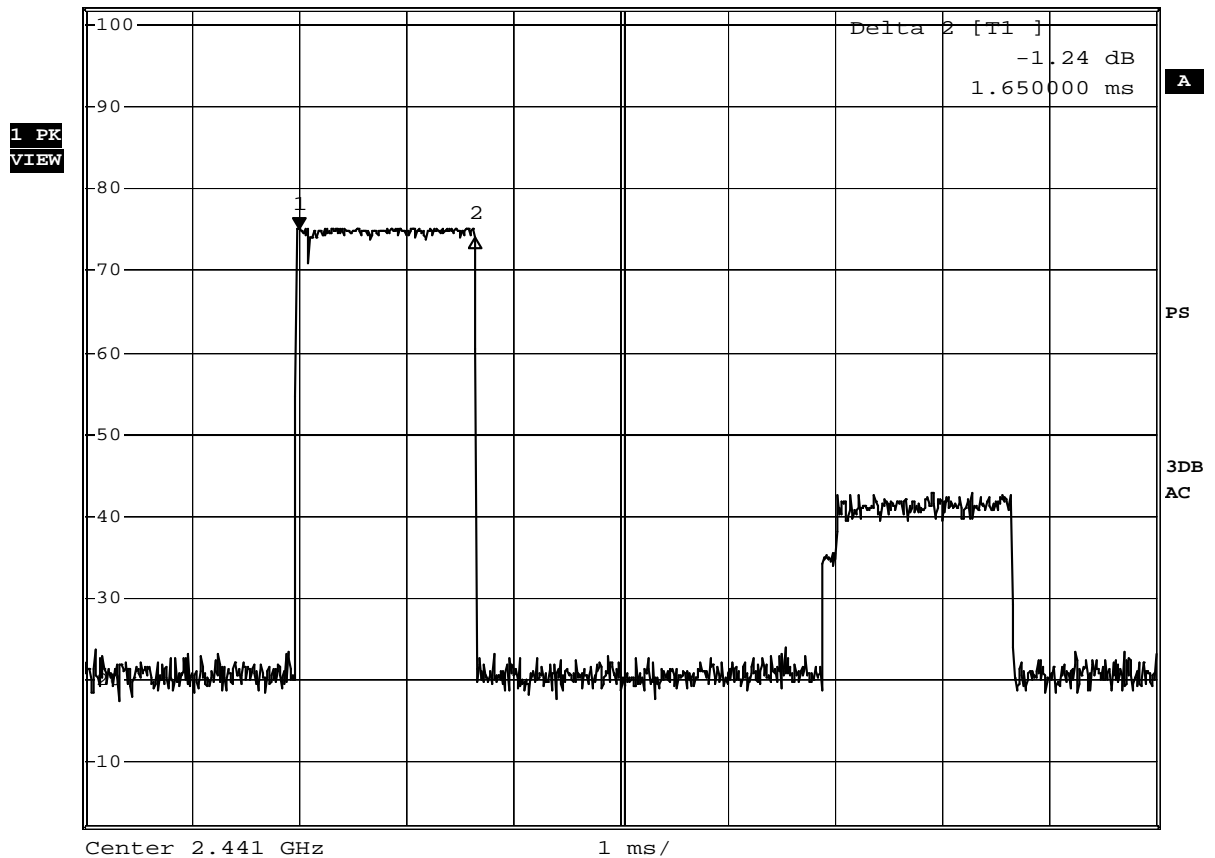
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Fig D. Single Pulse (DH3)



Ref 102 dB $\mu$ V      \*Att 10 dB      RBW 300 kHz      Marker 1 [T1]      75.21 dB $\mu$ V  
SWT 10 ms      1.990000 ms



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Fig. E Pulse Train (DH5)



