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Report On

FCC Testing of the Sharp SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V), Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 15C (Bluetooth)

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FCC ID: APYHRO00218

Document 75929719 Report 12 Issue 1

May 2015



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COMMERCIAL-IN-CONFIDENCE

REPORT ON

FCC Testing of the Sharp SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V), Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 15C (Bluetooth)

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May 2015

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DATED

18 May 2015

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15C. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

T Guy

Document 75929719 Report 12 Issue 1

M Toubella





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SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V),
Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart phone with
Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 15C (Bluetooth)



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1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC Testing of the Sharp SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V), Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS to the requirements of FCC 47 CFR Part 15C.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Sharp Corporation
Model Number(s)	SHV32
Serial Number(s)	IMEI 004401115406791 IMEI 004401115406536
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 15C (2014)
Incoming Release Date	Application Form 07 April 2015
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	10477 02 March 2015
Start of Test	14 April 2015
Finish of Test	06 May 2015
Name of Engineer(s)	T Guy M Toubella
Related Document(s)	ANSI C63.10: 2009



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Bluetooth				
2.1	15.207	AC Line Conducted Emissions	Pass	
2.2	15.247 (a)(1)(iii)	Frequency Hopping Systems - Number of Hopping Channels	Pass	
2.3	15.247 (a)(1)	Frequency Hopping Systems - 20 dB Bandwidth	Pass	
2.4	15.247 (a)(1)	Frequency Hopping Systems - Channel Separation	Pass	
2.5	15.247 (a)(1)(iii)	Frequency Hopping Systems - Average Time of Occupancy	Pass	
2.6	15.247 (b)(1)	Maximum Conducted Output Power	Pass	
2.7	15.247 (d) and 15.205	Spurious Radiated Emissions	Pass	
2.8	15.205	Restricted Band Edges	Pass	
2.9	15.247 (d)	Authorised Band Edges	Pass	



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1.3 APPLICATION FORM

EQUIPMENT DESCRIPTION	
Model Name/Number	SHV32
Part Number	CA306
FCC ID (if applicable)	APYHRO00218
Industry Canada ID (if applicable)	N/A
Technical Description (Please provide a brief description of the intended use of the equipment)	Hepta-band LTE(B1/B3/B5/B17/B26/B28/B41), Dual-band WCDMA(FDD-I/V), Quad-band GSM(850/900/1800/1900) Mini Phablet with Bluetooth, WLAN, NFC and GPS

Types of Modulations used by the Equipment	
<input checked="" type="checkbox"/>	FHSS
<input checked="" type="checkbox"/>	Other forms of modulation
In case of FHSS Modulation	
In case of non-Adaptive Frequency Hopping equipment:	
Number of Hopping Frequencies: N/A	
In case of Adaptive Frequency Hopping Equipment:	
Maximum number of Hopping Frequencies: Bluetooth(BR/EDR);79/ LE; 40	
Minimum number of Hopping Frequencies: 20	
Dwell Time: 3.75ms	
Minimum Channel Occupation Time: 1.25ms (5.5ms maximum)	
Adaptive / non-adaptive equipment:	
<input type="checkbox"/>	non-adaptive Equipment
<input checked="" type="checkbox"/>	adaptive Equipment without the possibility to switch to a non-adaptive mode
<input type="checkbox"/>	adaptive Equipment which can also operate in a non-adaptive mode
In case of adaptive equipment:	
The Channel Occupancy Time implemented by the equipment: 13 ms	
<input checked="" type="checkbox"/>	The equipment has implemented an LBT based DAA mechanism
In case of equipment using modulation different from FHSS:	
<input type="checkbox"/>	The equipment is Frame Based equipment
<input type="checkbox"/>	The equipment is Load Based equipment
<input checked="" type="checkbox"/>	The equipment can switch dynamically between Frame Based and Load Based equipment
The CCA time implemented by the equipment: 34 µs	
The value q as referred to in clause 4.3.2.5.2.2.2 is: 32	
<input type="checkbox"/>	The equipment has implemented an non-LBT based DAA mechanism
<input type="checkbox"/>	The equipment can operate in more than one adaptive mode



In case of non-adaptive Equipment:	
The maximum RF Output Power (e.i.r.p.): Bluetooth;7dBm/ WLAN;14.0 dBm	
The maximum (corresponding) Duty Cycle: %	
Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared):	
The worst case operational mode for each of the following tests:	
RF Output Power: Max.7dBm/ Nominal 4dBm(Bluetooth Power class-1), Max. 14dBm(IEEE802.11b/g/n)	
Power Spectral Density:	
Duty cycle, Tx-Sequence, Tx-gap:	
Dwell time, Minimum Frequency Occupation & Hopping Sequence (only for FHSS equipment): To be determined by test lab.	
Hopping Frequency Separation (only for FHSS equipment): To be determined by test lab.	
Medium Utilisation: To be determined by test lab.	
Adaptivity & Receiver Blocking: To be determined by test lab.	
Occupied Channel Bandwidth: To be determined by test lab.	
Transmitter unwanted emissions in the OOB domain: To be determined by test lab.	
Transmitter unwanted emissions in the spurious domain: To be determined by test lab.	
Receiver spurious emissions: To be determined by test lab.	
The different transmit operating modes (tick all that apply):	
<input type="checkbox"/>	Operating mode 1: Single Antenna Equipment
<input type="checkbox"/>	Equipment with only 1 antenna
<input type="checkbox"/>	Equipment with 2 diversity antennas but only 1 antenna active at any moment in time
<input type="checkbox"/>	Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)
<input checked="" type="checkbox"/>	Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming
<input type="checkbox"/>	Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode)
<input checked="" type="checkbox"/>	High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1
<input type="checkbox"/>	High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2
<i>NOTE: Add more lines if more channel bandwidths are supported.</i>	
<input type="checkbox"/>	Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming
<input type="checkbox"/>	Single spatial stream / Standard throughput (e.g. IEEE 802.11™ [i.3] legacy mode)
<input type="checkbox"/>	High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1
<input type="checkbox"/>	High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2
<i>NOTE: Add more lines if more channel bandwidths are supported.</i>	
In case of Smart Antenna Systems:	
The number of Receive chains: 2	
The number of Transmit chains: 2	
<input checked="" type="checkbox"/>	symmetrical power distribution
<input type="checkbox"/>	asymmetrical power distribution
In case of beam forming, the maximum beam forming gain:	
<i>NOTE: Beam forming gain does not include the basic gain of a single antenna.</i>	



