



STC Test Report

Date : 2013-03-05

Page 1 of 76

No. : DM110386

Applicant (DUM001): MASS FIDELITY
12-1064 Salk Road Suite 225, Pickering, Ontario, Canada
L1W 4B5

Manufacturer: MARQUESS CO., LTD,
RM 901-02, 9/F., SINO INDUSTRIAL PLAZA, 9 KAI
CHEUNG ROAD, KOWLOON BAY, KOWLOON,
HONG KONG

Description of Sample(s): Product: Bluetooth Audio Receiver
Brand Name: Mass Fidelity
Model Number: relay
FCC ID: SEPRelay

Date Sample(s) Received: 2013-03-05

Date Tested: 2013-03-06 to 2013-03-08

Investigation Requested: Perform ElectroMagnetic Interference measurement in
accordance with FCC 47CFR [Codes of Federal Regulations]
Part 15: 2012 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): ---



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

The Hong Kong Standards and Testing Centre Ltd.

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STC Test Report

Date : 2013-03-05

Page 2 of 76

No. : DM110386

CONTENT:

Cover	Page 1 of 76
Content	Page 2 of 76
<u>1.0 General Details</u>	
1.1 Test Laboratory	Page 3 of 76
1.2 Equipment Under Test [EUT] Description of EUT operation	Page 3 of 76
1.3 Date of Order	Page 3 of 76
1.4 Submitted Sample	Page 3 of 76
1.5 Test Duration	Page 3 of 76
1.6 Country of Origin	Page 3 of 76
1.7 RF Module Details	Page 4 of 76
1.8 Antenna Details	Page 4 of 76
<u>2.0 Technical Details</u>	
2.1 Investigations Requested	Page 5 of 76
2.2 Test Standards and Results Summary	Page 5 of 76
2.3 Table for Test Modes	Page 6 of 76
<u>3.0 Test Results</u>	
3.1 Emission	Page 7 - 69 of 76
<u>Appendix A</u>	
List of Measurement Equipment	Page 70 of 76
<u>Appendix B</u>	
Ancillary Equipment	Page 71 of 76
<u>Appendix C</u>	
Photographs	Page 72 - 76 of 76

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STC Test Report

Date : 2013-03-05

Page 3 of 76

No. : DM110386

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 Audio Receiver

Manufacturer: MARQUESS CO., LTD

Brand Name: Mass Fidelity

Model Number: relay

Input Voltage: 5Vd.c. with Jack

The AC/DC adaptor was provided by the applicant with following details:

Brand name: N/A; Model no.: HK-U-050A100-CP; Input: 100-240Va.c. 50/60Hz 0.2A;

Output: 5Vd.c. 1.0A.

1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Mass Fidelity, Bluetooth Audio Receiver, it is Audio System, modulation by IC; and type is frequency hopping spread spectrum Modulation.

1.3 Date of Order

2013-03-05

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2013-03-06 to 2013-03-08

1.6 Country of Origin

China

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STC Test Report

Date : 2013-03-05

Page 4 of 76

No. : DM110386

1.7 RF Module Details

Module Model Number:	JS-BTM513
Module FCC ID:	
Module Transmission Type:	Bluetooth V3.0+EDR
Modulation:	FHSS (GFSK / $\pi/4$ -DQPSK / 8DPSK)
Data Rates:	1Mbps: GFSK 2 Mbps: $\pi/4$ -DQPSK 3 Mbps: 8DPSK
Frequency Range:	2400-2483.5MHz
Carrier Frequencies:	2402MHz – 2480MHz

Module Specification (specification provided by manufacturer)

1.8 Antenna Details

Antenna Type:	RP-SMA Right Angle
Antenna Length:	41.5mm
Antenna Gain:	2.2dBi

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STC Test Report

Date : 2013-03-05

Page 5 of 76

No. : DM110386

2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2012 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"/>
RF Conducted Spurious Emission	FCC 47CFR 15.247(c)	N/A	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	ANSI C63.4:2009	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(c)	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)(2)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hopping Channel Separation	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



STC Test Report

Date : 2013-03-05

Page 6 of 76

No. : DM110386

2.3 Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate in the table below is the worst case rate with respect to the specific test item.

Investigation has been done on all the possible configurations for searching the worst cases.

The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate
Max. Conducted Output Power	GFSK / $\pi/4$ -DQPSK / 8DPSK	1MBps / 2MBps / 3MBps
Hopping Channel Separation	8DPSK	3MBps
Number of Hopping Frequency	8DPSK	3MBps
Dwell Time	DH1 / DH3 / DH5	3MBps
Radiated Emissions Below 1GHz	GFSK	1MBps
Radiated Emission Above 1GHz	GFSK	1MBps
Band Edge Emissions	GFSK / $\pi/4$ -DQPSK / 8DPSK	1MBps / 2MBps / 3MBps

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STC Test Report

Date : 2013-03-05

Page 7 of 76

No. : DM110386

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:	2013-03-08
Mode of Operation:	Tx mode

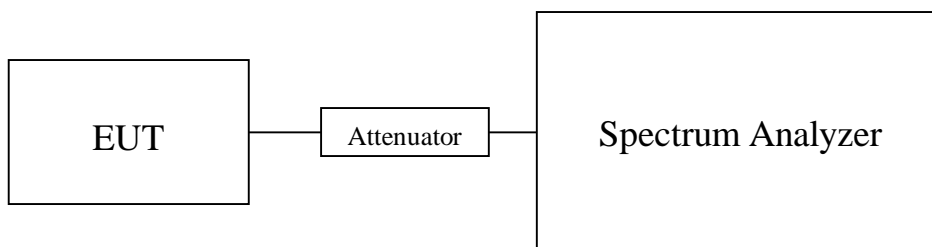
Test Method:

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 dBm.

Spectrum Analyzer Setting:

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

Test Setup:



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STC Test Report

Date : 2013-03-05

Page 8 of 76

No. : DM110386

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 Bluetooth Communication mode (GFSK) (Fundamental Power): Pass Maximum conducted output power

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2402	0.00192

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2441	0.00221

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2480	0.00237

Results of Bluetooth Communication mode ($\pi/4$ -DQPSK) (Fundamental Power): Pass Maximum conducted output power

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2402	0.00135

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2442	0.00149

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2480	0.00156

Results of Bluetooth Communication mode (8 DPSK) (Fundamental Power): Pass Maximum conducted output power

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2402	0.00139

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2442	0.00154

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2480	0.00164

Limit: 0.125W (125mW)

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

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STC Test Report

Date : 2013-03-05

Page 9 of 76

No. : DM110386

3.1.2 Radiated Spurious Emissions

Test Requirement:	FCC 47CFR 15.209
Test Method:	ANSI C63.4:2009
Test Date:	2013-03-08
Mode of Operation:	Tx mode / Bluetooth Communication 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 turn table, 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 STC (Dongguan) Company Ltd. 68 Fumin Nan Road, Dalang, Dongguan, Guangdong, PRC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 629686.

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STC Test Report

Date : 2013-03-05

Page 10 of 76

No. : DM110386

Spectrum Analyzer Setting:

9KHz – 30MHz (Pk & Av)

RBW: 10kHz
VBW: 30kHz
Sweep: Auto
Span: Fully capture the emissions being measured
Trace: Max. hold

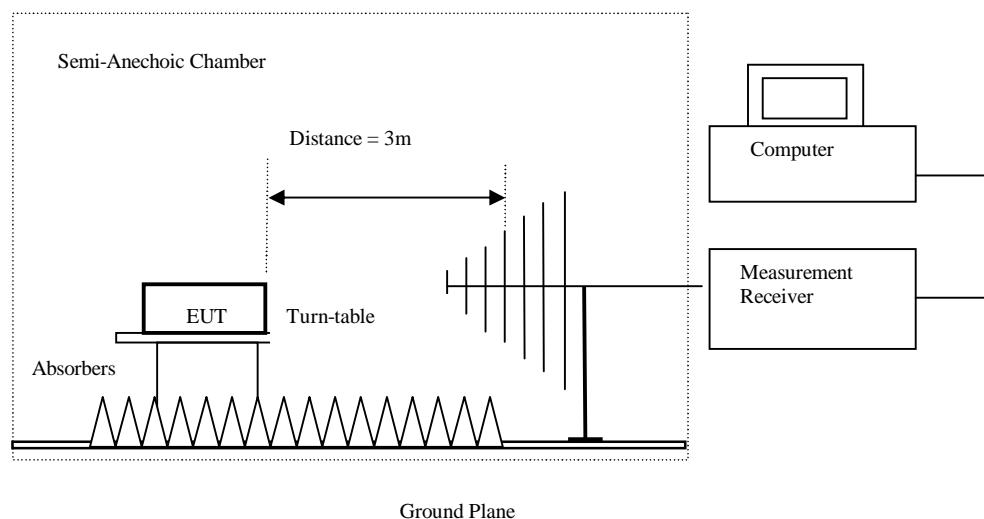
30MHz – 1GHz (QP)

RBW: 120kHz
VBW: 120kHz
Sweep: Auto
Span: Fully capture the emissions being measured
Trace: Max. hold

Above 1GHz (Pk & Av)

RBW: 1MHz
VBW: 3MHz
Sweep: Auto
Span: Fully capture the emissions being measured
Trace: Max. hold

Test Setup:



- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used.

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STC Test Report

Date : 2013-03-05

Page 11 of 76

No. : DM110386

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

Frequency Range	Quasi-Peak Limits
[MHz]	[$\mu\text{V/m}$]
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
Above 960	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) (GFSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency	Measured Level	Correction Factor	Field Strength	Field Strength	Limit	E-Field Polarity
MHz	$\text{dB}\mu\text{V}$	dB/m	$\text{dB}\mu\text{V/m}$	$\mu\text{V/m}$	$\mu\text{V/m}$	
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2402.0 MHz) (GFSK mode) (30MHz – 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency	Measured Level	Correction Factor	Field Strength	Field Strength	Limit	E-Field Polarity
MHz	$\text{dB}\mu\text{V}$	dB/m	$\text{dB}\mu\text{V/m}$	$\mu\text{V/m}$	$\mu\text{V/m}$	
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2402.0 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency	Measured Level @ 3m	Correction Factor	Field Strength	Limit @ 3m	Margin	E-Field Polarity
MHz	$\text{dB}\mu\text{V}$	dB/m	$\text{dB}\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$	
4804.0	12.1	41.5	53.6	74.0	20.4	Horizontal
4804.0	14.4	41.5	55.9	74.0	18.1	Vertical
7206.0	4.6	48.8	53.4	74.0	20.6	Horizontal
7206.0	6.9	48.8	55.7	74.0	18.3	Vertical

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STC Test Report

Date : 2013-03-05

Page 12 of 76

No. : DM110386

Result of Tx mode (2402.0 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4804.0	-2.3	41.5	39.2	54.0	14.8	Horizontal
4804.0	-1.7	41.5	39.8	54.0	14.2	Vertical
7206.0	-9.1	48.8	39.7	54.0	14.3	Horizontal
7206.0	-7.5	48.8	41.3	54.0	12.7	Vertical

Result of Tx mode (2441.0 MHz) (GFSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Results of Tx mode (2441.0 MHz) (GFSK mode) (30MHz – 1000MHz): PASS

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2441.0 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4882.0	11.7	41.4	53.1	74.0	20.9	Horizontal
4882.0	15.0	41.4	56.4	74.0	17.6	Vertical
7323.0	4.5	48.7	53.2	74.0	20.8	Horizontal
7323.0	6.9	48.7	55.6	74.0	18.4	Vertical

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STC Test Report

Date : 2013-03-05

Page 13 of 76

No. : DM110386

Result of Tx mode (2441.0 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4882.0	-2.2	41.4	39.2	54.0	14.8	Horizontal
4882.0	-0.3	41.4	41.1	54.0	12.9	Vertical
7323.0	-10.3	48.7	38.4	54.0	15.6	Horizontal
7323.0	-7.9	48.7	40.8	54.0	13.2	Vertical

Result of Tx mode (2480.0 MHz) (GFSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Results of Tx mode (2480.0 MHz) (GFSK mode) (30MHz – 1000MHz): PASS

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

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STC Test Report

Date : 2013-03-05

Page 14 of 76

No. : DM110386

Result of Tx mode (2480.0 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4960.0	13.4	41.4	54.8	74.0	19.2	Horizontal
4960.0	13.8	41.4	55.2	74.0	18.8	Vertical
7440.0	6.3	48.6	54.9	74.0	19.1	Horizontal
7440.0	8.0	48.6	56.6	74.0	17.4	Vertical

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2400.0	24.2	35.4	59.6	74.0	14.4	Vertical
2483.5	10.1	35.4	45.5	74.0	28.5	Vertical

Result of Tx mode (2480.0 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4960.0	-1.3	41.4	40.1	54.0	13.9	Horizontal
4960.0	-1.1	41.4	40.3	54.0	13.7	Vertical
7440.0	-7.9	48.6	40.7	54.0	13.3	Horizontal
7440.0	-6.8	48.6	41.8	54.0	12.2	Vertical

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2400.0	7.2	35.4	42.6	54.0	11.4	Vertical
2483.5	-3.5	35.4	31.9	54.0	22.1	Vertical

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STC Test Report

Date : 2013-03-05

Page 15 of 76

No. : DM110386

Result of Tx mode (2402.0 MHz) ($\pi/4$ -DQPSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2402.0 MHz) ($\pi/4$ -DQPSK mode) (30MHz – 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2402.0 MHz) ($\pi/4$ -DQPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4804.0	10.9	41.5	52.4	74.0	21.6	Horizontal
4804.0	14.6	41.5	56.1	74.0	17.9	Vertical
7206.0	5.8	48.8	54.6	74.0	19.4	Horizontal
7206.0	6.7	48.8	55.5	74.0	18.5	Vertical

Result of Tx mode (2402.0 MHz) ($\pi/4$ -DQPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4804.0	-3.6	41.5	37.9	54.0	16.1	Horizontal
4804.0	0.3	41.5	41.8	54.0	12.2	Vertical
7206.0	-8.5	48.8	40.3	54.0	13.7	Horizontal
7206.0	-7.9	48.8	40.9	54.0	13.1	Vertical

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STC Test Report

Date : 2013-03-05

Page 16 of 76

No. : DM110386

Result of Tx mode (2441.0 MHz) ($\pi/4$ -DQPSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Results of Tx mode (2441.0 MHz) ($\pi/4$ -DQPSK mode) (30MHz – 1000MHz): PASS

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2441.0 MHz) ($\pi/4$ -DQPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4882.0	12.3	41.4	53.7	74.0	20.3	Horizontal
4882.0	13.5	41.4	54.9	74.0	19.1	Vertical
7323.0	5.7	48.7	54.4	74.0	19.6	Horizontal
7323.0	7.1	48.7	55.8	74.0	18.2	Vertical

Result of Tx mode (2441.0 MHz) ($\pi/4$ -DQPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4882.0	-2.2	41.4	39.2	54.0	14.8	Horizontal
4882.0	-1.3	41.4	40.1	54.0	13.9	Vertical
7323.0	-9.1	48.7	39.6	54.0	14.4	Horizontal
7323.0	-7.0	48.7	41.7	54.0	12.3	Vertical

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STC Test Report

Date : 2013-03-05

Page 17 of 76

No. : DM110386

Result of Tx mode (2480.0 MHz) ($\pi/4$ -DQPSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Results of Tx mode (2480.0 MHz) ($\pi/4$ -DQPSK mode) (30MHz – 1000MHz): PASS

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2480.0 MHz) ($\pi/4$ -DQPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4960.0	12.4	41.4	53.8	74.0	20.2	Horizontal
4960.0	13.8	41.4	55.2	74.0	18.8	Vertical
7440.0	5.0	48.6	53.6	74.0	20.4	Horizontal
7440.0	7.7	48.6	56.3	74.0	17.7	Vertical

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2400.0	19.0	35.4	54.4	74.0	19.6	Vertical
2483.5	10.8	35.4	46.2	74.0	27.8	Vertical

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STC Test Report

Date : 2013-03-05

Page 18 of 76

No. : DM110386

Result of Tx mode (2480.0 MHz) ($\pi/4$ -DQPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4960.0	-1.7	41.4	39.7	54.0	14.3	Horizontal
4960.0	-1.5	41.4	39.9	54.0	14.1	Vertical
7440.0	-9.9	48.6	38.7	54.0	15.3	Horizontal
7440.0	-7.2	48.6	41.4	54.0	12.6	Vertical