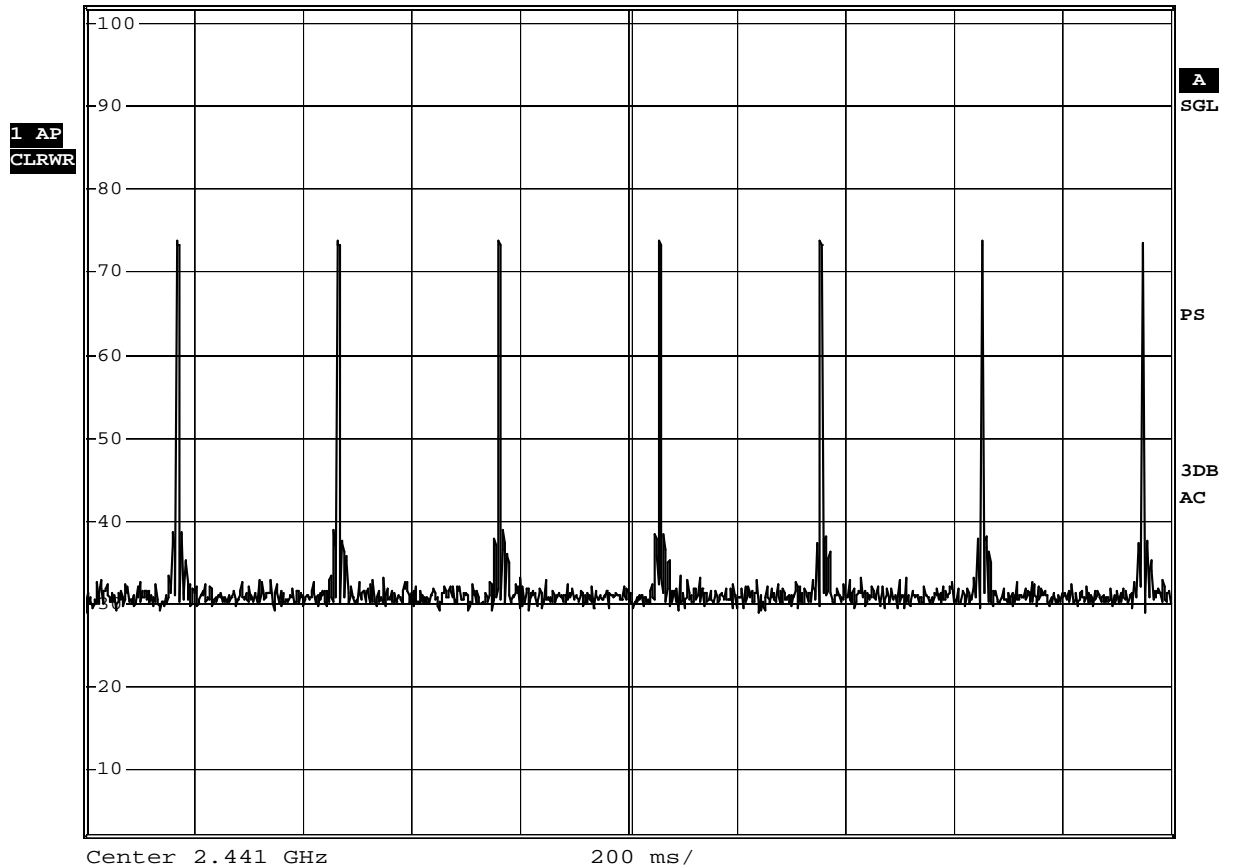
RBW 100 kHz

\*VBW 300 kHz

Ref 102 dB $\mu$ V

\*Att 10 dB

SWT 2 s



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Fig F. Single Pulse (DH5)