Operating Frequency Range(s) of the equipment:	
Operating Frequency Range 1: 2402 MHz to 2480 MHz	Bluetooth (e.g Bluetooth for EU)
Operating Frequency Range 2: 2412 MHz to 2472 MHz	WLAN for EU (e.g WLAN for EU)
Operating Frequency Range 3: MHz to MHz	(e.g Bluetooth for FCC and/or Industry Canada)
Operating Frequency Range 4: MHz to MHz	(e.g WLAN for FCC and/or Industry Canada)
<i>NOTE: Add more lines if more Frequency Ranges are supported.</i>	
Occupied Channel Bandwidth(s):	
Occupied Channel Bandwidth1: 1 MHz to 2 (LE) MHz	
Occupied Channel Bandwidth2: 20 (802.11 b/g/n) MHz to MHz	
<i>NOTE: Add more lines if more channel bandwidths are supported.</i>	
Type of Equipment (stand-alone, combined, plug-in radio device, etc.):	
<input checked="" type="checkbox"/>	Stand-alone
<input type="checkbox"/>	Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)
<input type="checkbox"/>	Plug-in radio device (Equipment intended for a variety of host systems)
<input type="checkbox"/>	Other
The extreme operating conditions that apply to the equipment:	
Operating temperature range: -10 °C to 55 °C	
Operating voltage range: 3.7 V to 4.0 V	<input type="checkbox"/> AC <input checked="" type="checkbox"/> DC
Details provided are for the:	
<input checked="" type="checkbox"/>	stand-alone equipment
<input type="checkbox"/>	combined (or host) equipment
<input type="checkbox"/>	test jig



The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels:			
Antenna Type:			
<input checked="" type="checkbox"/> Integral Antenna			
Antenna Gain: 0 dBi			
If applicable, additional beamforming gain (excluding basic antenna gain): 0 dB			
<input checked="" type="checkbox"/> Temporary RF connector provided			
<input type="checkbox"/> No temporary RF connector provided			
<input type="checkbox"/> Dedicated Antennas (equipment with antenna connector)			
<input type="checkbox"/> Single power level with corresponding antenna(s)			
<input type="checkbox"/> Multiple power settings and corresponding antenna(s)			
Number of different Power Levels:			
Power Level 1: dBm			
Power Level 2: dBm			
Power Level 3: dBm			
Power Level 4: dBm			
<i>NOTE 1: Add more lines in case the equipment has more power levels.</i>			
<i>NOTE 2: These power levels are conducted power levels (at antenna connector).</i>			
For each of the Power Levels, provide the intended antenna assemblies, their corresponding gains (G) and the resulting e.i.r.p. levels also taking into account the beamforming gain (Y) if applicable			
Power Level 1: 13 dBm			
Number of antenna assemblies provided for this power level:			
Assembly #	Gain (dBi)	e.i.r.p (dBm)	Part number or model number
1			
2			
3			
4			
<i>NOTE: Add more rows in case more antenna assemblies are supported for this power level.</i>			
Power Level 2: 0 dBm			
Number of antenna assemblies provided for this power level:			
Assembly #	Gain (dBi)	e.i.r.p (dBm)	Part number or model number
1			
2			
3			
4			
<i>NOTE: Add more rows in case more antenna assemblies are supported for this power level.</i>			
Power Level 3: dBm			
Number of antenna assemblies provided for this power level:			
Assembly #	Gain (dBi)	e.i.r.p (dBm)	Part number or model number
1			
2			
3			
4			
<i>NOTE: Add more rows in case more antenna assemblies are supported for this power level.</i>			



The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:	
Details provided are for the: <input checked="" type="checkbox"/> stand-alone equipment	
<input type="checkbox"/> combined (or host) equipment	
<input type="checkbox"/> test jig	
Supply Voltage <input type="checkbox"/> AC mains State AC voltage	
<input checked="" type="checkbox"/> State DC voltage 4.0	
In case of DC, indicate the type of power source	
<input type="checkbox"/> Internal Power Supply	
<input type="checkbox"/> External Power Supply or AC/DC adapter	
<input checked="" type="checkbox"/> Battery	
<input type="checkbox"/> Other:	
Describe the test modes available which can facilitate testing:	
The equipment type (e.g. Bluetooth®, IEEE 802.11™ [i.3], proprietary, etc.):	
Bluetooth Ver.4 and , IEEE 802.11b/g/n	
Combination for testing (see clause 5.1.3.3 of EN 300 328 V1.8.1)	
From all combinations of conducted power settings and intended antenna assembly(ies) specified in clause 3.1 m), specify the combination resulting in the highest e.i.r.p. for the radio equipment.	
Unless otherwise specified in EN 300 328, this power setting is to be used for testing against the requirements of EN 300 328. In case there is more than one such conducted power setting resulting in the same (highest) e.i.r.p. level, the highest power setting is to be used for testing. See also EN 300 328, clause 5.1.3.3.	
Highest overall e.i.r.p. value: dBm	
Corresponding Antenna assembly gain: 0 dBi	Antenna Assembly #:
Corresponding conducted power setting: 14 dBm	Listed as Power Setting #:
(also the power level to be used for testing)	
Additional information provided by the applicant	
Modulation	
ITU Class(es) of emission:	
Can the transmitter operate unmodulated? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Duty Cycle	
The transmitter is intended for:	
<input type="checkbox"/> Continuous duty	
<input type="checkbox"/> Intermittent duty	
<input checked="" type="checkbox"/> Continuous operation possible for testing purposes	
About the UUT	
<input type="checkbox"/> The equipment submitted are representative production models	
<input checked="" type="checkbox"/> If not, the equipment submitted are pre-production models ?	
<input checked="" type="checkbox"/> If pre-production equipment are submitted, the final production equipment will be identical in all respects with the equipment tested	
<input type="checkbox"/> If not, supply full details	
<input type="checkbox"/> The equipment submitted is CE marked	
<input type="checkbox"/> In addition to the CE mark, the Class-II identifier (Alert Sign) is affixed.	



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Additional items and/or supporting equipment provided	
<input type="checkbox"/>	Spare batteries (e.g. for portable equipment)
<input checked="" type="checkbox"/>	Battery charging device
<input type="checkbox"/>	External Power Supply or AC/DC adapter
<input type="checkbox"/>	Test Jig or interface box
<input type="checkbox"/>	RF test fixture (for equipment with integrated antennas)
<input type="checkbox"/>	Host System
	Manufacturer
	Model
	Model Name
<input type="checkbox"/>	Combined equipment
	Manufacturer
	Model
	Model Name
<input type="checkbox"/>	User Manual
<input type="checkbox"/>	Technical documentation (Handbook and circuit diagrams)

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Signature:  Name: Kiyoharu Kaidoh
 Position held: Chief Date: 7th April, 2015



Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V), Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 4.0 V DC supply.