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2400.0	5.2	35.4	40.6	54.0	13.4	Vertical
2483.5	-2.9	35.4	32.5	54.0	21.5	Vertical

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STC Test Report

Date : 2013-03-05

Page 19 of 76

No. : DM110386

Result of Tx mode (2402.0 MHz) (8DPSK) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2402.0 MHz) (8DPSK) (30MHz – 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2402.0 MHz) (8DPSK) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4804.0	11.7	41.5	53.2	74.0	20.8	Horizontal
4804.0	14.2	41.5	55.7	74.0	18.3	Vertical
7206.0	6.3	48.8	55.1	74.0	18.9	Horizontal
7206.0	8.0	48.8	56.8	74.0	17.2	Vertical

Result of Tx mode (2402.0 MHz) (8DPSK) (Above 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4804.0	-0.2	41.5	41.3	54.0	12.7	Horizontal
4804.0	0.7	41.5	42.2	54.0	11.8	Vertical
7206.0	-7.1	48.8	41.7	54.0	12.3	Horizontal
7206.0	-6.4	48.8	42.4	54.0	11.6	Vertical

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STC Test Report

Date : 2013-03-05

Page 20 of 76

No. : DM110386

Result of Tx mode (2441.0 MHz) (8DPSK) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit μV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Results of Tx mode (2441.0 MHz) (8DPSK) (30MHz – 1000MHz): PASS

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit μV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2441.0 MHz) (8DPSK) (Above 1GHz): Pass

Field Strength of Spurious 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	14.4	41.4	55.8	74.0	18.2	Vertical
7323.0	5.8	48.7	54.5	74.0	19.5	Horizontal
7323.0	7.5	48.7	56.2	74.0	17.8	Vertical

Result of Tx mode (2441.0 MHz) (8DPSK) (Above 1GHz): Pass

Field Strength of Spurious 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	-1.5	41.4	39.9	54.0	14.1	Horizontal
4882.0	-0.8	41.4	40.6	54.0	13.4	Vertical
7323.0	-8.0	48.7	40.7	54.0	13.3	Horizontal
7323.0	-3.2	48.7	45.5	54.0	8.5	Vertical

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STC Test Report

Date : 2013-03-05

Page 21 of 76

No. : DM110386

Result of Tx mode (2480.0 MHz) (8DPSK) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit μV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Results of Tx mode (2480.0 MHz) (8DPSK) (30MHz – 1000MHz): PASS

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit μV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2480.0 MHz) (8DPSK) (Above 1GHz): Pass

Field Strength of Spurious 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
4960.0	13.9	41.4	55.3	74.0	18.7	Horizontal
4960.0	14.6	41.4	56.0	74.0	18.0	Vertical
7440.0	8.2	48.6	56.8	74.0	17.2	Horizontal
7440.0	7.0	48.6	55.6	74.0	18.4	Vertical

Field Strength of Spurious 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
2400.0	18.3	35.4	53.7	74.0	20.3	Vertical
2483.5	11.1	35.4	46.5	74.0	27.5	Vertical

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STC Test Report

Date : 2013-03-05

Page 22 of 76

No. : DM110386

Result of Tx mode (2480.0 MHz) (8DPSK) (Above 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4960.0	-2.2	41.4	39.2	54.0	14.8	Horizontal
4960.0	-1.1	41.4	40.3	54.0	13.7	Vertical
7440.0	-8.4	48.6	40.2	54.0	13.8	Horizontal
7440.0	-8.8	48.6	39.8	54.0	14.2	Vertical

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2400.0	3.2	35.4	38.6	54.0	15.4	Vertical
2483.5	-2.8	35.4	32.6	54.0	21.4	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: (9kHz – 30MHz): 3.3dB

(30MHz – 1GHz): 4.6dB

(1GHz – 18GHz): 4.4dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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STC Test Report

Date : 2013-03-05

Page 23 of 76

No. : DM110386

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

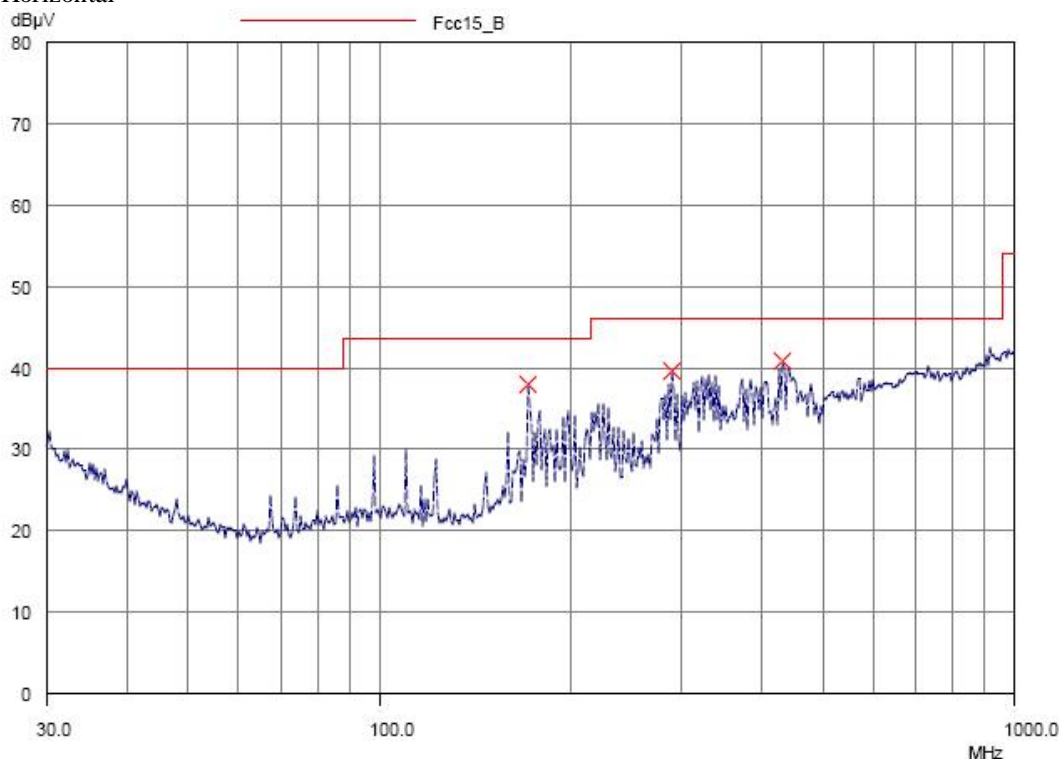
Frequency Range	Quasi-Peak Limits
[MHz]	[$\mu\text{V/m}$]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above 960	500

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 Communication mode (30MHz – 1GHz): Pass

Please refer to the following table for result details

Horizontal



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STC Test Report

Date : 2013-03-05

Page 24 of 76

No. : DM110386

Result of Bluetooth Communication mode (30MHz – 1GHz): Pass

Radiated Emissions					
Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @ 3m dB μ V/m	Limit @ 3m dB μ V/m	Level @ 3m μ V/m	Limit @ 3m μ V/m
172.1	Horizontal	36.3	43.5	65.3	150
288.0	Horizontal	38.6	46.0	85.1	200
429.9	Horizontal	39.8	46.0	97.7	200

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STC Test Report

Date : 2013-03-05

Page 25 of 76

No. : DM110386

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

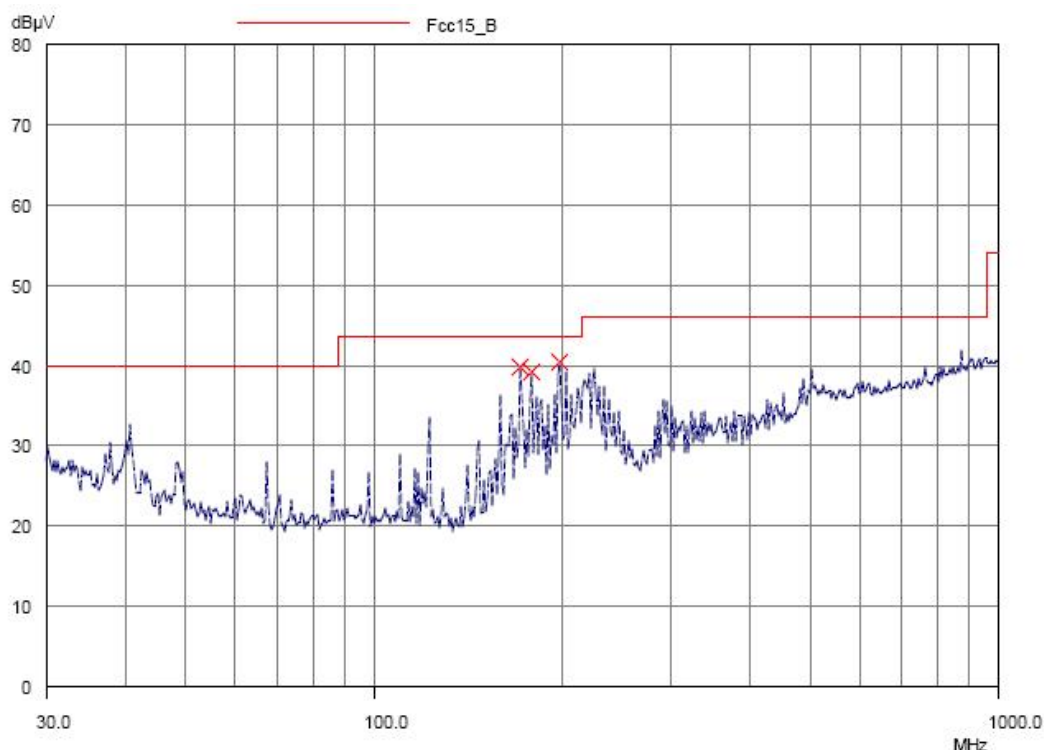
Frequency Range	Quasi-Peak Limits
[MHz]	[$\mu\text{V/m}$]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

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 Bluetooth Communication mode (30MHz – 1GHz): Pass

Please refer to the following table for result details

Vertical



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STC Test Report

Date : 2013-03-05

Page 26 of 76

No. : DM110386

Result of Bluetooth Communication mode (30MHz – 1GHz): Pass

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @ 3m dB μ V/m	Limit @3m dB μ V/m	Level @3m μ V/m	Limit @ 3m μ V/m
172.1	Vertical	39.2	43.5	91.2	150
178.2	Vertical	37.3	43.5	73.3	150
198.4	Vertical	39.5	43.5	94.4	150

Remarks:

Calculated measurement uncertainty (30MHz – 1GHz): 4.6dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst -case test results are recorded in this report.

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STC Test Report

Date : 2013-03-05

Page 27 of 76

No. : DM110386

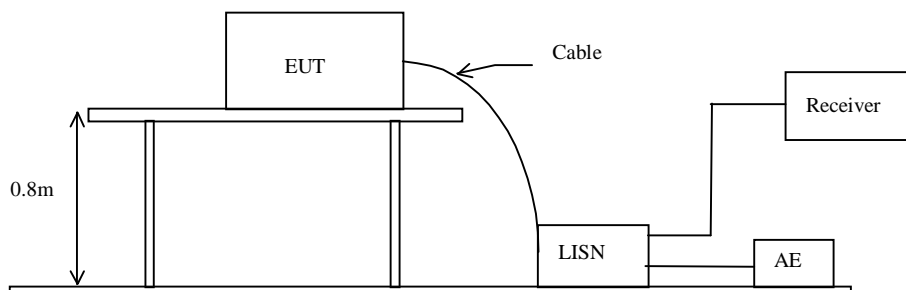
3.1.3 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.4:2009
Test Date:	2013-03-06
Mode of Operation:	Bluetooth communication mode
Test Voltage:	117Va.c., 60Hz

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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Date : 2013-03-05

Page 28 of 76

No. : DM110386

Limit for Conducted Emissions (FCC 47 CFR 15.207):

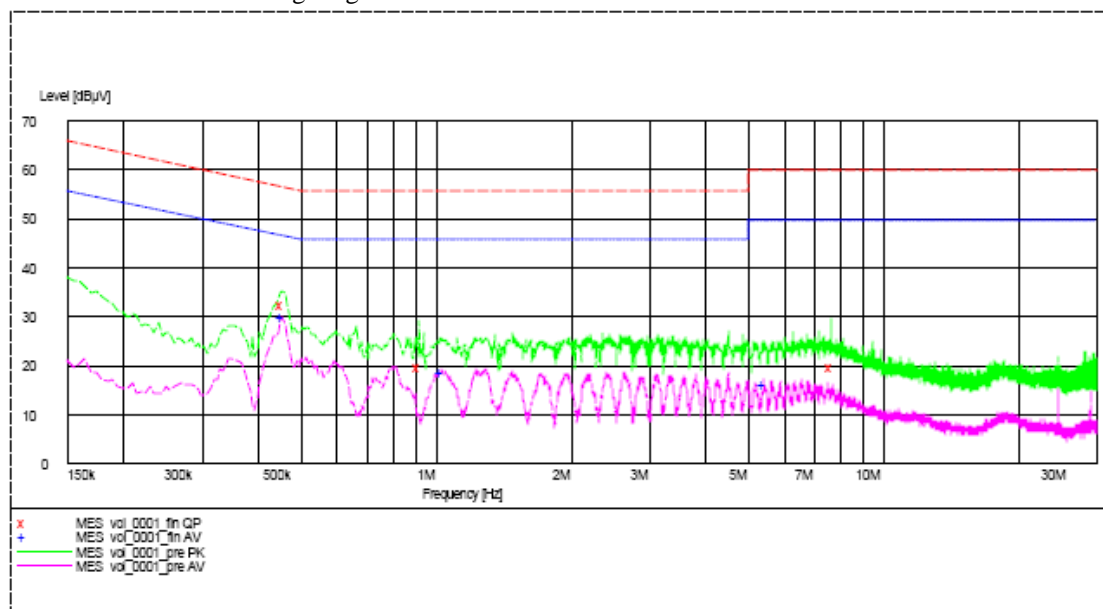
Frequency Range [MHz]	Quasi-Peak Limits [dBμV]	Average [dBμV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* 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 communication mode (L): PASS

Please refer to the following diagram for individual results.



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STC Test Report

Date : 2013-03-05

Page 29 of 76

No. : DM110386

Results of Bluetooth communication mode (L): PASS

Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB μ V	Limit dB μ V	Level dB μ V	Limit dB μ V
Live	0.455	-*-	-*-	32.4	47.0
Live	1.035	-*-	-*-	19.8	46.0
Live	5.420	-*-	-*-	19.9	50.0
Live	0.455	32.4	57.0	-*-	-*-
Live	0.920	19.8	56.0	-*-	-*-
Live	7.665	19.9	60.0	-*-	-*-

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STC Test Report

Date : 2013-03-05

Page 30 of 76

No. : DM110386

Limit for Conducted Emissions (FCC 47 CFR 15.207):

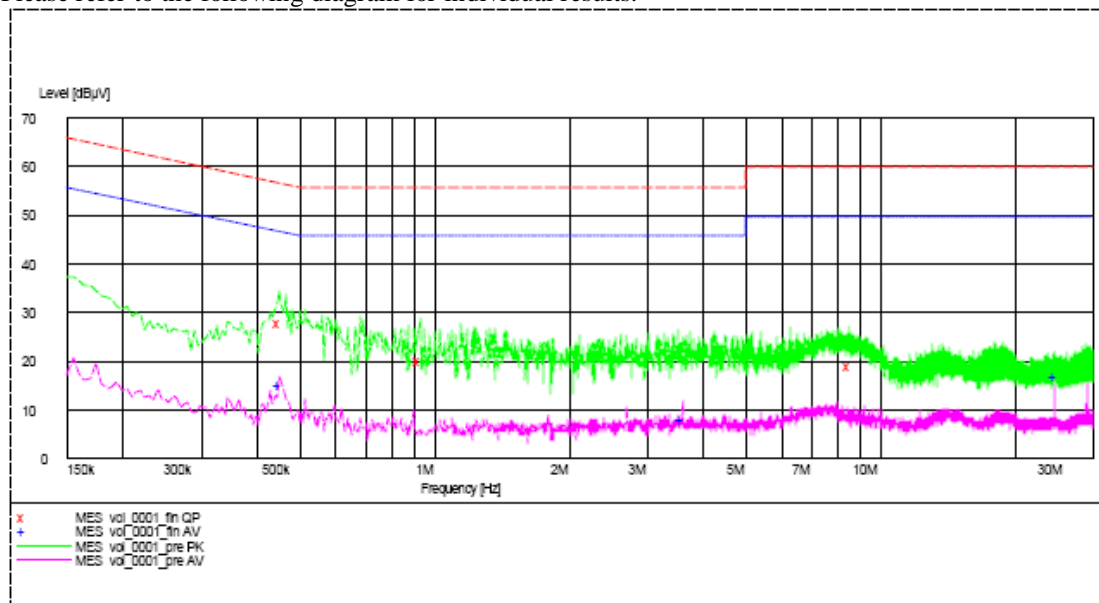
Frequency Range [MHz]	Quasi-Peak Limits [dBμV]	Average [dBμV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* 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 communication mode (N): PASS

Please refer to the following diagram for individual results.