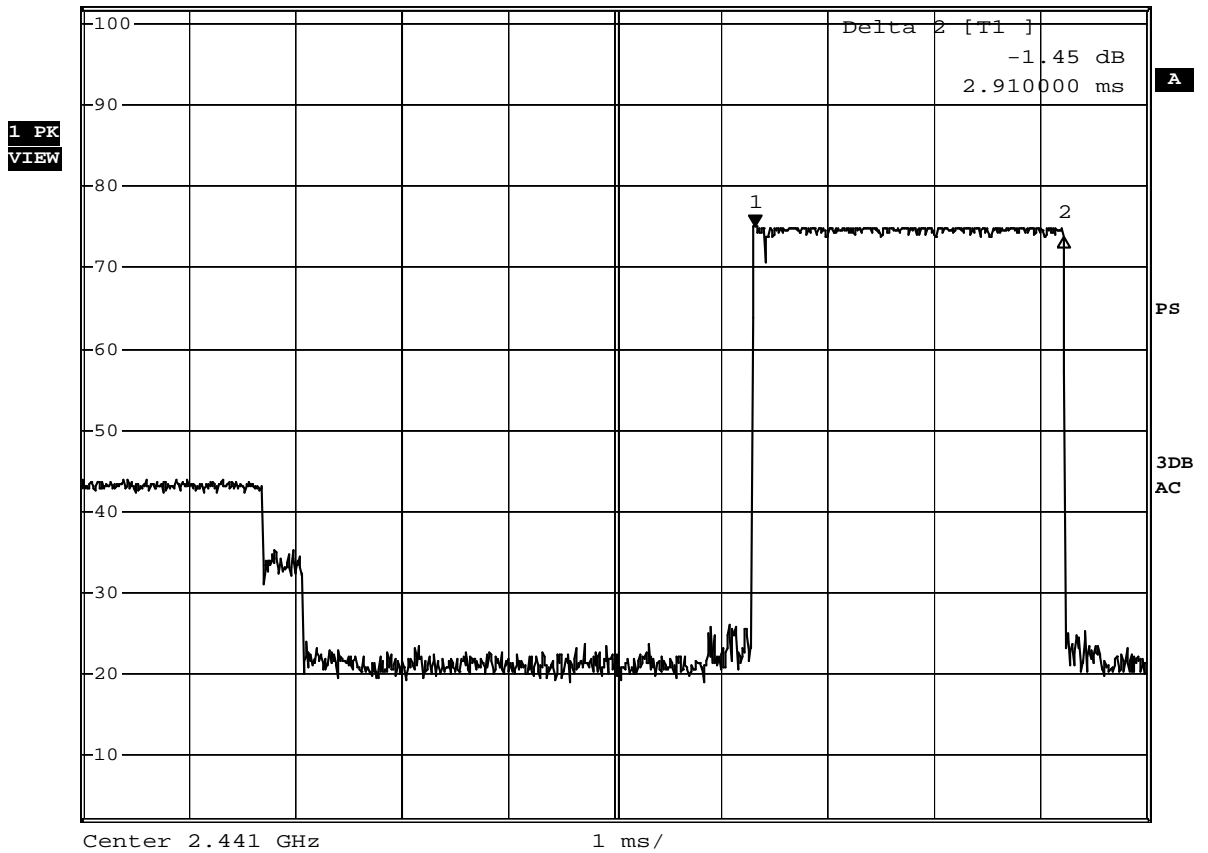
RBW 300 kHz Marker 1 [T1 ]  
\*VBW 300 kHz 75.11 dBμV  
SWT 10 ms 6.310000 ms

Ref 102 dBμV

\*Att 10 dB

SWT 10 ms

6.310000 ms



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## STC Test Report

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### **RF Exposure**

Test Requirement:	FCC 47CFR 15.247(i)
Test Date:	2012-04-28
Ambient Temperature:	25 °C
Relative Humidity:	59 %
Atmospheric Pressure (kPa):	101
Mode of Operation:	Tx mode

### **Test Method:**

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

### **Test Results:**

The EUT complied with the requirement(s) of this section.  
EUT meets the requirements of these sections as proven through MPE calculation  
The MPE calculation for EUT @ 20cm  
Based on the highest P =1.48 mW

$$\begin{aligned} P_d &= PG / 4\pi R^2 = (1.48 \times 2.512) / 12.566 \times (20)^2 \\ &= (3.718) / 12.566 \times 400 = 3.718 / 5026.4 \\ &= 0.00074 \text{ mW/cm}^2 \end{aligned}$$

where:

- \*Pd = power density in mW/cm<sup>2</sup>
- \* G = Antenna numeric gain (2.512); Log G = g/10 ( g = 4.0 dBi ).
- \* P = Conducted RF power to antenna (1.48 mW).
- \* R = Minimum allowable distance.(20 cm)

- \*The power density Pd = 0.00074 mW/cm<sup>2</sup> is less than 1 mW/cm<sup>2</sup> (listed MPE limit)
- \*The SAR evaluation is not needed ( this is a desk top device, R> 20 cm )
- \* The EUT( antenna ) must be 0.2 meters away from the General Population.

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### Appendix A

#### List of Measurement Equipment

##### Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EMD015	Signal Generator	MARCONI INSTRUMENTS	2030	112191/012	2012.03.09	2013.03.09
EMD036	EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	100388	2011.09.07	2012.09.07
EMD061	Biconilog Antenna	ETS.LINDGREN	3142C	00060439	2010.11.20	2012.11.20
EMD062	Double-Ridged Waveguide	ETS.LINDGREN	3117	00075933	2011.11.20	2012.11.20
EMD084	MULTI-DVICE CONTROLLER	ETS.LINDGREN	2090	00060107	N/A	N/A
EMD088	Video Contol Unit	ETS.LINDGREN	Y21953A	2601073	N/A	N/A
EMD093	Monitor	ViewSonic	VA9036	Q8X064201876	N/A	N/A
EMD102	Intelligent Frequency	Ainuo Instrument Co., Ltd	AN97005SS	79707454	N/A	N/A
EMD105	FACT-3 EMC Chamber	ETS.LINDGREN	FACT-3	3803	N/A	N/A
EMD130	Horn Antenna	Chengdu AINFO Inc.	JXTXLB-10180-SF	J2031090903006	2011.08.21	2012.08.21

##### Conducted Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EMD003	IMPULSEGREINZER PULSE LIMITER	ROHDE & SCHWARZ	ESH3-Z2	100071	2012.03.09	2013.03.09
EMD004	ZWEILEITER-V-NETZNACHBILDUNG TWO-LINE V-NETWORK	ROHDE & SCHWARZ	ESH3-Z5	100102	2012.03.09	2013.03.09
EMD036	EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	100388	2011.09.07	2012.09.07
EMD103	Intelligent Frequency	Ainuo Instrument Co., Ltd	AN97005SS	79707455	N/A	N/A
EMD106	Shielding Room #1	ETS.LINDGREN	RFD-100	3802	N/A	N/A

Remarks:-

CM Corrective Maintenance  
N/A Not Applicable or Not Available

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### **Appendix B**

#### **Ancillary Equipment**

ITEM NO.	DESCRIPTION	MODEL NO.	FCC ID	REMARK
1	DELL COMPUTER	DMC	N/A	N/A
2	DELL MONITOR	E551C	ARSCM356N	RESOLUTION:800x600(DURING TESTING) 1.0M UNSHIEDED POWER CORD CONNECTED TO THE COMPUTER 2.8M SHIELDED CABLE CONNECTED TO THE COMPUTER
3	DELL KEYBOARD	SK-8110	N/A	1.8M SHIELDED COILED CABLE CONNECTED TO THE COMPUTER
4	DELL MOUSE	N/A	N/A	2.4M UNSHIELDED CABLE CONNECTED TO THE COMPUTER
5	LASER PRINTER	HP LaserJet 1020 Plus	N/A	1.8M UNSHIELDED POWER CORD 2.8M SHIELDED CABLE (BUNDLED TO 1M) CONNECTED TO THE COMPUTER