FCC Measurement Facility Registration Number
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard or test plan were made during testing.

1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.



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SECTION 2

TEST DETAILS

FCC Testing of the
Sharp SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V),
Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart phone with
Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 15C (Bluetooth)



Product Service

2.1 AC LINE CONDUCTED EMISSIONS

2.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.207

2.1.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406791 - Modification State 0

2.1.3 Date of Test

25 April 2015

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

The test was performed in accordance with ANSI C63.10, clause 6.2.

Remarks

A mains supply cable of 1 m length was used to supply mains power to the EUT from the LISN.

All final measurements were assessed against the Class B emission limits in Clause 15.207 of FCC 47 CFR Part 15.

2.1.6 Environmental Conditions

Ambient Temperature	20.5°C
Relative Humidity	33.0%

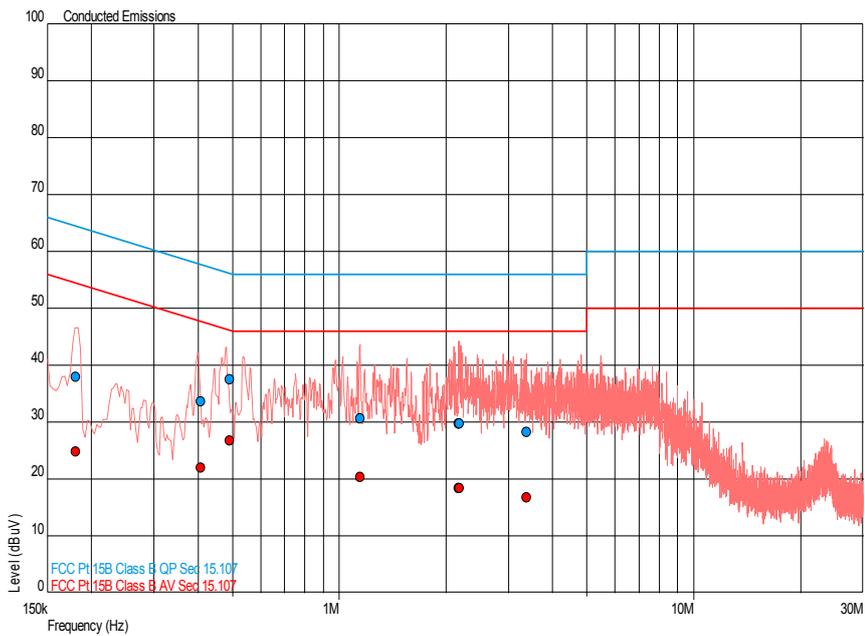


2.1.7 Test Results

Bluetooth, Live Line, AC Line Conducted Emissions Result

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dBµV)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dBµV)
0.181	38.1	64.4	-26.4	24.9	54.4	-29.5
0.407	33.7	57.7	-24.0	22.0	47.7	-25.7
0.490	37.6	56.2	-18.6	26.8	46.2	-19.4
1.145	30.7	56.0	-25.3	20.4	46.0	-25.6
2.169	29.8	56.0	-26.2	18.4	46.0	-27.6
2.183	29.7	56.0	-26.3	18.5	46.0	-27.5
3.373	28.3	56.0	-27.7	16.9	46.0	-29.1

Bluetooth, Live Line, AC Line Conducted Emissions Plot

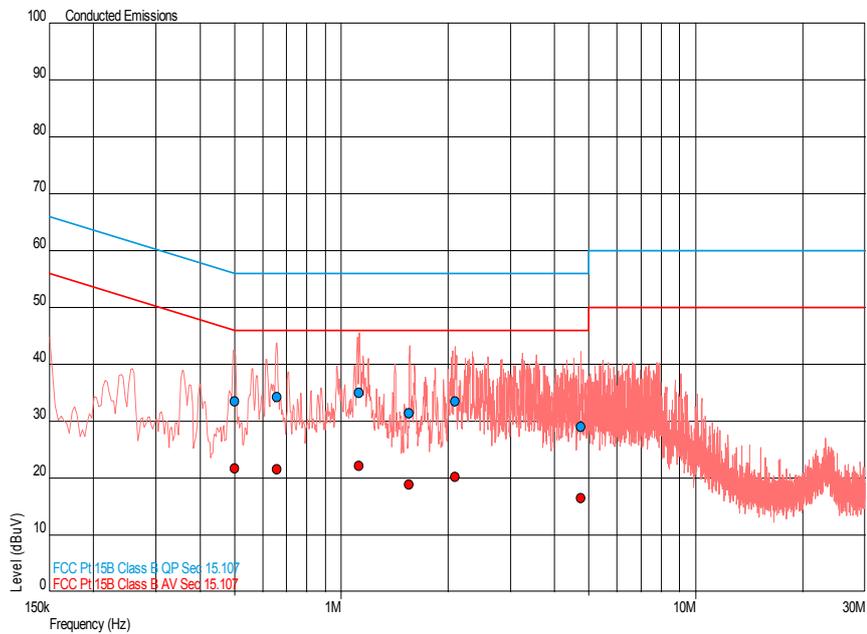




Bluetooth, Neutral Line, AC Line Conducted Emissions Result

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dBµV)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dBµV)
0.500	33.5	56.0	-22.5	21.8	46.0	-24.2
0.658	34.2	56.0	-21.8	21.6	46.0	-24.4
1.125	35.0	56.0	-21.0	22.1	46.0	-23.9
1.556	31.4	56.0	-24.6	18.9	46.0	-27.1
2.090	33.4	56.0	-22.6	20.3	46.0	-25.7
4.746	29.0	56.0	-27.0	16.4	46.0	-29.6

Bluetooth, Neutral Line, AC Line Conducted Emissions Plot



FCC 47 CFR Part 15, Limit Clause 15.207

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

*Decreases with the logarithm of the frequency.



Product Service

2.2 FREQUENCY HOPPING SYSTEMS - NUMBER OF HOPPING CHANNELS

2.2.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(1)(iii)

2.2.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406536 - Modification State 0

2.2.3 Date of Test

06 May 2015

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

The test was performed in accordance with ANSI C36.10, clause 7.7.3.