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STC Test Report

Date : 2013-03-05

Page 31 of 76

No. : DM110386

Results of Bluetooth communication mode (N): PASS

Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB μ V	Limit dB μ V	Level dB μ V	Limit dB μ V
Neutral	0.450	27.8	57.0	15.4	47.0
Neutral	3.605	-*-	-*-	8.2	46.0
Neutral	24.575	-*-	-*-	16.9	50.0
Neutral	0.930	20.1	56.0	-*-	-*-
Neutral	8.545	19.0	60.0	-*-	-*-

Remarks:

Calculated measurement uncertainty (0.15MHz – 30MHz): 3.2dB

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

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STC Test Report

Date : 2013-03-05

Page 32 of 76

No. : DM110386

3.1.4 20dB Bandwidth Measurement

Test Requirement:	FCC 47CFR 15.247(a)(1)
Test Method:	ANSI C63.4:2009
Test Date:	2013-03-06
Mode of Operation:	Bluetooth communication mode

Remark:

The result has been done on all the possible configurations for searching the worst cases.

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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STC Test Report

Date : 2013-03-05

Page 33 of 76

No. : DM110386

Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2402	1.11	Within 2400-2483.5

(Lowest Operating Frequency) - (GFSK)

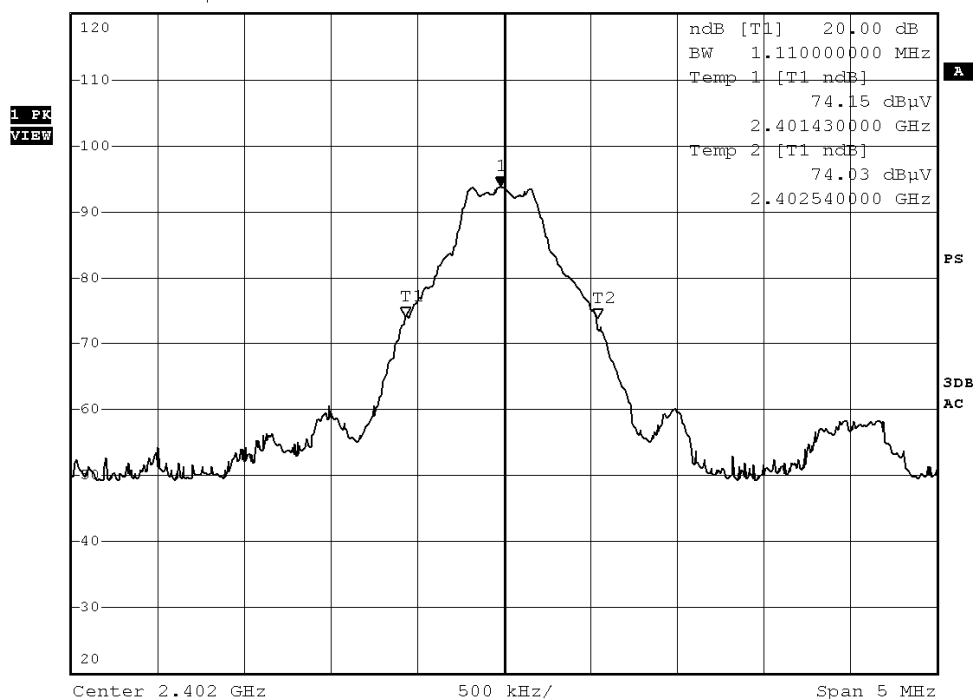


*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 93.75 dBμV
*SWT 5 ms 2.401980000 GHz

Ref 120 dBμV

*Att 35 dB

2.401980000 GHz



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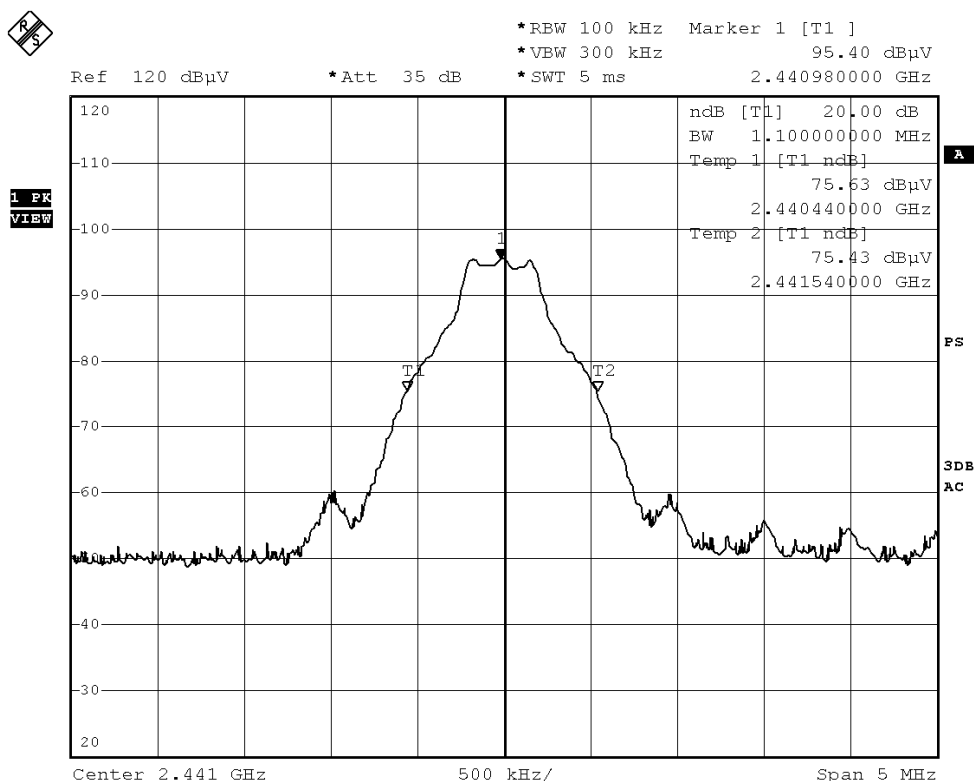
Date : 2013-03-05

Page 34 of 76

No. : DM110386

Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2441	1.10	Within 2400-2483.5

(Middle Operating Frequency) - (GFSK)



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STC Test Report

Date : 2013-03-05

Page 35 of 76

No. : DM110386

Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2480	1.10	Within 2400-2483.5

(Highest Operating Frequency) - (GFSK)

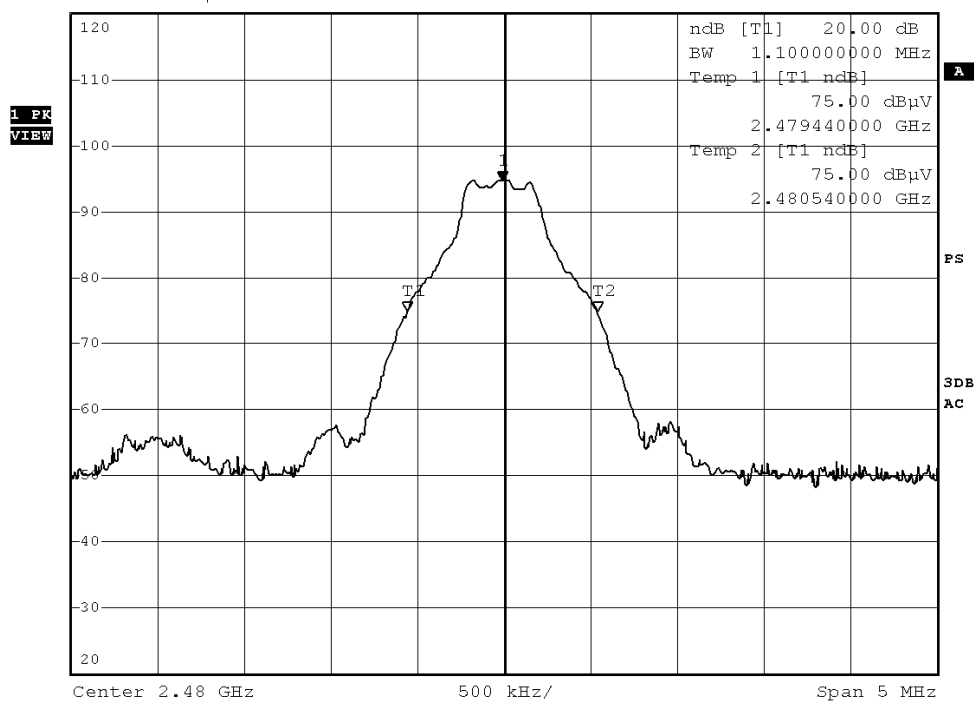


*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 94.69 dBμV
*SWT 5 ms 2.479990000 GHz

Ref 120 dBμV

*Att 35 dB

2.479990000 GHz



Center 2.48 GHz

500 kHz/

Span 5 MHz

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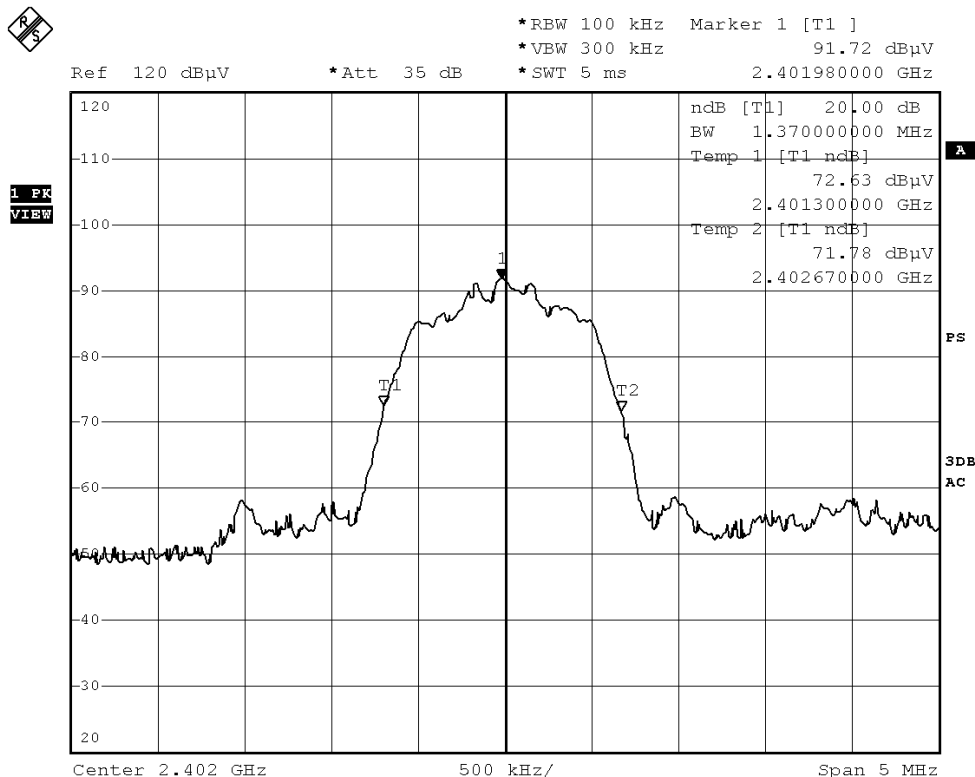
Date : 2013-03-05

Page 36 of 76

No. : DM110386

Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2402	1.37	Within 2400-2483.5

(Lowest Operating Frequency) - ($\pi/4$ DQPSK)



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Date : 2013-03-05

Page 37 of 76

No. : DM110386

Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2441	1.38	Within 2400-2483.5

(Middle Operating Frequency) - ($\pi/4$ DQPSK)

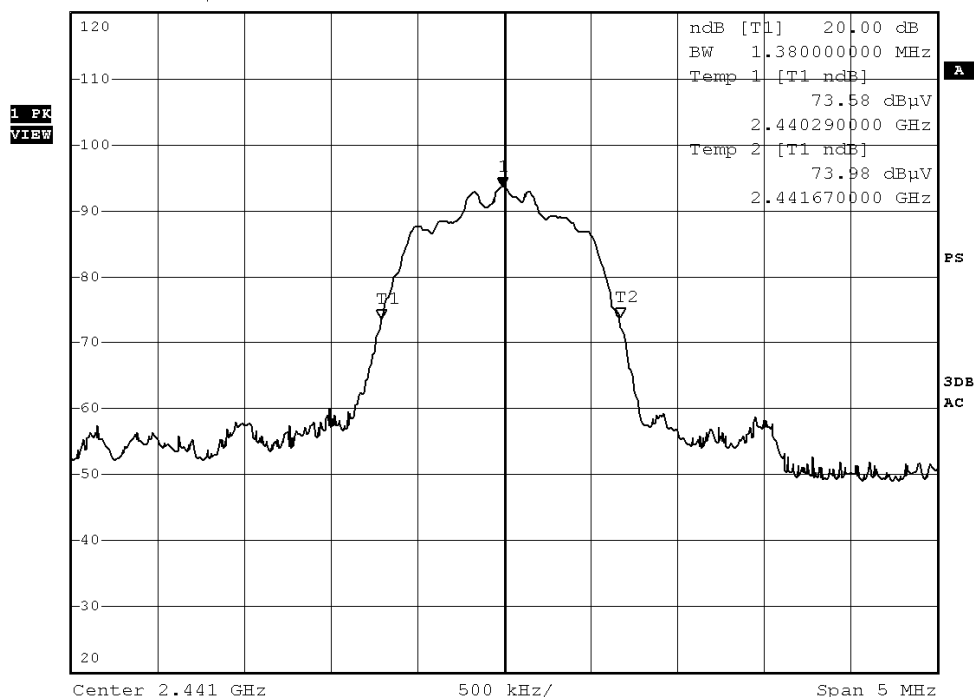


*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 93.57 dB μ V
*SWT 5 ms 2.440990000 GHz

Ref 120 dB μ V

*Att 35 dB

2.440990000 GHz



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STC Test Report

Date : 2013-03-05

Page 38 of 76

No. : DM110386

Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2480	1.38	Within 2400-2483.5

(Highest Operating Frequency) - ($\pi/4$ DQPSK)

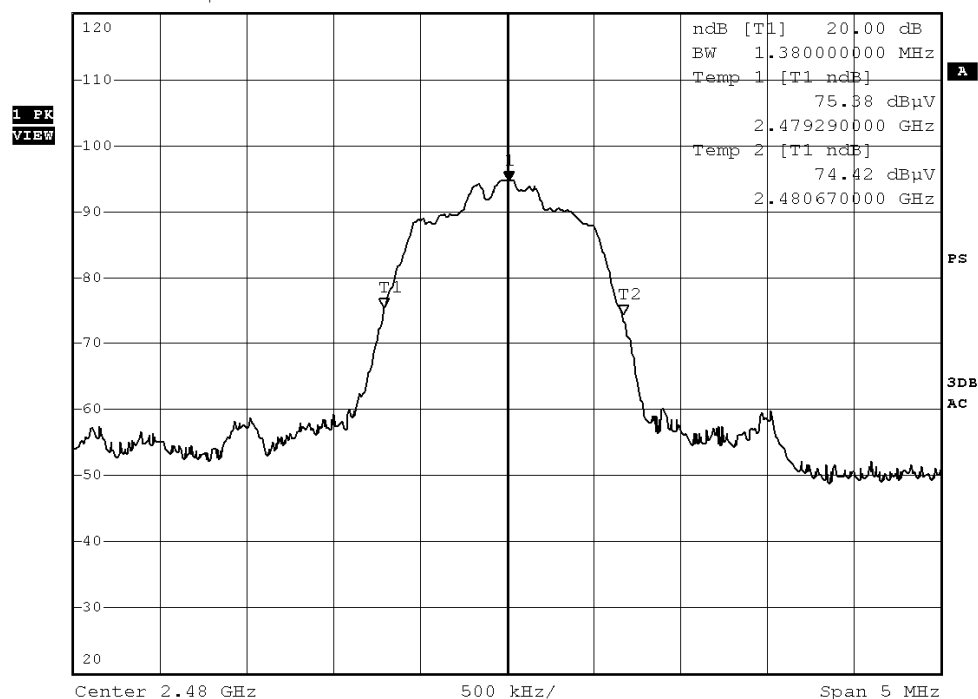


*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 94.76 dB μ V
*SWT 5 ms 2.480010000 GHz