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### Appendix C

#### Photographs of EUT

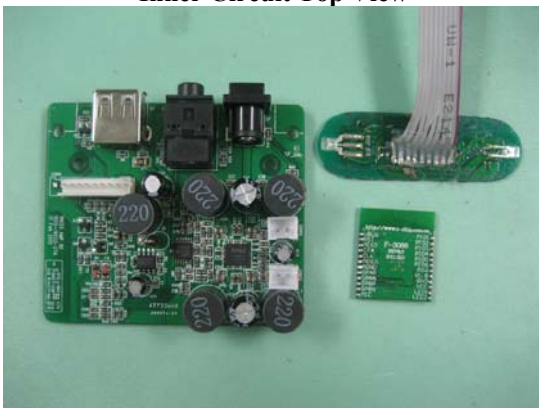
Front View of the product



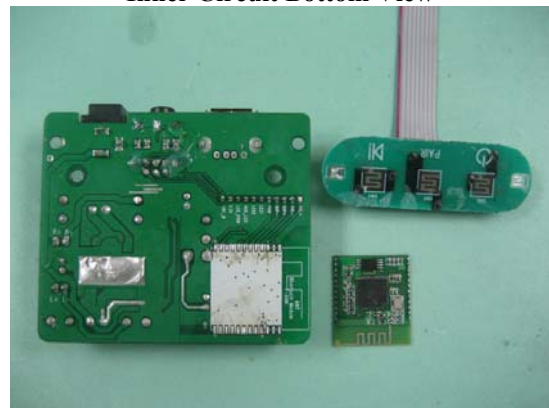
Rear View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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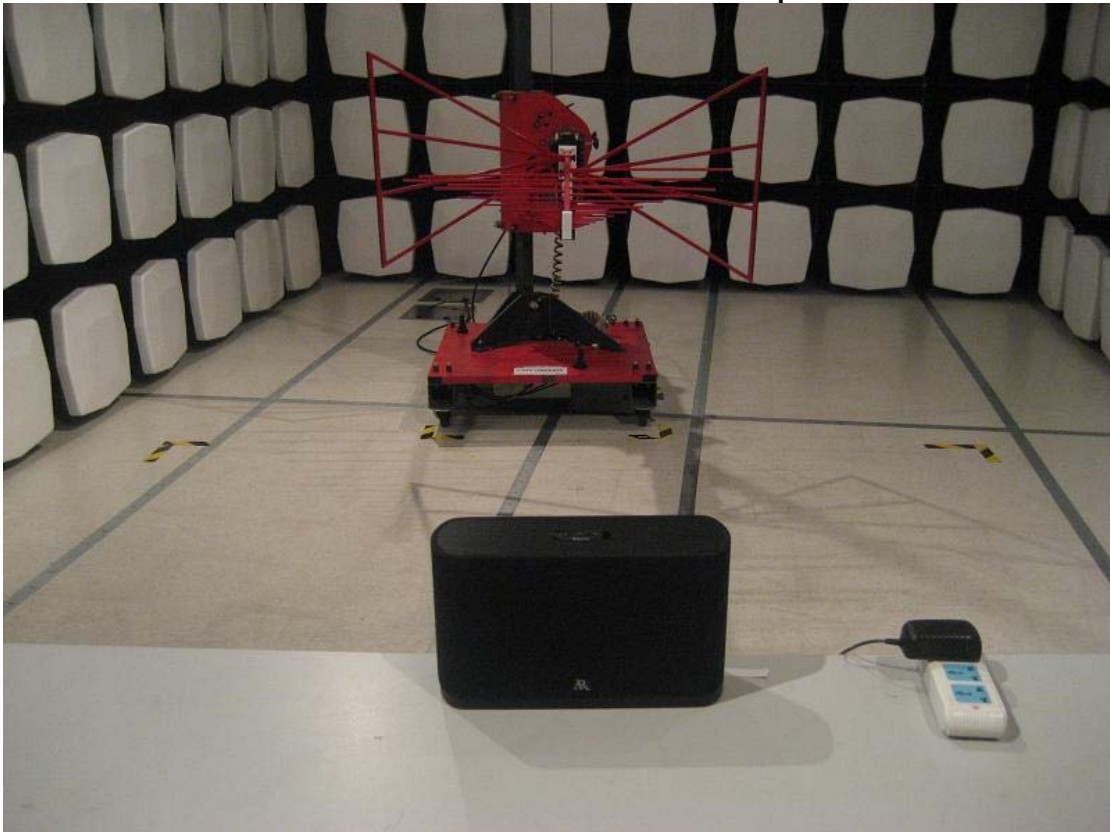
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### **Photographs of EUT**