2.2.6 Environmental Conditions

Ambient Temperature	22.8°C
Relative Humidity	38.7%



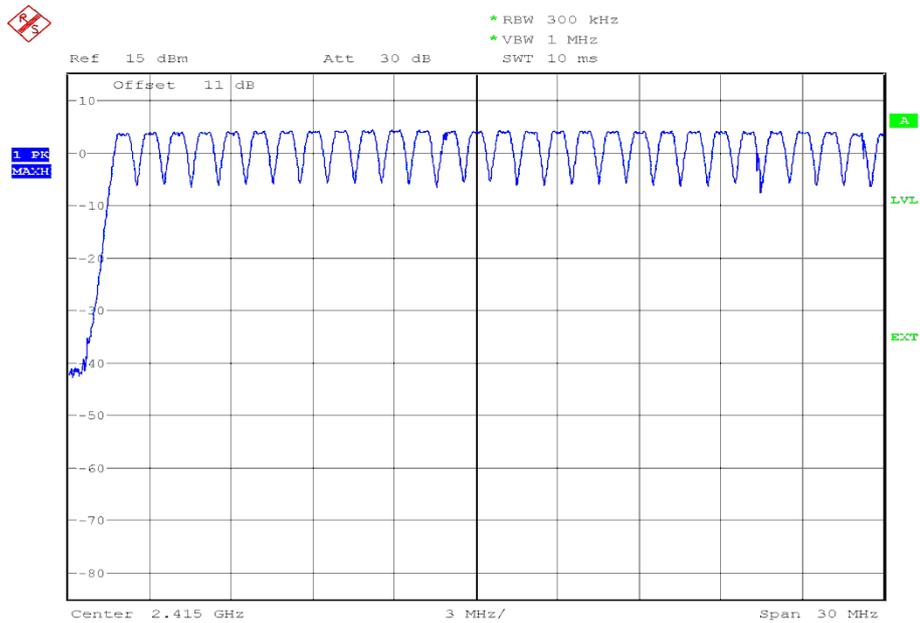
Product Service

2.2.7 Test Results

Bluetooth, Number of Hopping Channels Results

Number of Hopping Channels: 79

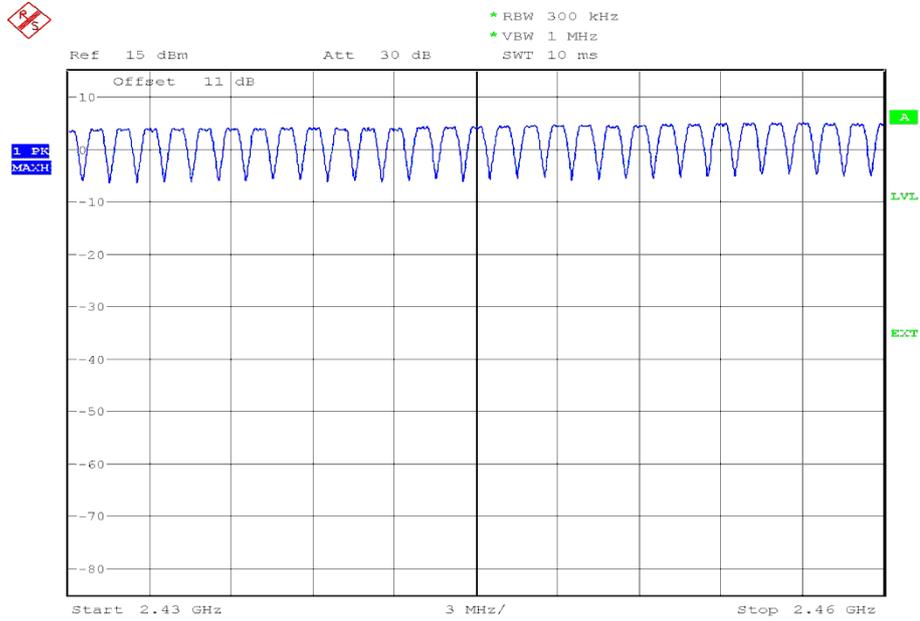
Bluetooth, Segment 1, Number of Hopping Channels Plot



Date: 6.MAY.2015 18:20:42

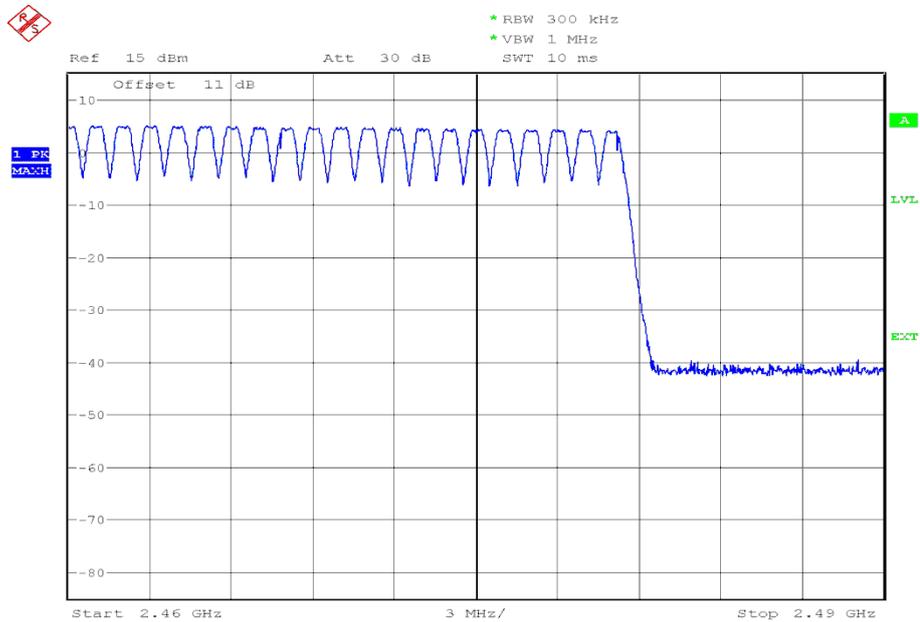


Bluetooth, Segment 2, Number of Hopping Channels Plot



Date: 6.MAY.2015 18:24:06

Bluetooth, Segment 3, Number of Hopping Channels Plot



Date: 6.MAY.2015 18:27:04

FCC 47 CFR Part 15, Limit Clause 15.247 (a)(1)(iii)

≥ 15 channels



Product Service

2.3 FREQUENCY HOPPING SYSTEMS - 20 dB BANDWIDTH

2.3.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(1)

2.3.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406536 - Modification State 0

2.3.3 Date of Test

14 April 2015

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Procedure

The test was performed in accordance with ANSI C36.10, clause 6.9.1.