Ref 120 dB μ V

*Att 35 dB

2.480010000 GHz



Center 2.48 GHz

500 kHz/

Span 5 MHz

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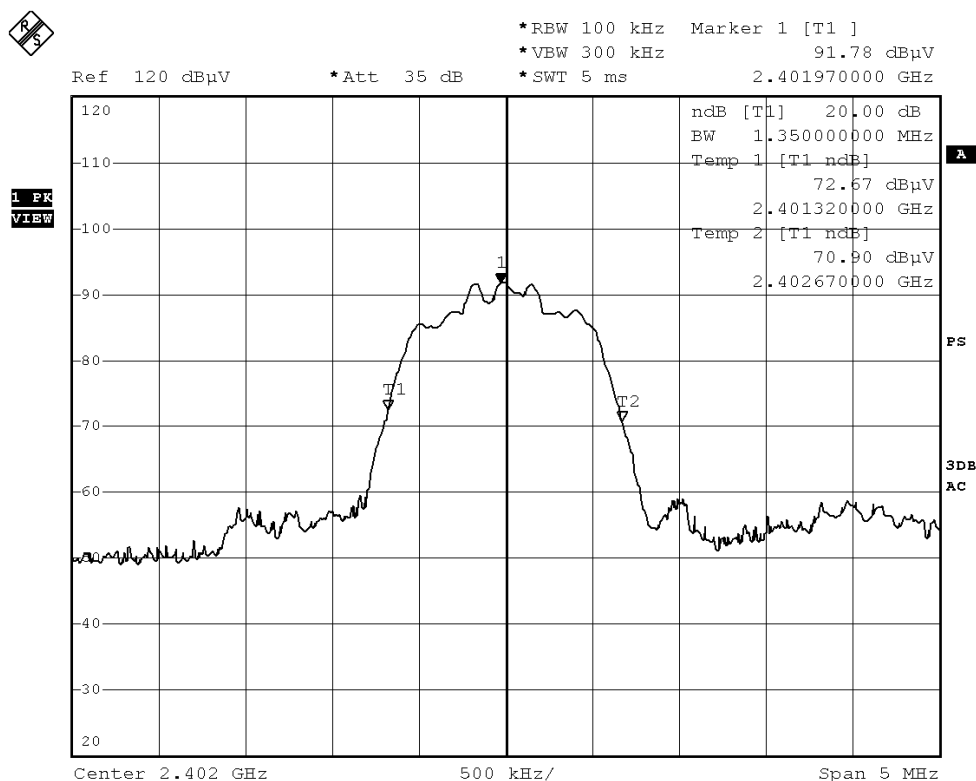
Date : 2013-03-05

Page 39 of 76

No. : DM110386

Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2402	1.35	Within 2400-2483.5

(Lowest Operating Frequency) - (8DPSK)



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Date : 2013-03-05

Page 40 of 76

No. : DM110386

Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2441	1.35	Within 2400-2483.5

(Middle Operating Frequency) - (8DPSK)



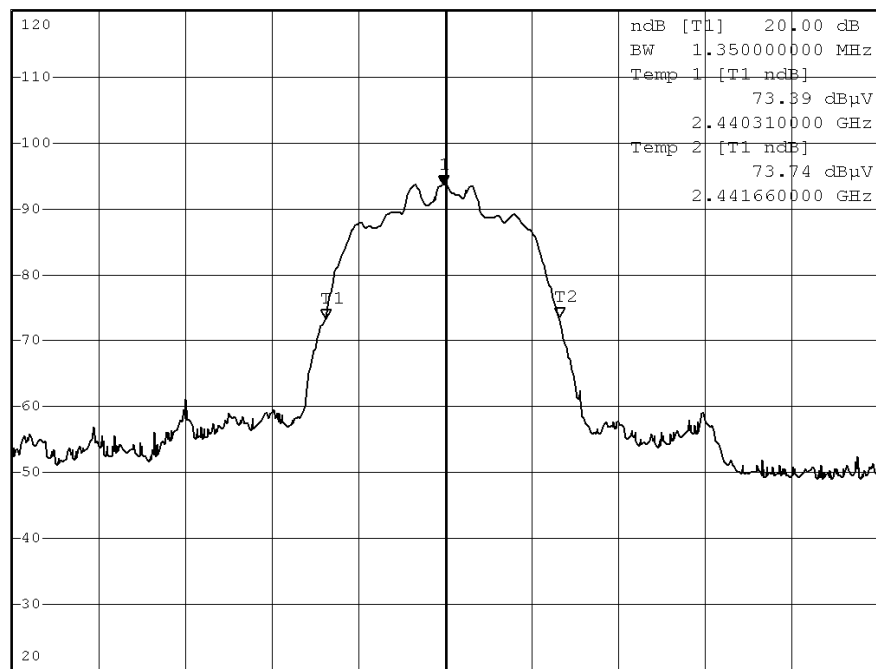
*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 93.62 dBμV
*SWT 5 ms 2.440990000 GHz

Ref 120 dBμV

*Att 35 dB

2.440990000 GHz

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Center 2.441 GHz

500 kHz/

Span 5 MHz

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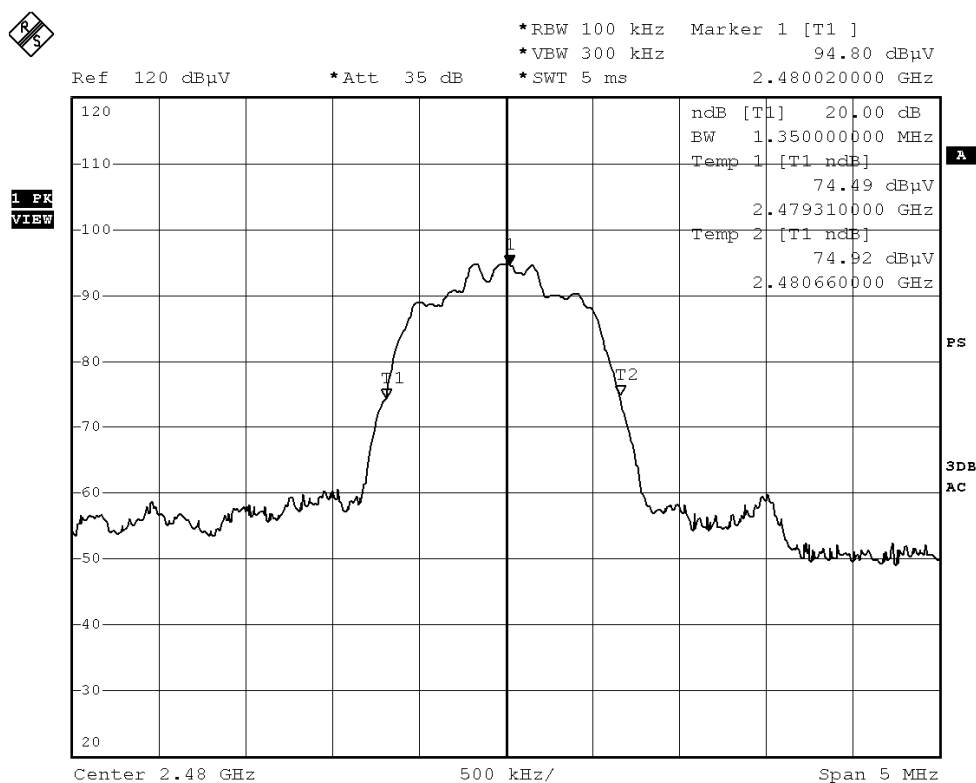
Date : 2013-03-05

Page 41 of 76

No. : DM110386

Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2480	1.35	Within 2400-2483.5

(Highest Operating Frequency) - (8DPSK)



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STC Test Report

Date : 2013-03-05

Page 42 of 76

No. : DM110386

Channel Centre Frequency

Requirements:

Frequency hopping system in the 2400-2483.5MHz band shall use at least 79 (Channel 0 to 78) non-overlapping channels.

The EUT operates in according with the Bluetooth system specification within the 2400 - 2483.5 MHz frequency band.

RF channels for Bluetooth systems are spaced 1 MHz and are ordered in channel number k. In order to comply with out-of-band regulations, a lower frequency guard band of 2.0 MHz and a higher frequency guard band of 3.5MHz is used.

The operating frequencies of each channel are as follows:

First RF channel start from 2400MHz + 2MHz guard band = 2402MHz

Frequency of RF Channel = 2402+k MHz, k = 0,...,78 (Channel separation = 1MHz)

Hopping Channel Separation

Requirements:

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

Limit:

The measured minimum bandwidth $\ast \frac{2}{3} = 1.380\text{MHz} \ast \frac{2}{3} = 920\text{kHz}$

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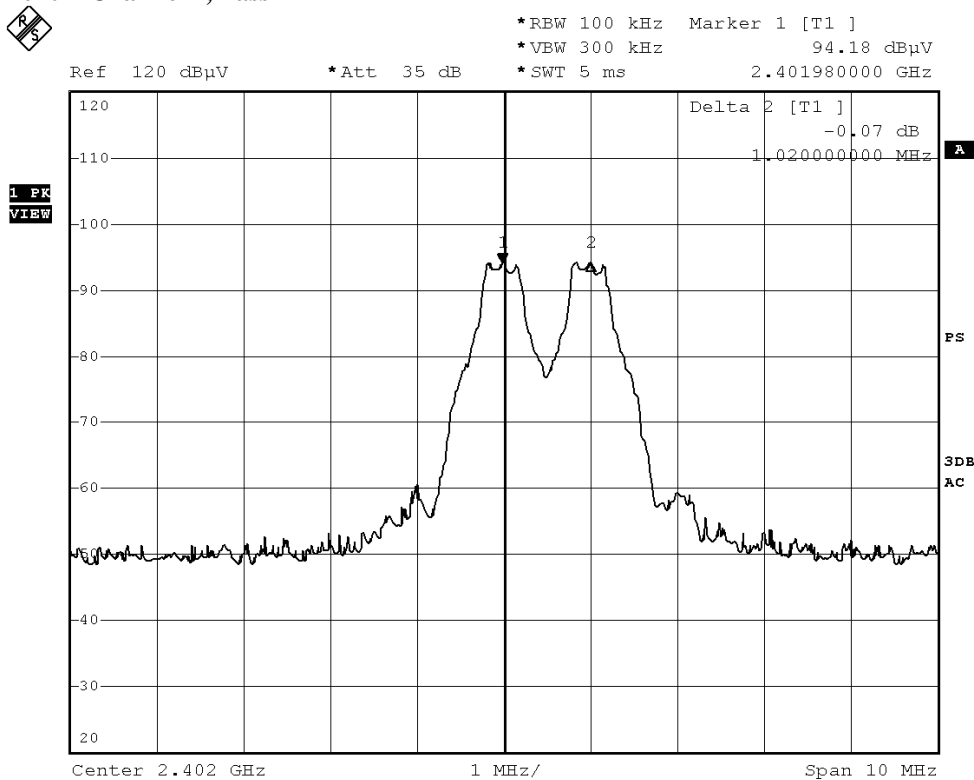
Date : 2013-03-05

Page 43 of 76

No. : DM110386

Channel separation = 1MHz (>920kHz) (GFSK)

Channel 0 – Channel 1, Pass



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STC Test Report

Date : 2013-03-05

Page 44 of 76

No. : DM110386

Channel 39 – Channel 40, Pass



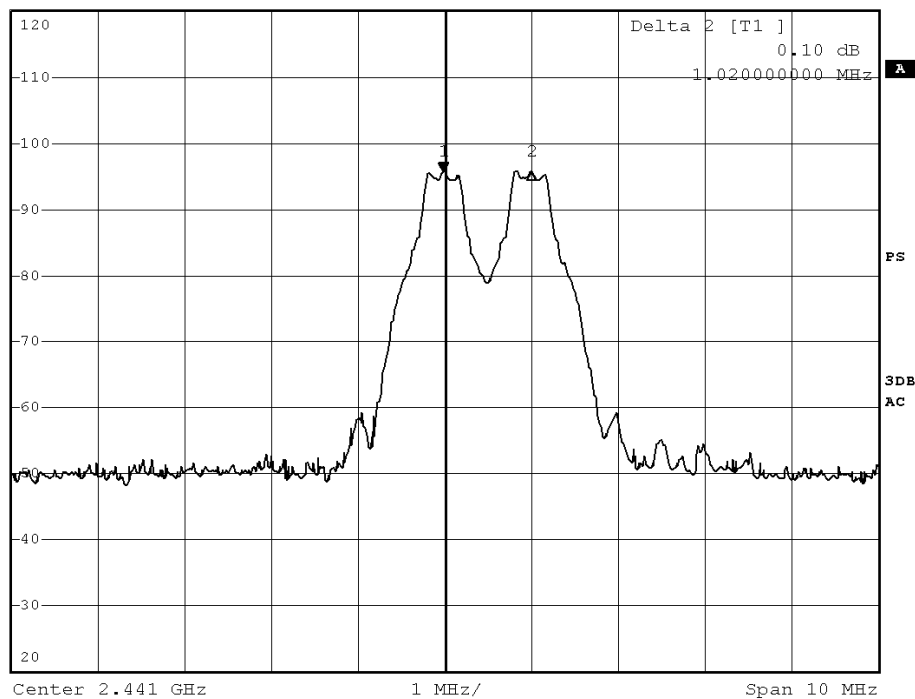
*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 95.70 dBμV
*SWT 5 ms 2.440980000 GHz

Ref 120 dBμV

*Att 35 dB

2.440980000 GHz

1 PK
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Date : 2013-03-05

Page 45 of 76

No. : DM110386

Channel 78 – Channel 79, Pass



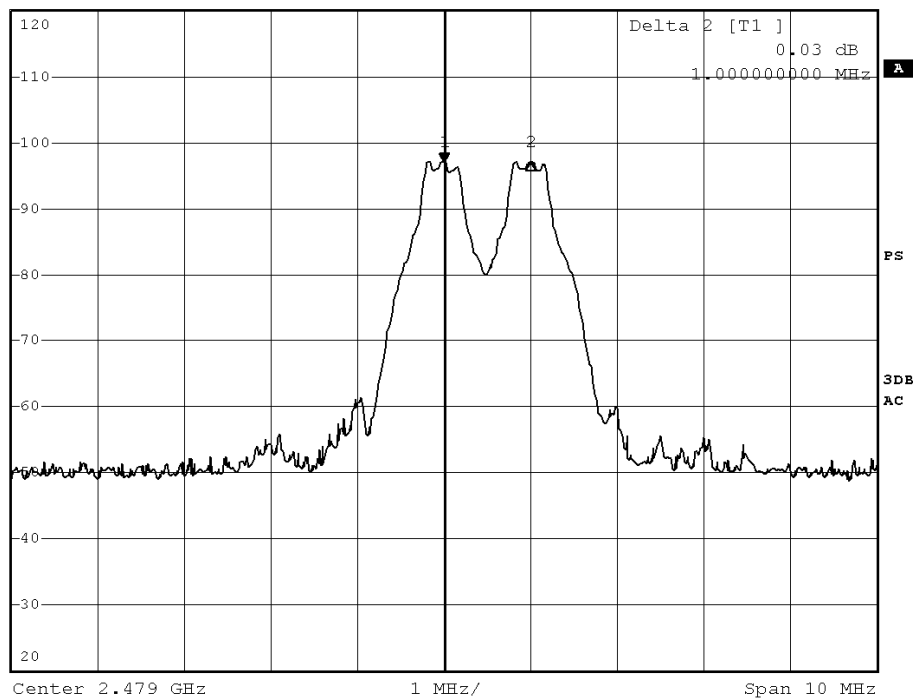
*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 97.04 dBμV
*SWT 5 ms 2.479000000 GHz