**Measurement of Radiated Emission Test Set Up**



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## **STC Test Report**

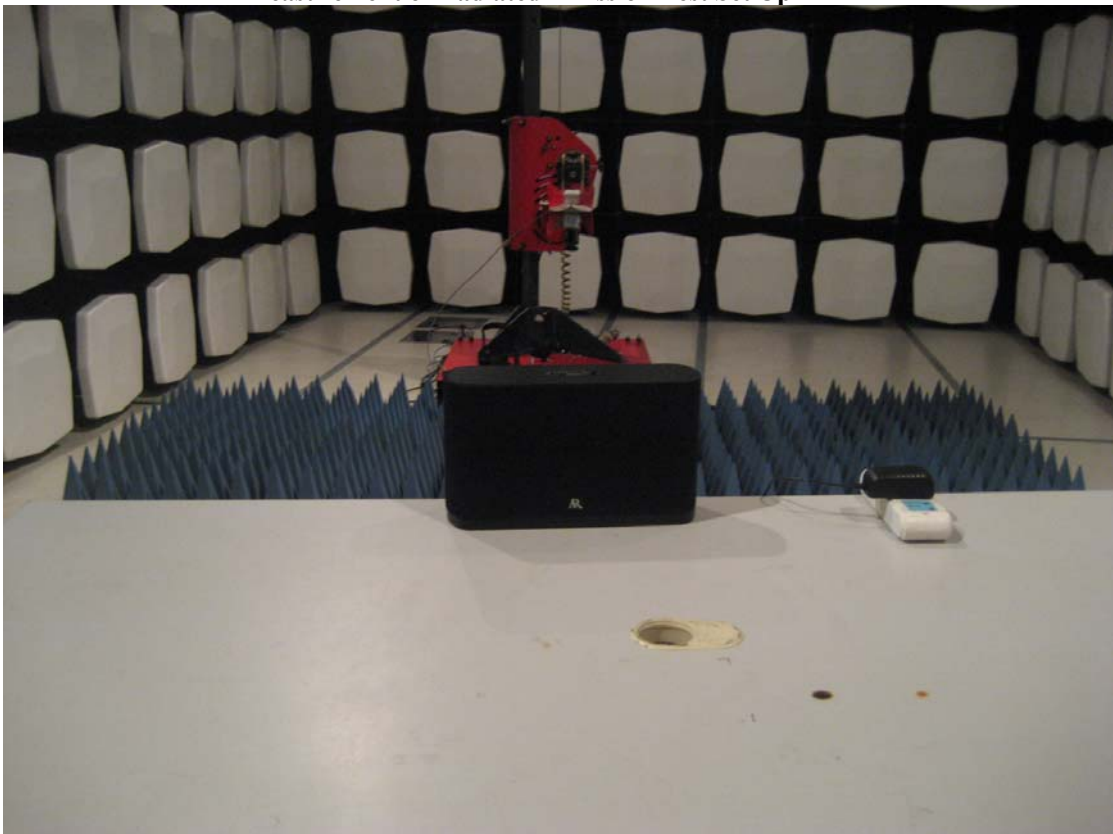
**Date : 2012-05-03**

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### **Photographs of EUT**

**Measurement of Radiated Emission Test Set Up**



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## **STC Test Report**

**Date : 2012-05-03**

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**No. : DM107777**

### **Photographs of EUT**

#### **Measurement of Conducted Emission Test Set Up**



**\*\*\*\*\* End of Test Report \*\*\*\*\***

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