2.3.6 Environmental Conditions

Ambient Temperature	25.3°C
Relative Humidity	34.2%



Product Service

2.3.7 Test Results

4.0 V DC Supply

Bluetooth, 20 dB Bandwidth Results

Modulation	2402 MHz	2441 MHz	2480 MHz
	kHz	kHz	kHz
GFSK	705	738	861
pi/4 DQPSK	1101	1158	1137
8-DPSK	1134	1134	1098

Bluetooth, 2402 MHz, GFSK, 20 dB Bandwidth Plot





Product Service

Bluetooth, 2402 MHz, pi/4 DQPSK, 20 dB Bandwidth Plot



Bluetooth, 2402 MHz, 8-DPSK, 20 dB Bandwidth Plot





Bluetooth, 2441 MHz, GFSK, 20 dB Bandwidth Plot



Bluetooth, 2441 MHz, pi/4 DQPSK, 20 dB Bandwidth Plot





Bluetooth, 2441 MHz, 8-DPSK, 20 dB Bandwidth Plot



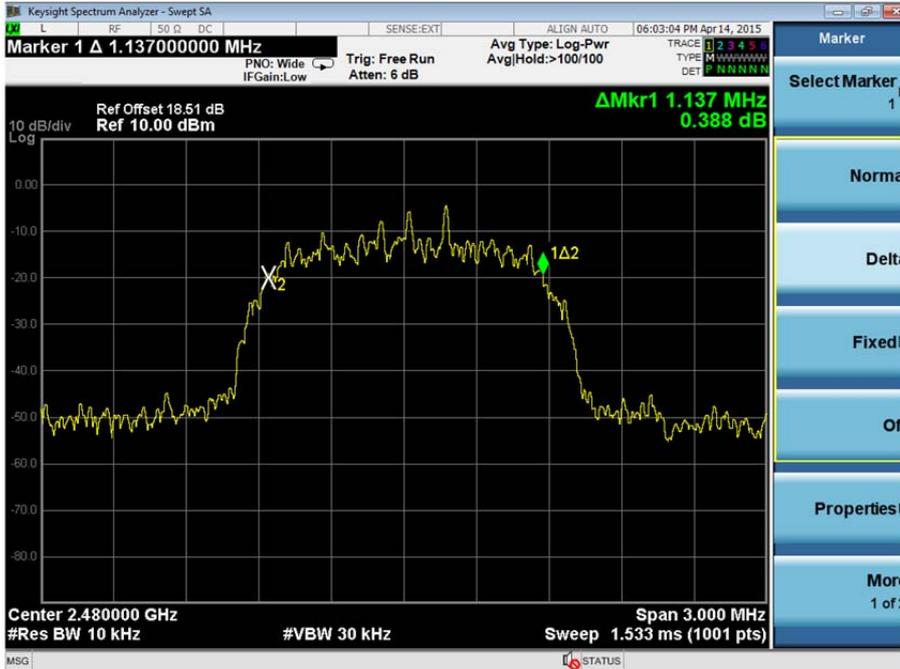
Bluetooth, 2480 MHz, GFSK, 20 dB Bandwidth Plot





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Bluetooth, 2480 MHz, pi/4 DQPSK, 20 dB Bandwidth Plot



Bluetooth, 2480 MHz, 8-DPSK, 20 dB Bandwidth Plot



FCC 47 CFR Part 15, Limit Clause

None specified.



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2.4 FREQUENCY HOPPING SYSTEMS - CHANNEL SEPARATION

2.4.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(1)

2.4.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406536 - Modification State 0

2.4.3 Date of Test

16 April 2015

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Procedure

The test was performed in accordance with ANSI C36.10, clause 7.7.2.

2.4.6 Environmental Conditions

Ambient Temperature	22.4°C
Relative Humidity	36.4%



Product Service

2.4.7 Test Results

4.0 V DC Supply

Bluetooth, Channel Separation Results

Modulation	Frequency Hopping
	MHz
GFSK	1.00
pi/4 DQPSK	0.99
8-DPSK	1.00

Bluetooth, GFSK, Channel Separation Plot





Bluetooth, pi/4 DQPSK, Channel Separation Plot



Bluetooth, 8-DPSK, Channel Separation Plot





Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (a)(1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the band 2400-2483.5 MHz 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 0.125 W.



Product Service

2.5 FREQUENCY HOPPING SYSTEMS - AVERAGE TIME OF OCCUPANCY

2.5.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(1)(iii)

2.5.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406536 - Modification State 0

2.5.3 Date of Test

17 April 2015 & 6 May 2015

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Test Procedure

The test was performed in accordance with ANSI C36.10, clause 7.7.4.

2.5.6 Environmental Conditions

Ambient Temperature	25.2°C
Relative Humidity	25.0%

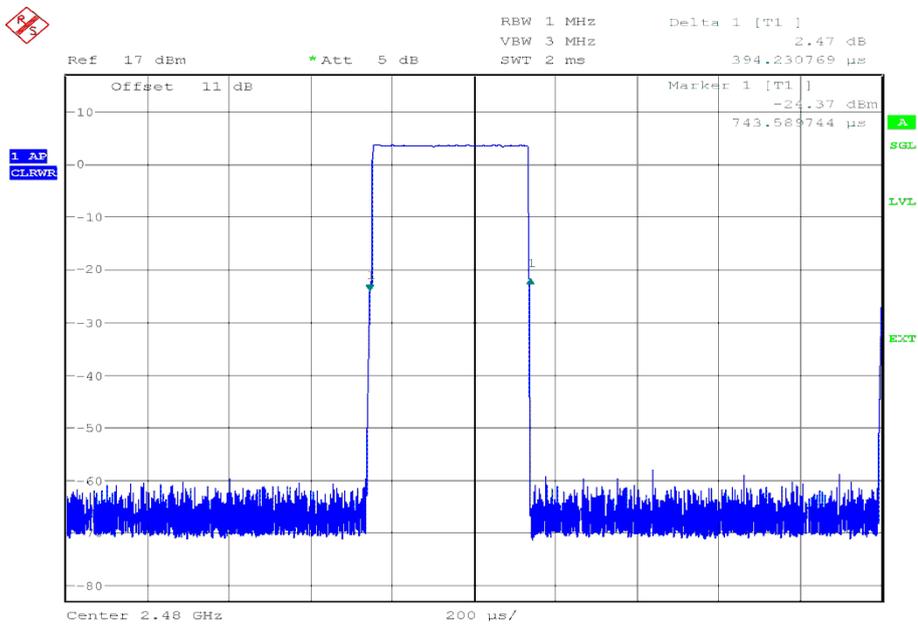


2.5.7 Test Results

Bluetooth, Average Time of Occupancy Results

Packet Type	Dwell Time (ms)	Number of Transmissions	Average Occupancy Time (ms)
DH1	0.39	320	124.80
DH3	1.64	162	265.68
DH5	2.89	109	315.01