Ref 120 dBμV

*Att 35 dB

2.479000000 GHz

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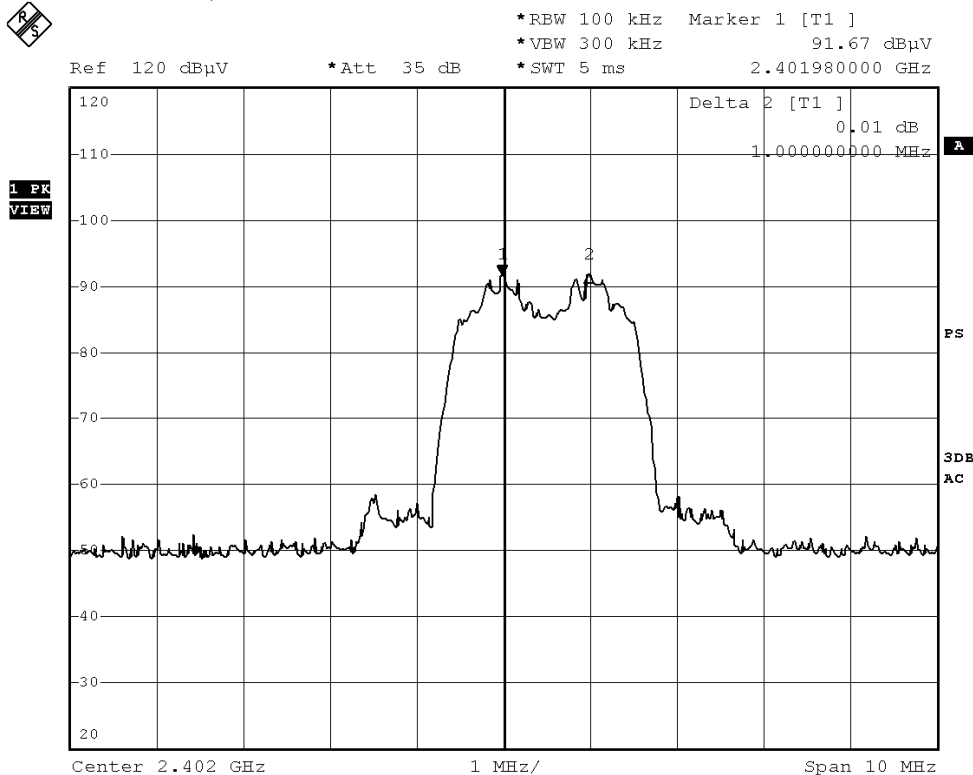
Date : 2013-03-05

Page 46 of 76

No. : DM110386

Channel separation = 1MHz (>920kHz) ($\pi/4$ DQPSK)

Channel 0 – Channel 1, Pass



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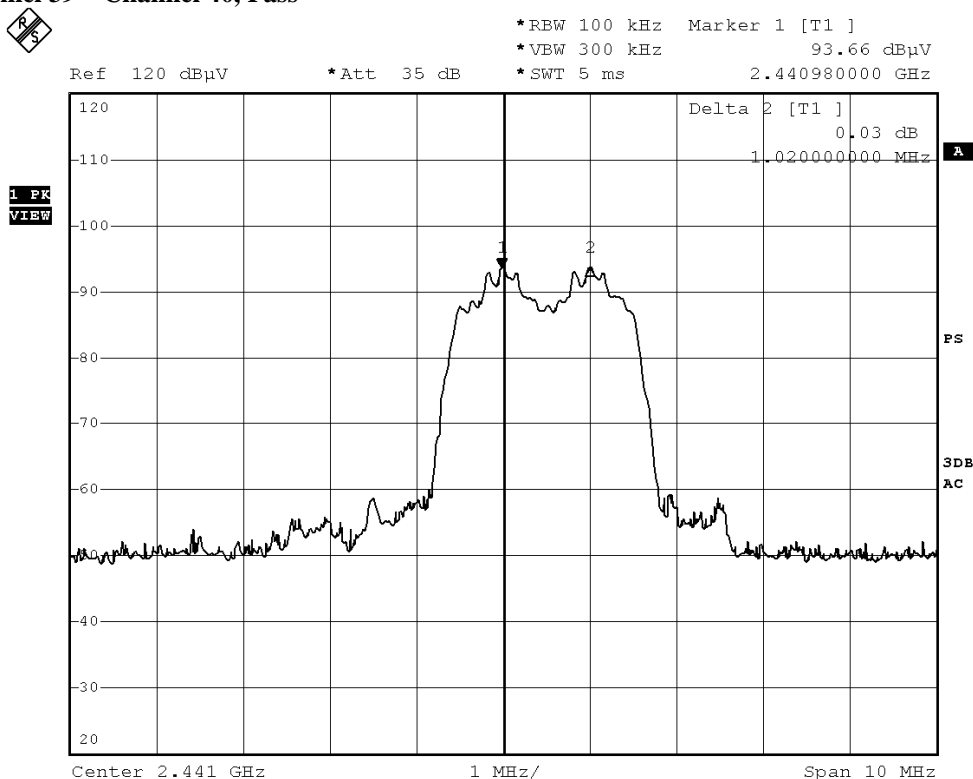
STC Test Report

Date : 2013-03-05

Page 47 of 76

No. : DM110386

Channel 39 – Channel 40, Pass



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STC Test Report

Date : 2013-03-05

Page 48 of 76

No. : DM110386

Channel 78 – Channel 79, Pass



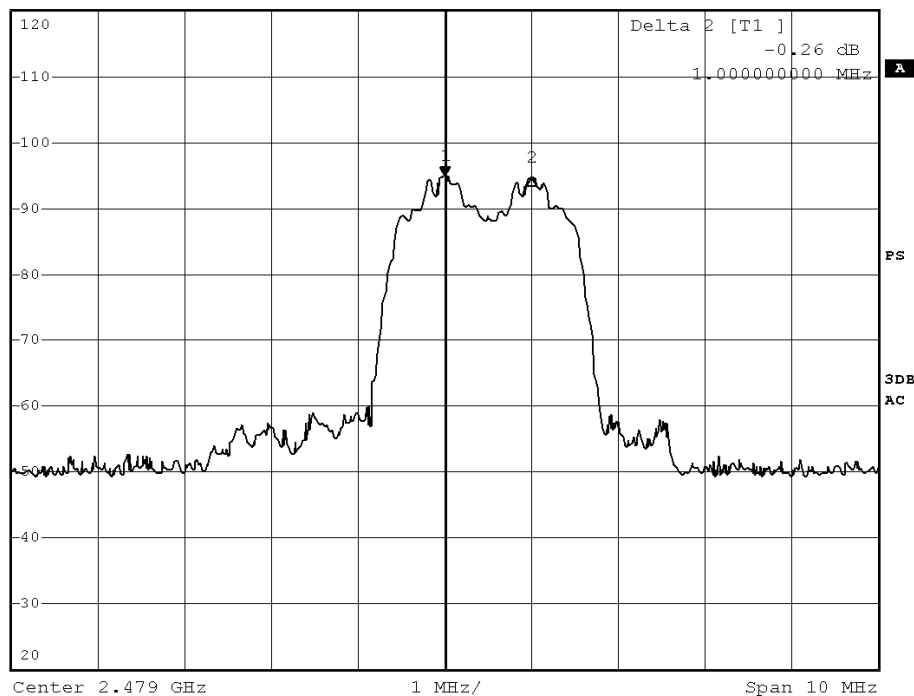
*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 94.89 dBμV
*SWT 5 ms 2.479000000 GHz

Ref 120 dBμV

*Att 35 dB

2.479000000 GHz

1 PK
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STC Test Report

Date : 2013-03-05

Page 49 of 76

No. : DM110386

Channel separation = 1MHz (>920kHz) (8DPSK)

Channel 0 – Channel 1, Pass

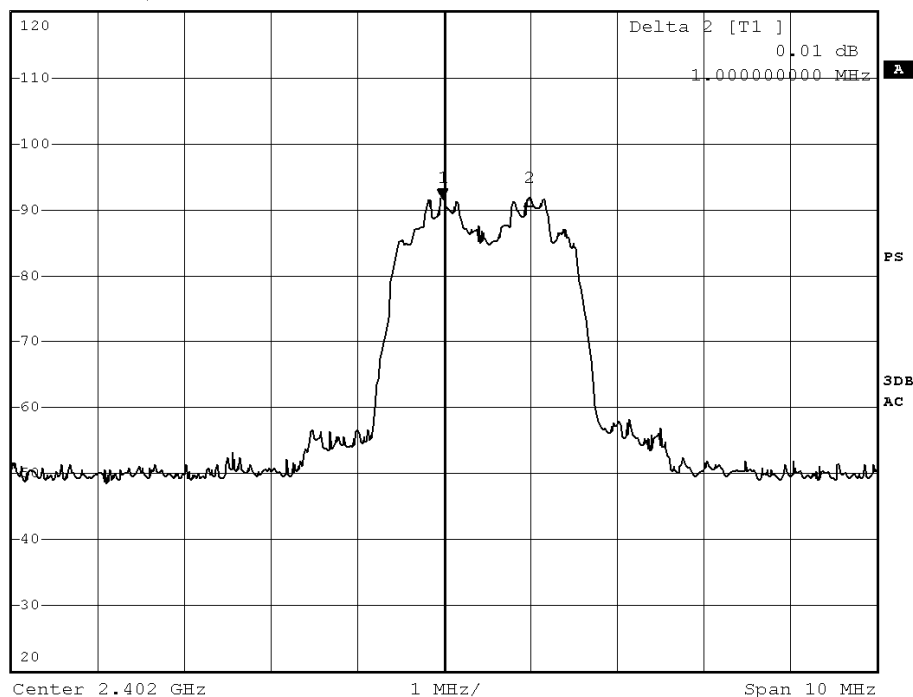


*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 91.70 dBμV
*SWT 5 ms 2.401980000 GHz

Ref 120 dBμV

*Att 35 dB

2.401980000 GHz



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STC Test Report

Date : 2013-03-05

Page 50 of 76

No. : DM110386

Channel 39 – Channel 40, Pass



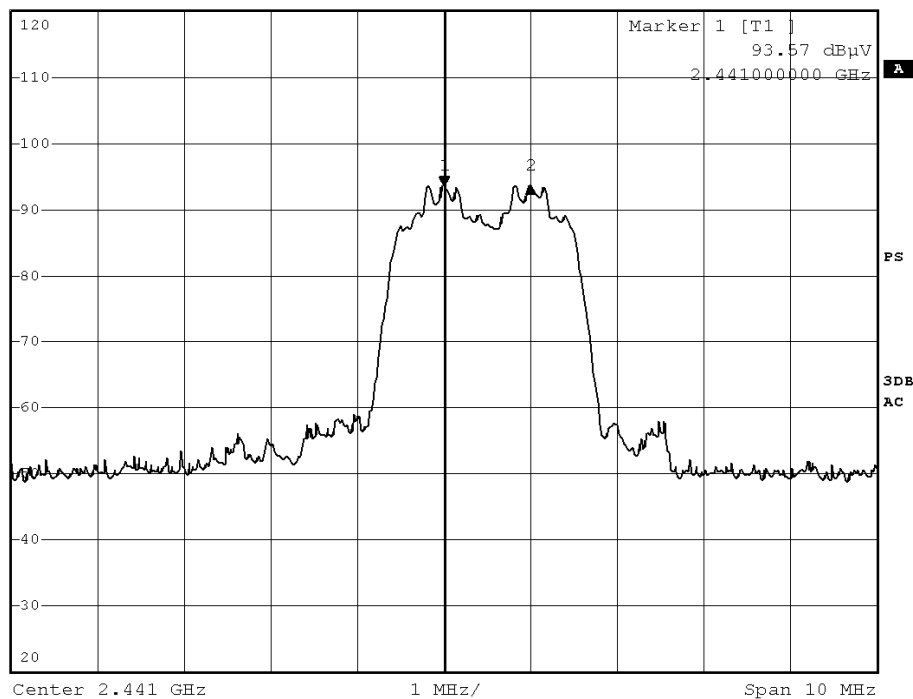
*RBW 100 kHz Delta 2 [T1]
*VBW 300 kHz 0.02 dB
*SWT 5 ms 1.000000000 MHz

Ref 120 dBμV

*Att 35 dB

1.000000000 MHz

1 PK
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Date : 2013-03-05

Page 51 of 76

No. : DM110386

Channel 78 – Channel 79, Pass



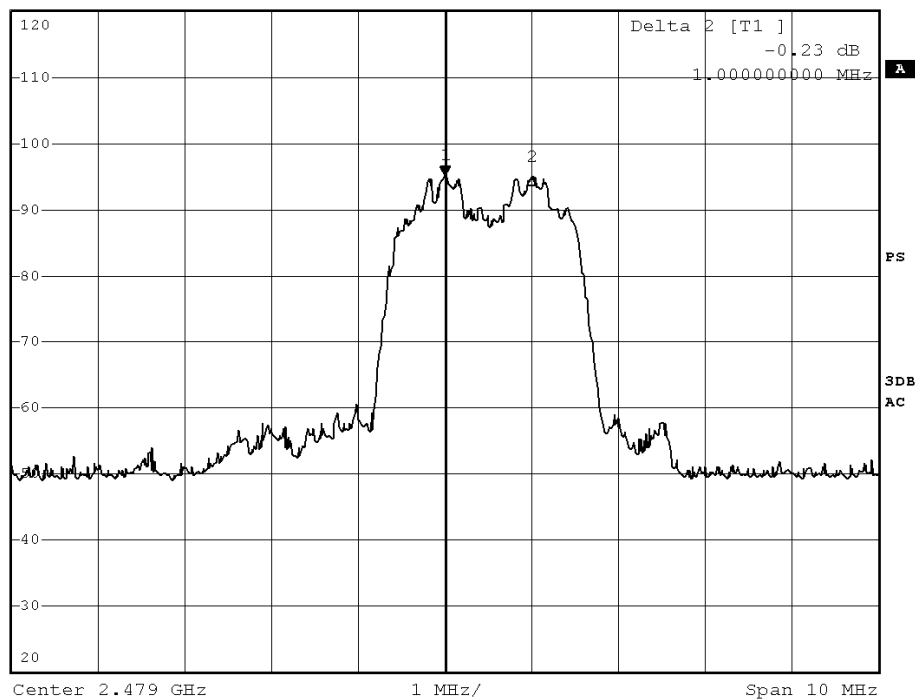
*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 95.09 dBμV
*SWT 5 ms 2.479000000 GHz

Ref 120 dBμV

*Att 35 dB

2.479000000 GHz

1 PK
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STC Test Report

Date : 2013-03-05

Page 52 of 76

No. : DM110386

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



1 PK
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STC Test Report

Date : 2013-03-05

Page 53 of 76

No. : DM110386

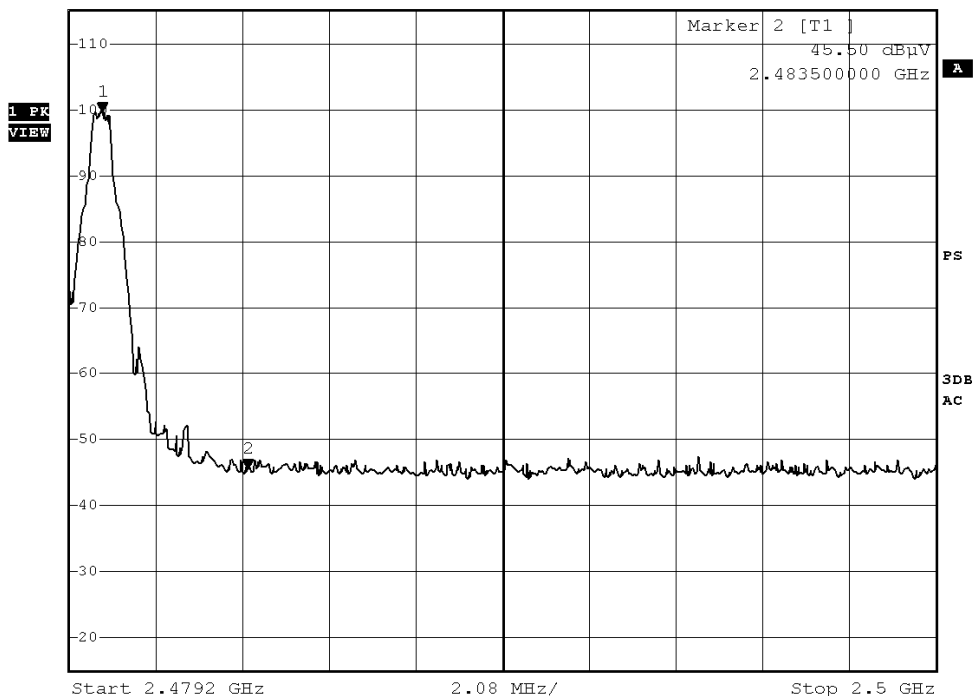
Band-edge Compliance of RF Emissions – Highest (GFSK)



*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 99.59 dBμV
*SWT 5 ms 2.479990400 GHz

Ref 115 dBμV

*Att 30 dB



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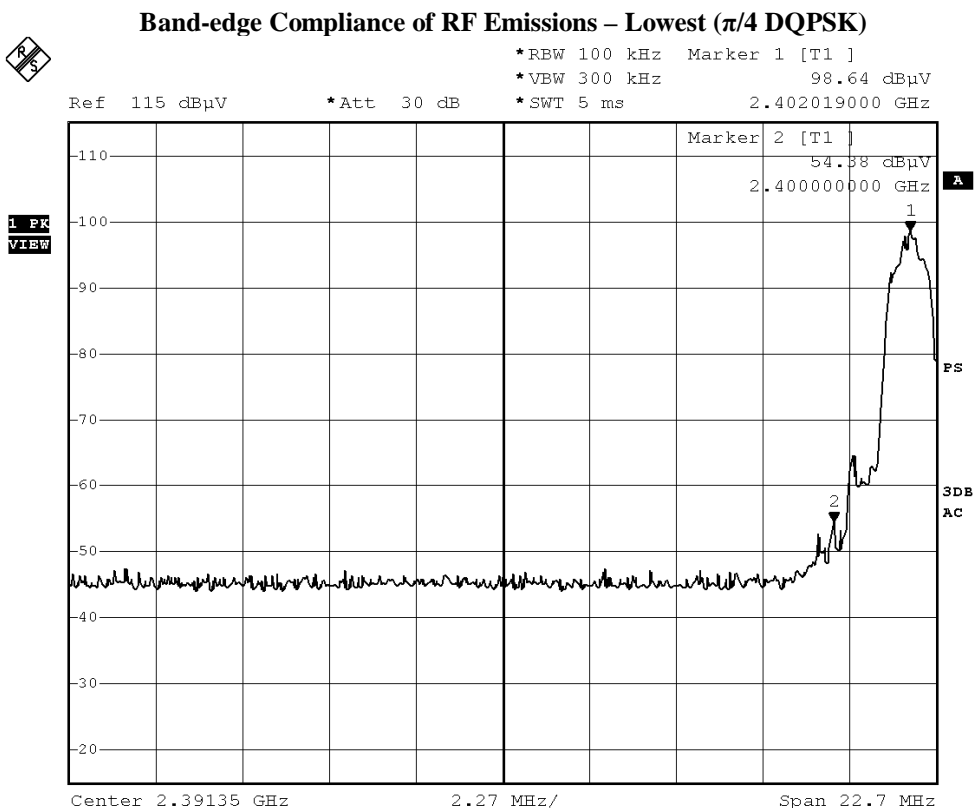


STC Test Report

Date : 2013-03-05

Page 54 of 76

No. : DM110386



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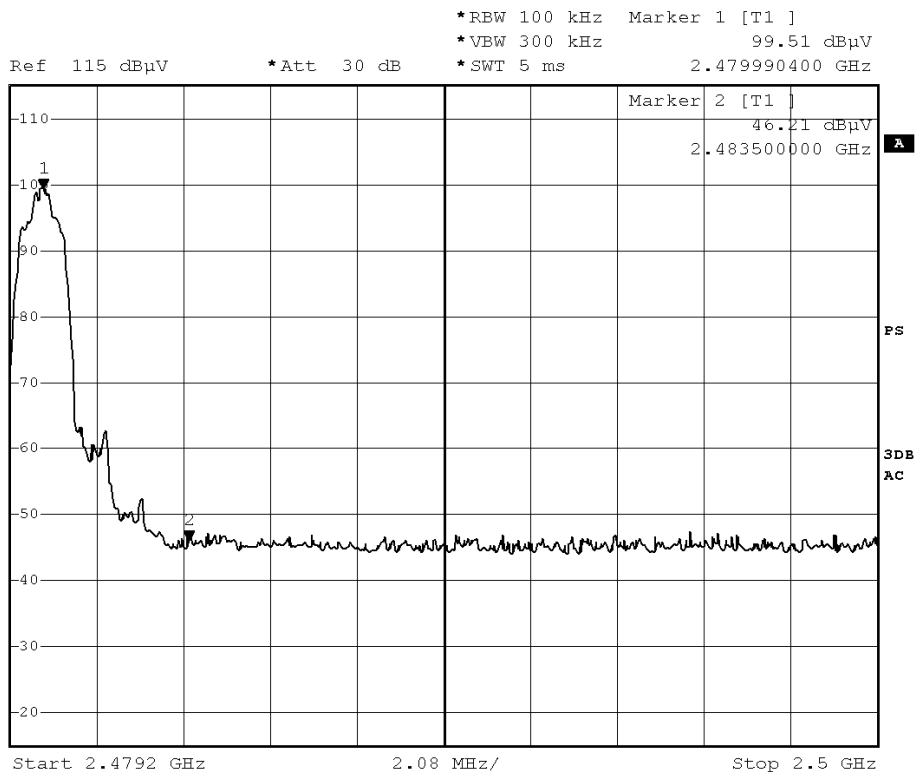
STC Test Report

Date : 2013-03-05

Page 55 of 76

No. : DM110386

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



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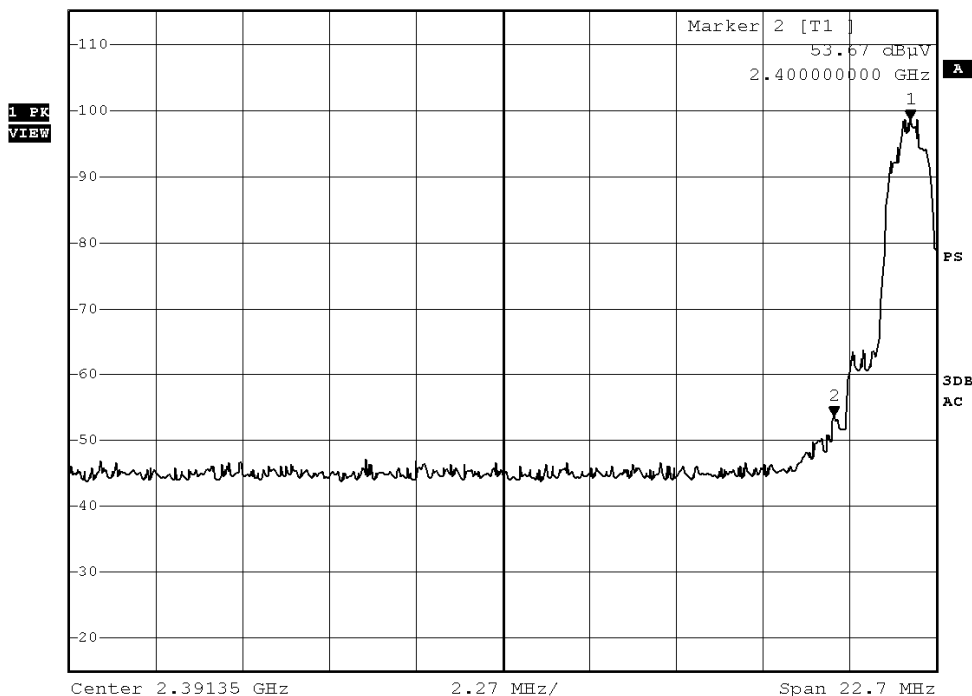
Page 56 of 76

No. : DM110386

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



Ref 115 dBμV *Att 30 dB *RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 98.67 dBμV
*SWT 5 ms 2.402019000 GHz



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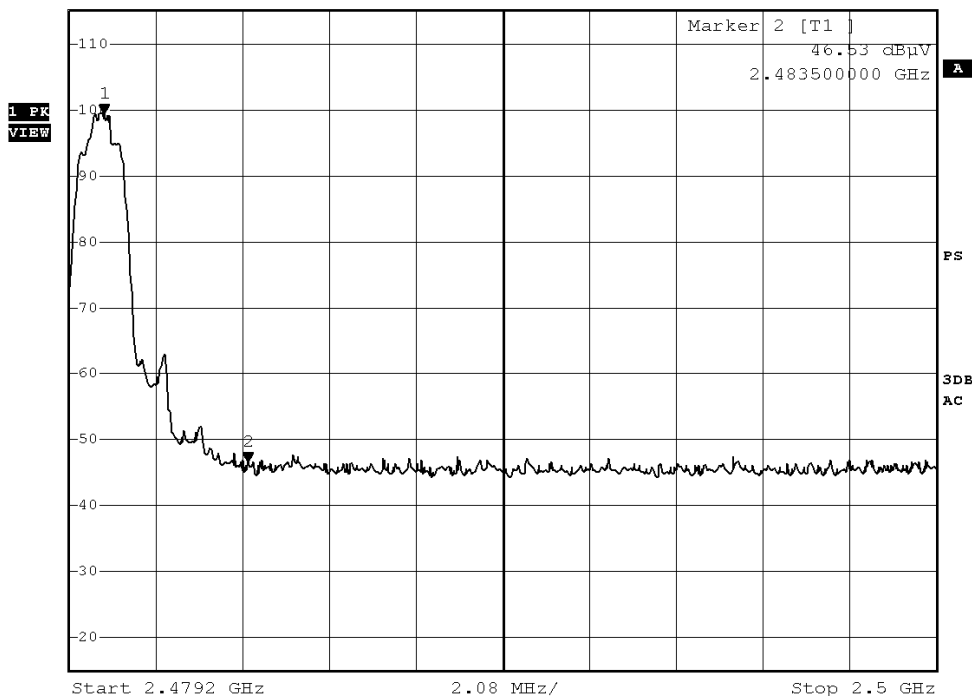
Page 57 of 76

No. : DM110386

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



Ref 115 dBμV *Att 30 dB *RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 99.50 dBμV
*SWT 5 ms 2.480032000 GHz



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STC Test Report

Date : 2013-03-05

Page 58 of 76

No. : DM110386

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 [RP-SMA Right Angle Antenna] which is attached to the main unit and attached on PCB board, the antenna gain = 2.2dBi. All component install on inside of EUT.

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STC Test Report

Date : 2013-03-05

Page 59 of 76

No. : DM110386

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.

EUT Pseudorandom Hopping Algorithm

The EUT is a Bluetooth device, the Pseudo-random hopping pattern; hopping characteristics and algorithm are based on the Bluetooth specification.

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STC Test Report

Date : 2013-03-05

Page 60 of 76

No. : DM110386

Occupancy Time (Dwell time)

Requirements:

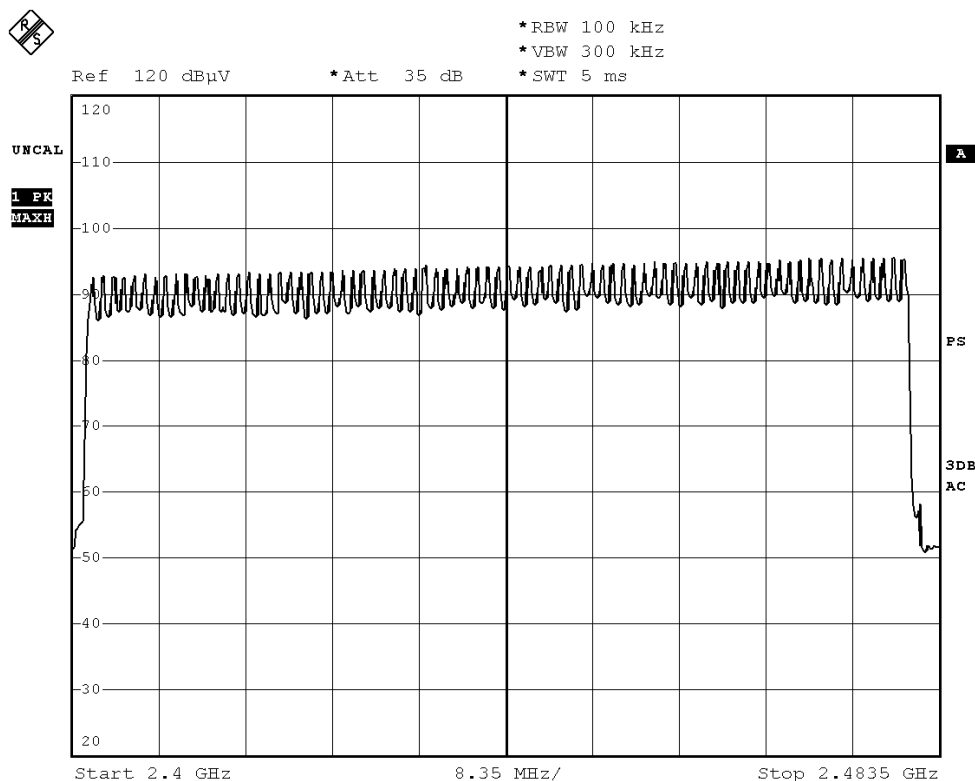
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channel employed.
No requirements for Digital Transmission System.

Dwell Time = Pulse Duration * hop rate / number of channel * observation duration

Observed duration: 0.4s x 79 = 31.6s

Measurement Data:

Channel Occupied in 8DPSK: 79 of 79 Channel



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Date : 2013-03-05

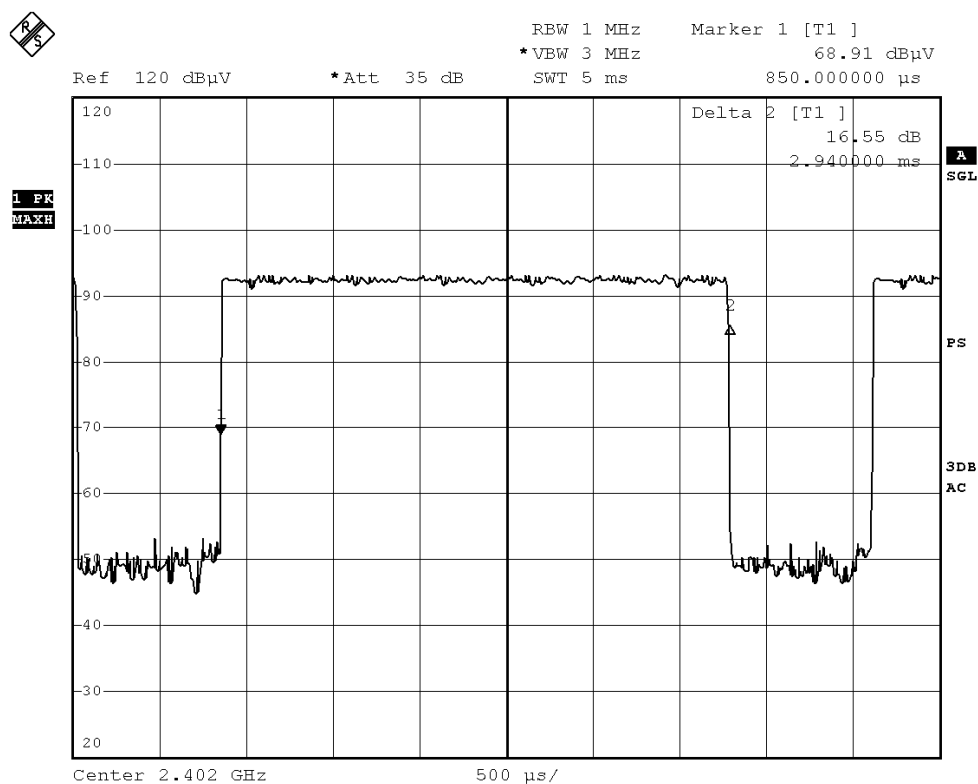
Page 61 of 76

No. : DM110386

DH5 Packet:

DH5 Packet permit maximum $1600/79/6 = 3.37$ hops per second in each channel (5 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times $3.37 \times 31.6 = 106.6$ within 31.6 seconds

Fig. A
[Pulse duration of Lowest Channel]