Bluetooth, DH1, Average Time of Occupancy Plot

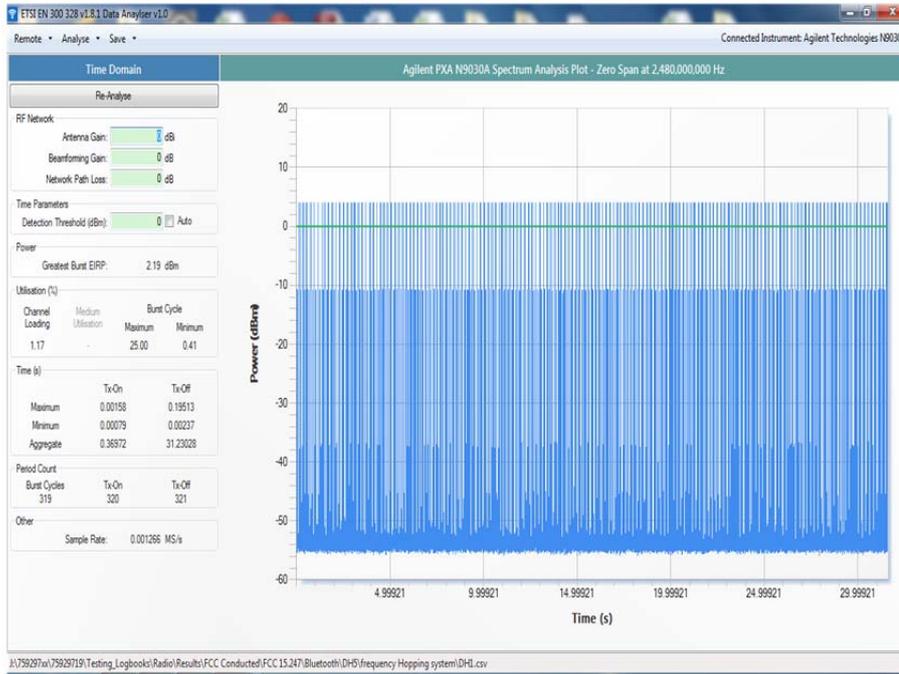


Date: 6.MAY.2015 17:44:21

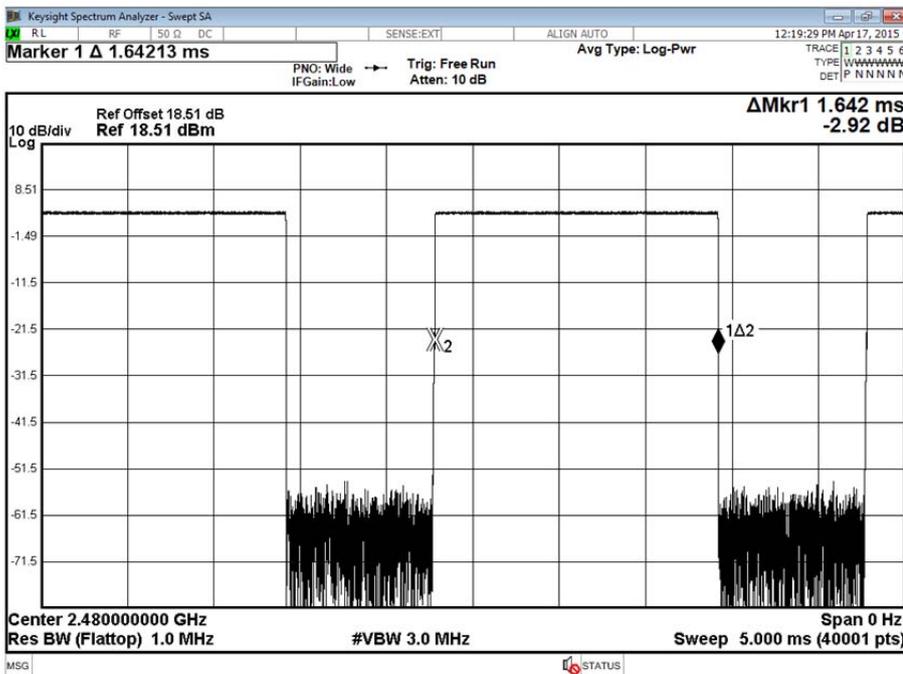


Product Service

Bluetooth, DH1, Total Average Time of Occupancy Plot



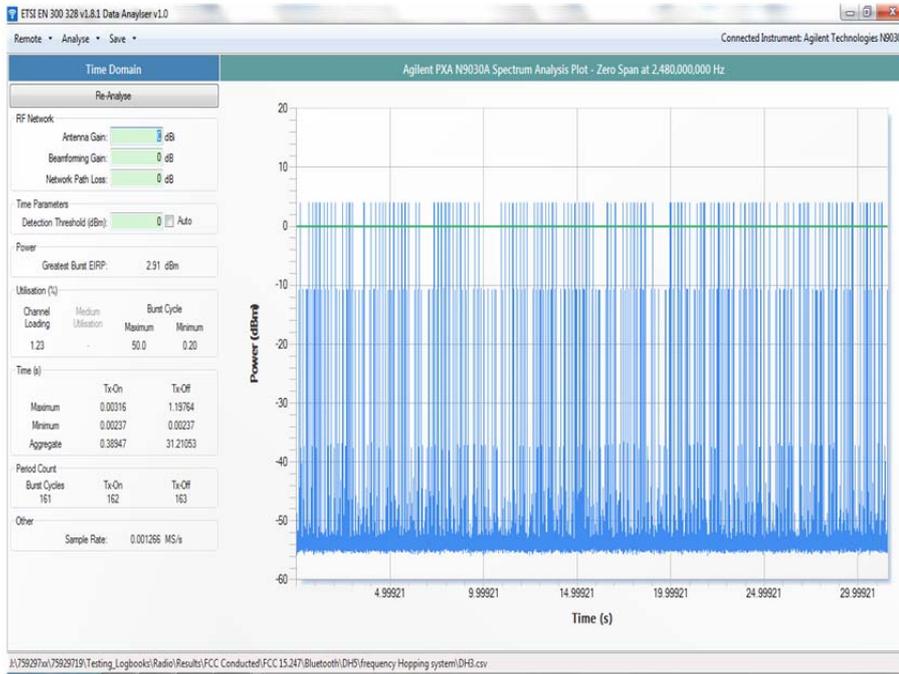
Bluetooth, DH3, Average Time of Occupancy Plot