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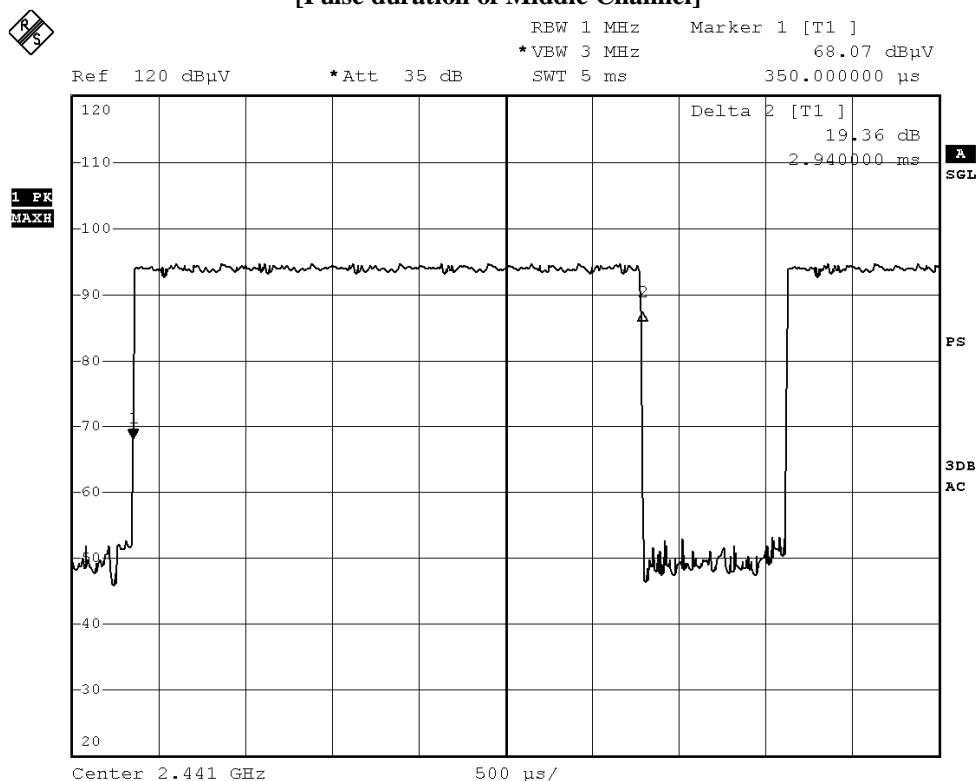
STC Test Report

Date : 2013-03-05

Page 62 of 76

No. : DM110386

Fig. B
[Pulse duration of Middle Channel]



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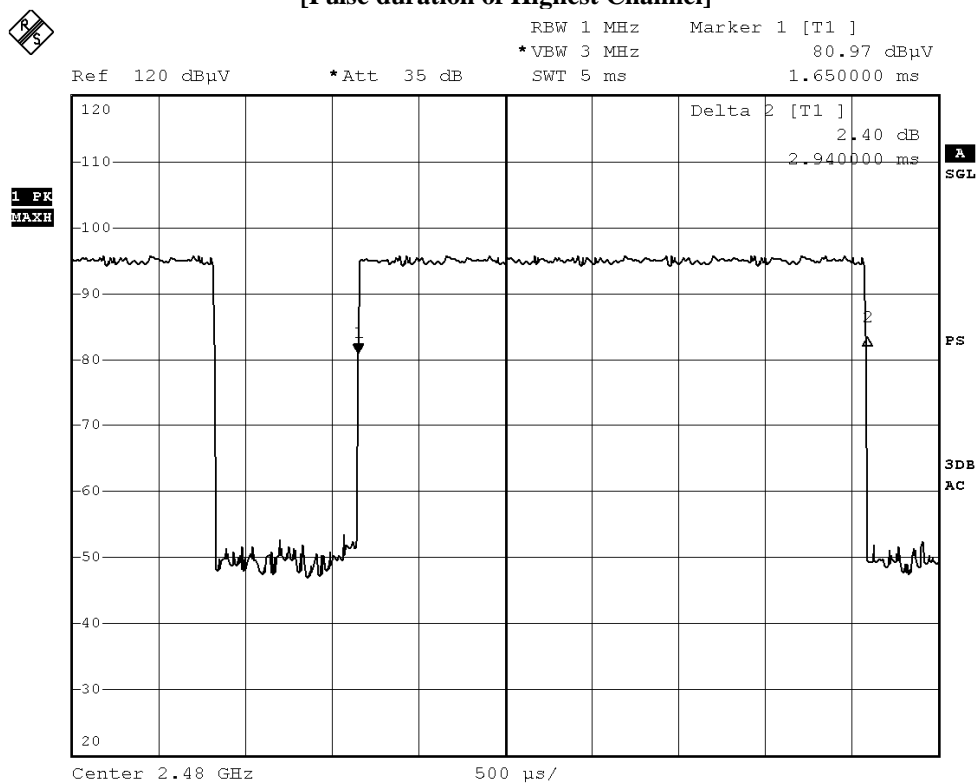
STC Test Report

Date : 2013-03-05

Page 63 of 76

No. : DM110386

Fig. C
[Pulse duration of Highest Channel]



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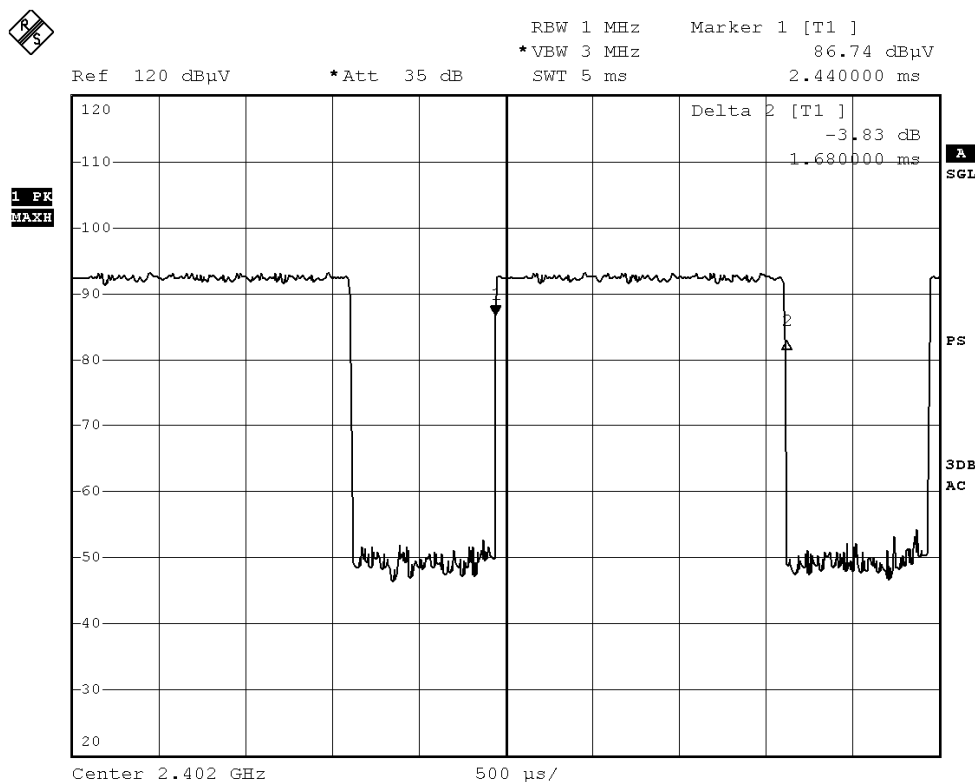
Page 64 of 76

No. : DM110386

DH3 Packet:

DH3 Packet permit maximum $1600/79/4 = 5.06$ hops per second in each channel (3 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times $5.06 \times 31.6 = 160$ within 31.6 seconds

Fig. D
[Pulse duration of Lowest Channel]



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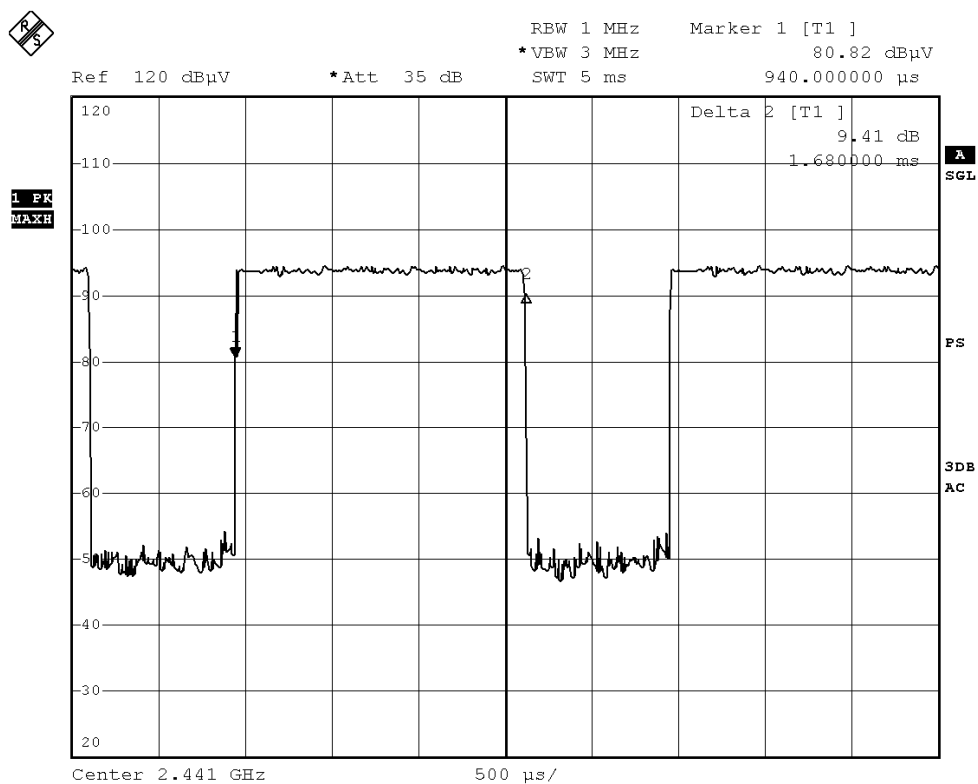
STC Test Report

Date : 2013-03-05

Page 65 of 76

No. : DM110386

Fig. E
[Pulse duration of Middle Channel]



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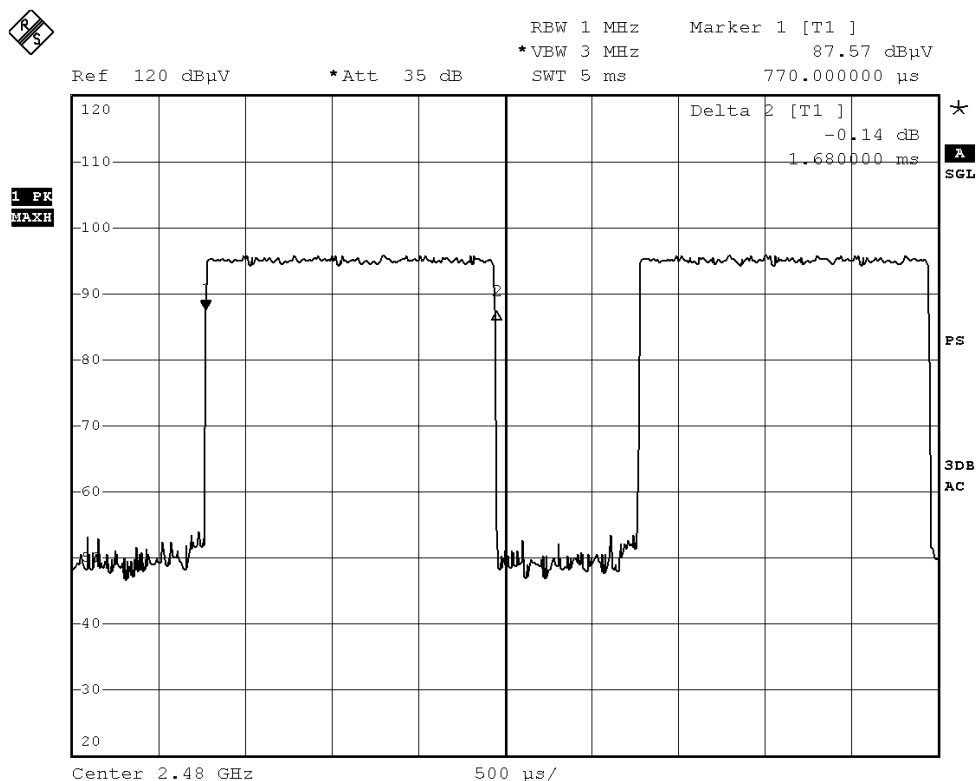
STC Test Report

Date : 2013-03-05

Page 66 of 76

No. : DM110386

Fig. F
[Pulse duration of Highest Channel]



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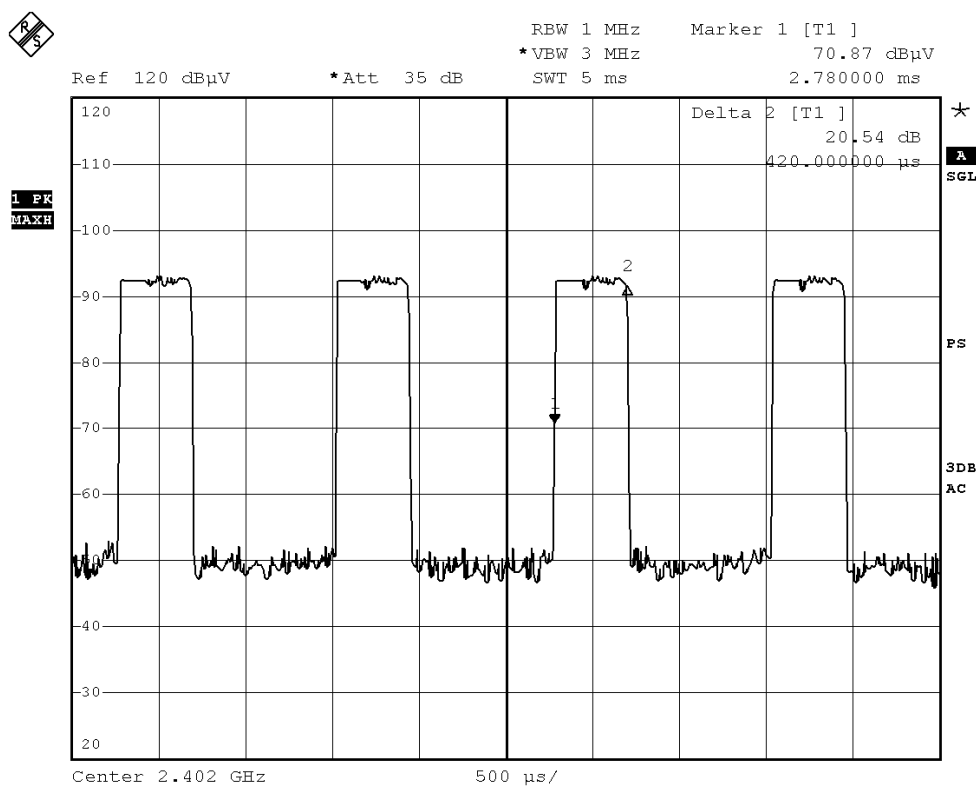
Page 67 of 76

No. : DM110386

DH1 Packet:

DH1 Packet permit maximum $1600/79/2 = 10.12$ hops per second in each channel (3 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times $10.12 \times 31.6 = 320$ within 31.6 seconds

Fig. G
[Pulse duration of Lowest Channel]



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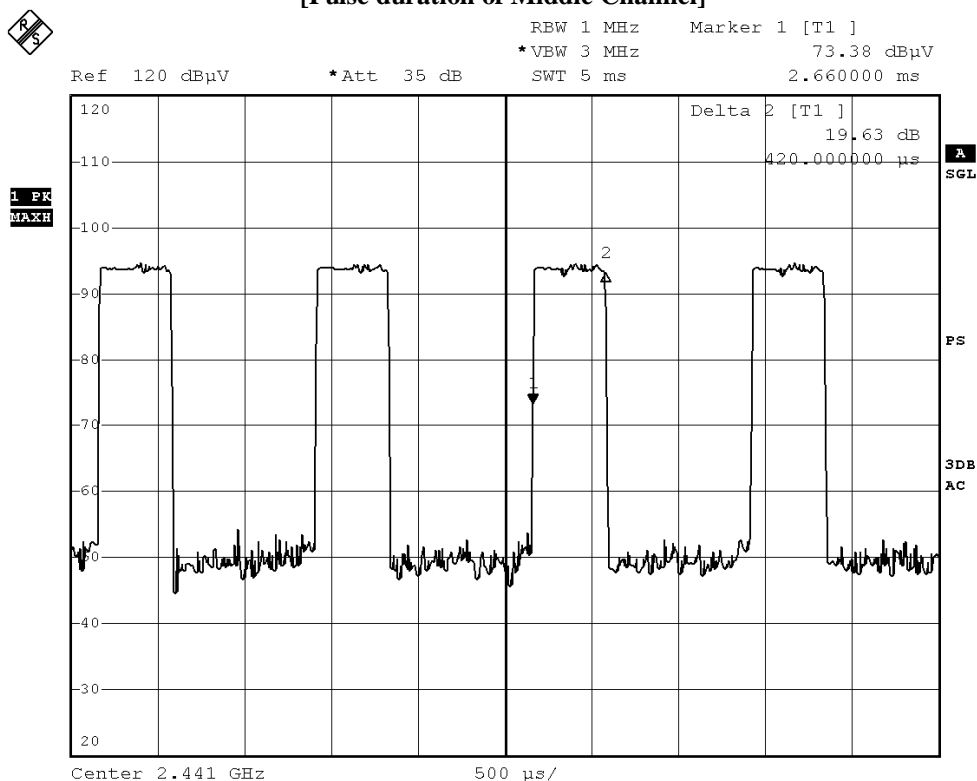
STC Test Report

Date : 2013-03-05

Page 68 of 76

No. : DM110386

Fig. H
[Pulse duration of Middle Channel]



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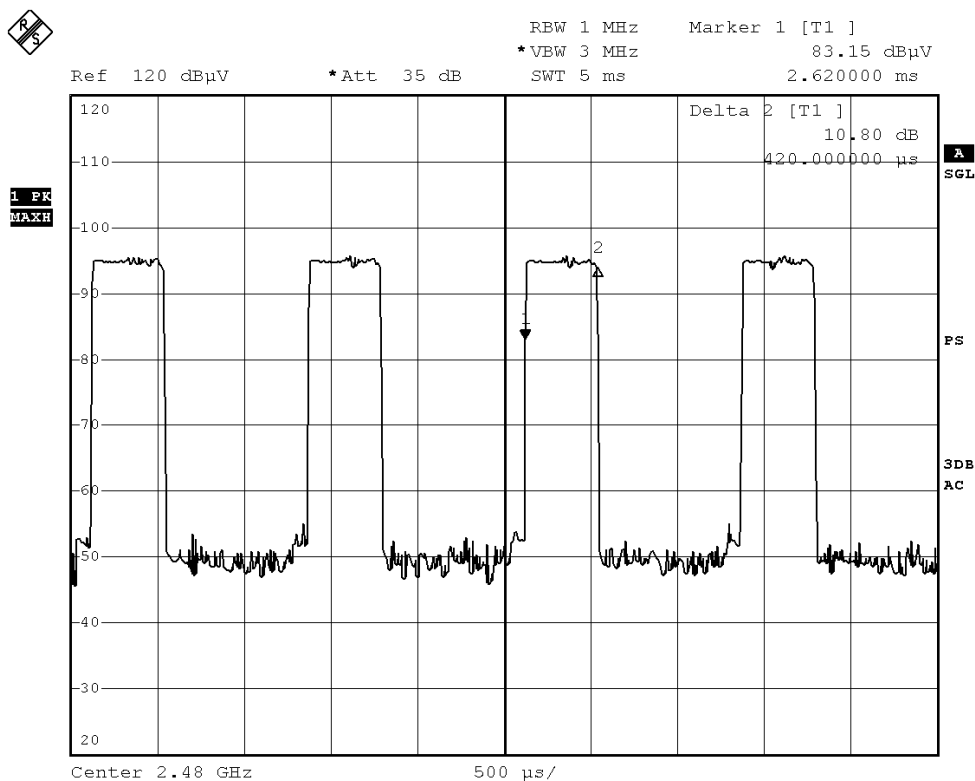
STC Test Report

Date : 2013-03-05

Page 69 of 76

No. : DM110386

Fig. I
[Pulse duration of Highest Channel]



Time of occupancy (Dwell Time):

Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Results
DH5	2402	2.940	0.314	0.400	Complies
DH5	2441	2.940	0.314	0.400	Complies
DH5	2480	2.940	0.314	0.400	Complies
DH3	2402	1.680	0.269	0.400	Complies
DH3	2441	1.680	0.269	0.400	Complies
DH3	2480	1.680	0.269	0.400	Complies
DH1	2402	0.420	0.134	0.400	Complies
DH1	2441	0.420	0.134	0.400	Complies
DH1	2480	0.420	0.134	0.400	Complies

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STC Test Report

Date : 2013-03-05

Page 70 of 76

No. : DM110386

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	2013.03.15	2014.03.15
EMD036	EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	100388	2012.07.06	2013.07.06
EMD061	Biconilog Antenna	ETS.LINDGREN	3142C	00060439	2012.11.03	2014.11.03
EMD062	Double-Ridged Waveguide (1GHz – 18GHz)	ETS.LINDGREN	3117	00075933	2012.11.28	2014.11.28
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
EMD124	Loop Antenna	ETS-Lindgren	6502	00104905	2012.03.26	2014.03.26
EMD131	Standard Gain Horn Antenna (18GHz – 26.5GHz)	Chengdu AINFO Inc.	JTXLB-42-15-C-KF	J2021100721001	2013.01.25	2015.01.25

Conducted Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EMD003	IMPULSEGENERATOR PULSE LIMITER	ROHDE & SCHWARZ	ESH3-Z2	100071	2013.03.15	2014.03.15
EMD022	EMI Test Receiver	ROHDE & SCHWARZ	ESCS 30	100314	2013.03.15	2014.03.15
EMD041	TWO-LINE V-NETWORK	ROHDE & SCHWARZ	ENV216	100261	2012.07.06	2013.07.06
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
TBD To Be Determined

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STC Test Report

Date : 2013-03-05

Page 71 of 76

No. : DM110386

Appendix B

Ancillary Equipment

ITEM NO.	DESCRIPTION	MODEL NO.	FCC ID	REMARK
1	iPod Touch	A1367	BCG-E2407	N/A

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STC Test Report

Date : 2013-03-05

Page 72 of 76

No. : DM110386

Appendix C

Photographs of EUT

Front View of the product



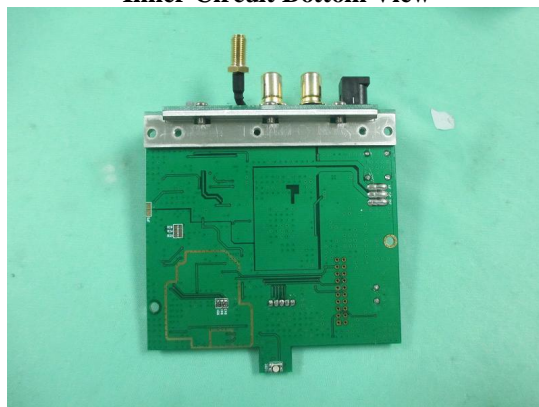
Rear View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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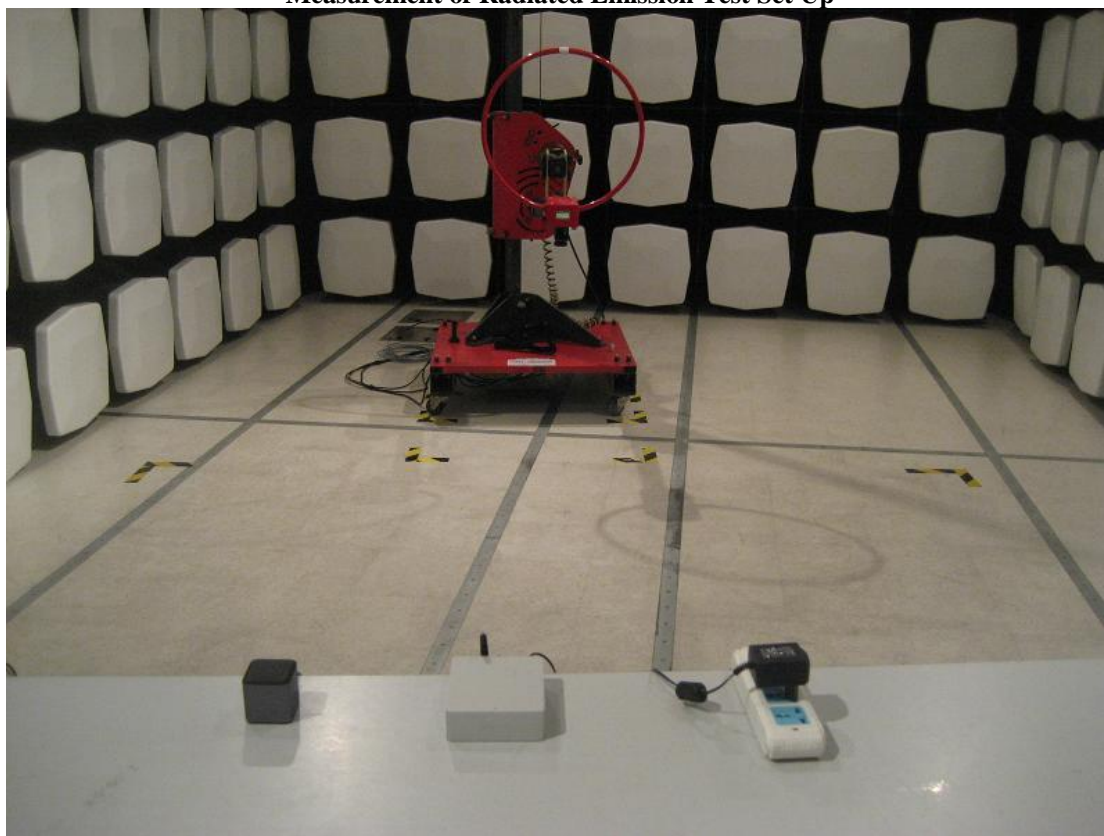
Date : 2013-03-05

Page 73 of 76

No. : DM110386

Photographs of EUT

Measurement of Radiated Emission Test Set Up



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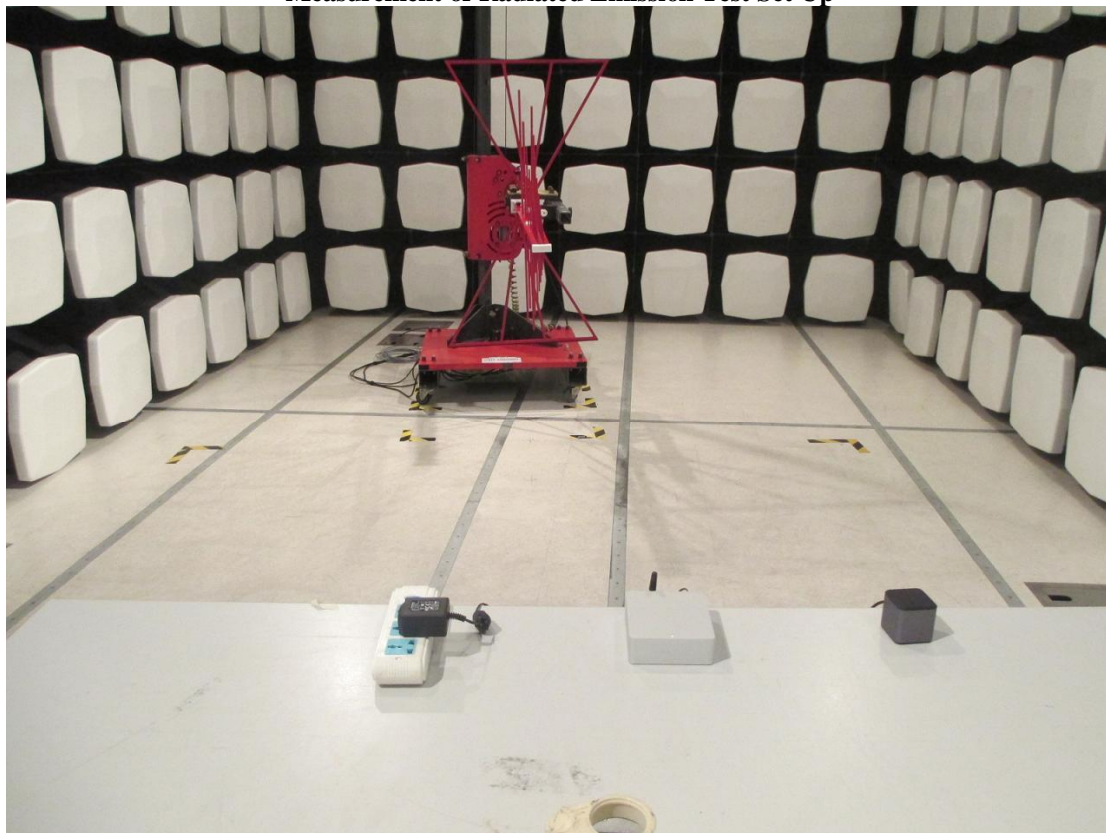
Date : 2013-03-05

Page 74 of 76

No. : DM110386

Photographs of EUT

Measurement of Radiated Emission Test Set Up



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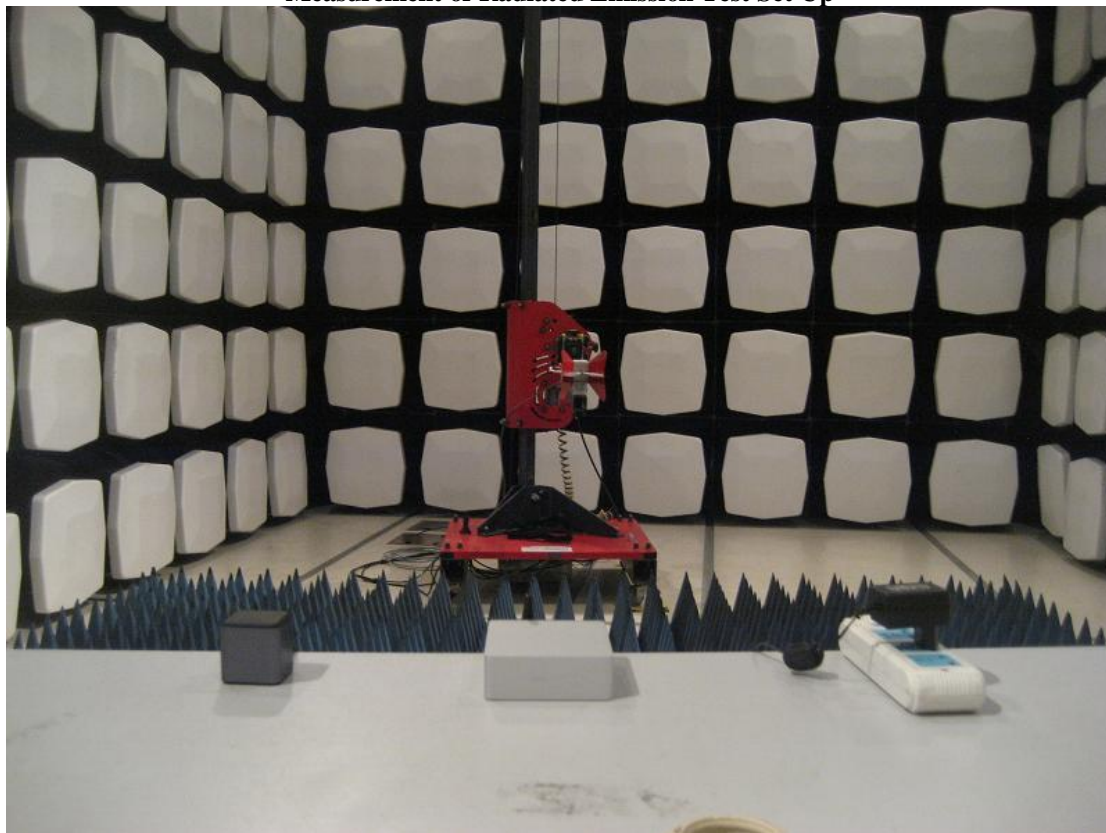
Date : 2013-03-05

Page 75 of 76

No. : DM110386

Photographs of EUT

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STC Test Report

Date : 2013-03-05

Page 76 of 76

No. : DM110386

Photographs of EUT

Measurement of Conducted Emission Test Set Up



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