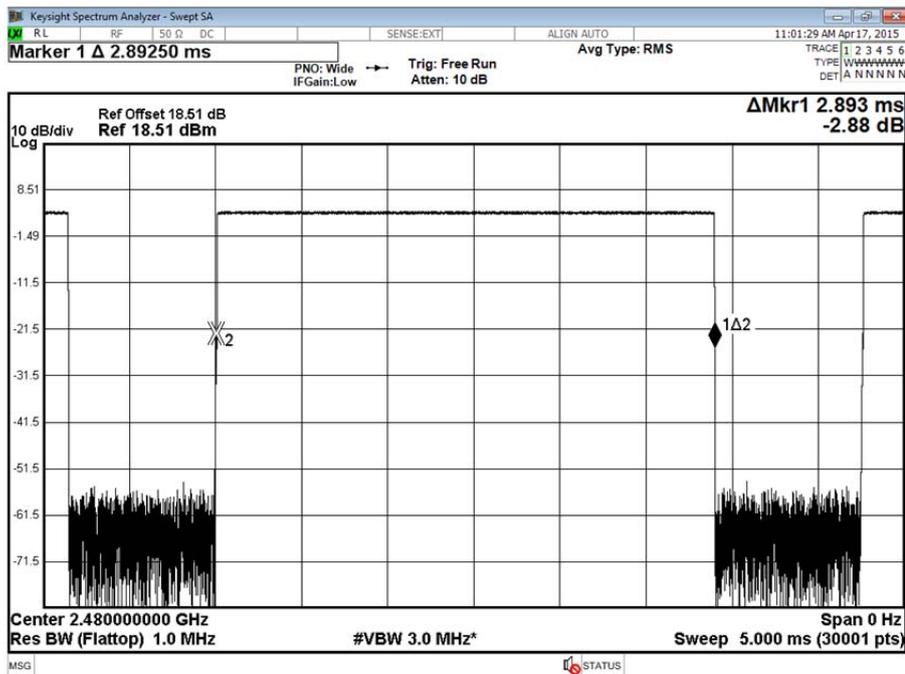


Product Service

Bluetooth, DH3, Total Average Time of Occupancy Plot



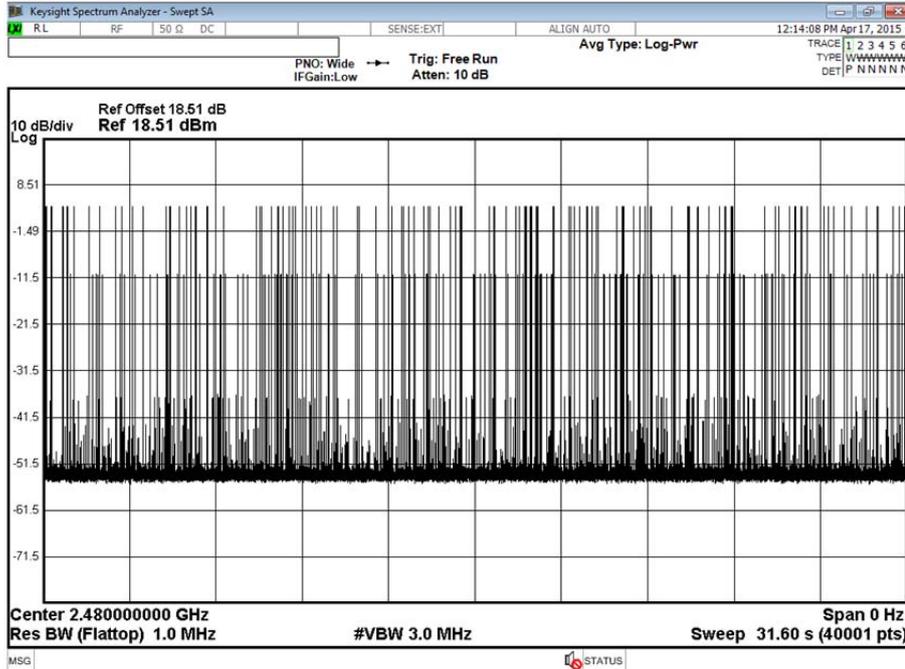
Bluetooth, DH5, Average Time of Occupancy Plot





Product Service

Bluetooth, DH5, Total Average Time of Occupancy Plot



FCC 47 CFR Part 15, Limit Clause 15.247 (a)(1)(iii)

Frequency hopping systems operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.



Product Service

2.6 MAXIMUM CONDUCTED OUTPUT POWER**2.6.1 Specification Reference**

FCC 47 CFR Part 15C, Clause 15.247 (b)(1)

2.6.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406536 - Modification State 0

2.6.3 Date of Test

15 April 2015

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Procedure

This test was performed in accordance with ANSI C63.10, Clause 6.10.1.

2.6.6 Environmental Conditions

Ambient Temperature	22.8°C
Relative Humidity	38.7%



Product Service

2.6.7 Test Results

4.0 V DC Supply

Bluetooth, DH5, Maximum Conducted Output Power Results

2402 MHz		2441 MHz		2480 MHz	
dBm	mW	dBm	mW	dBm	mW
3.53	2.25	3.76	2.38	3.80	2.40

Bluetooth, 2402 MHz, DH5, Maximum Conducted Output Power Plot





Product Service

Bluetooth, 2441 MHz, DH5, Maximum Conducted Output Power Plot



Bluetooth, 2480 MHz, DH5, Maximum Conducted Output Power Plot





Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (b)

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

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non overlapping hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.



Product Service

2.7 SPURIOUS RADIATED EMISSIONS

2.7.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d) and 15.205

2.7.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406791 - Modification State 0

2.7.3 Date of Test

18 April 2015, 19 April 2015, 22 April 2015 & 23 April 2015

2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.5 Test Procedure

The test was performed in accordance with ANSI C63.10, clause 6.3, 6.5 and 6.6.

2.7.6 Environmental Conditions

Ambient Temperature	20.1°C
Relative Humidity	25.9 - 30.2%



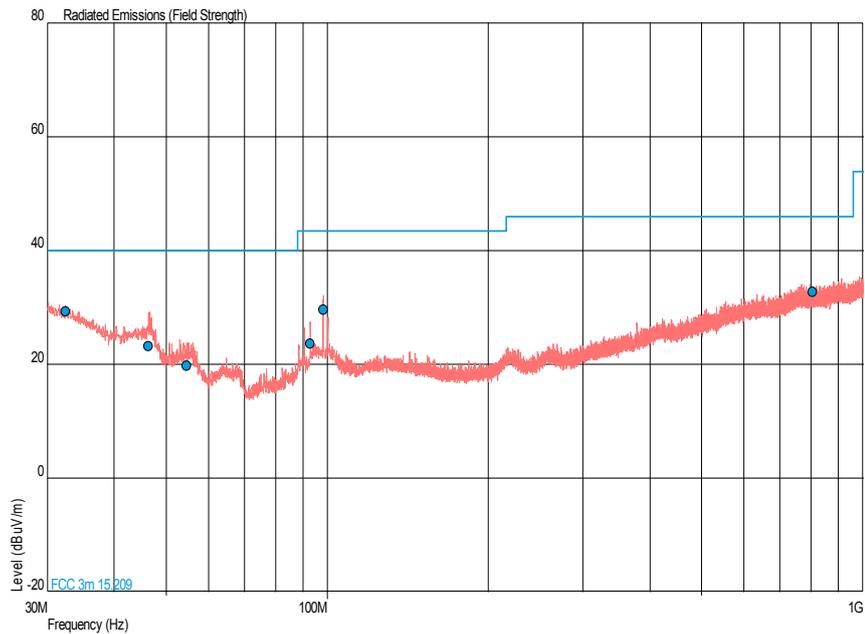
2.7.7 Test Results

4.0 V DC Supply

Bluetooth, 2402 MHz, DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dB μ V/m)	QP Margin (dB μ V/m)	QP Level (μ V/m)	QP Margin (μ V/m)	Angle (°)	Height (m)	Polarisation
32.425	29.4	-10.6	29.5	-70.5	30	1.40	Horizontal
46.387	23.2	-16.8	14.5	-85.5	88	1.00	Vertical
54.673	19.7	-20.3	9.7	-90.3	203	1.00	Vertical
92.910	23.6	-19.9	15.1	-134.9	154	1.00	Vertical
98.200	29.6	-13.9	30.2	-119.8	126	1.06	Vertical
805.077	32.7	-13.3	43.2	-156.8	355	1.00	Vertical

Bluetooth, 2402 MHz, DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot





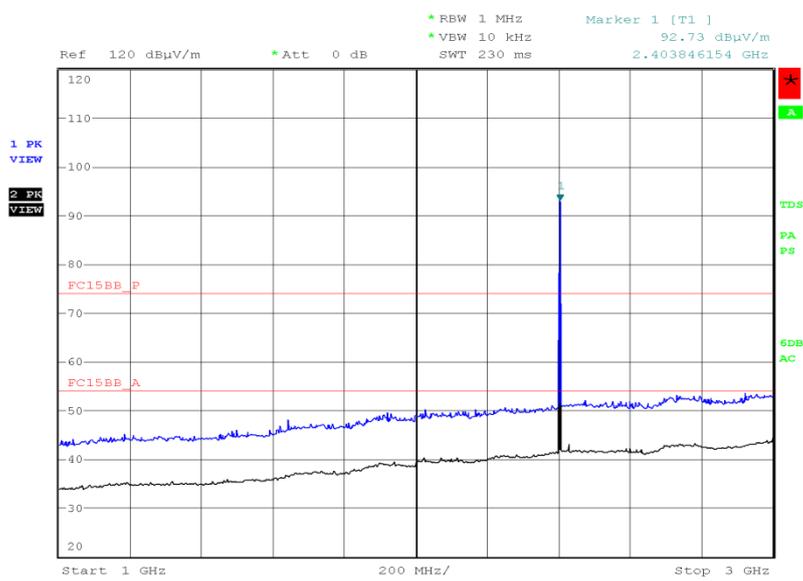
Product Service

Bluetooth, 2402 MHz, DH5, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
*							

No emissions were detected within 6 dB of the limit.

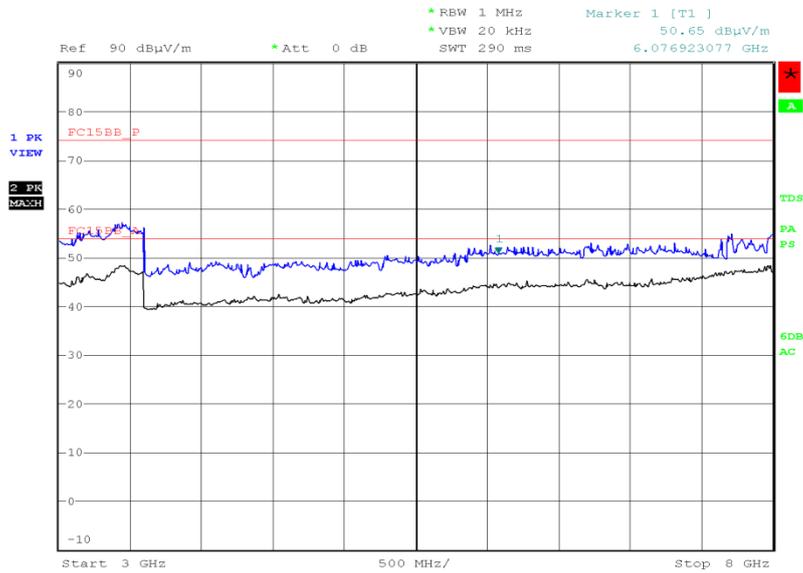
Bluetooth, 2402 MHz, DH5, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



Date: 18.APR.2015 04:55:04

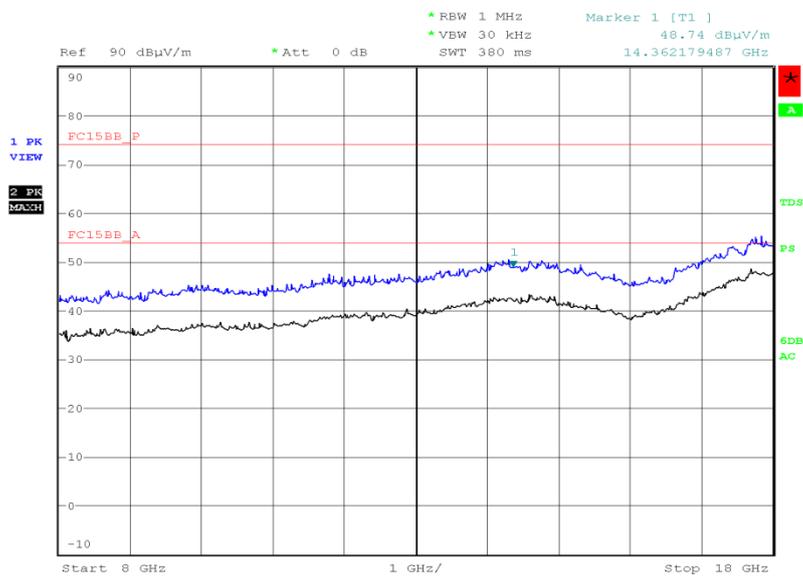


Bluetooth, 2402 MHz, DH5, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 18.APR.2015 04:06:29

Bluetooth, 2402 MHz, DH5, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot

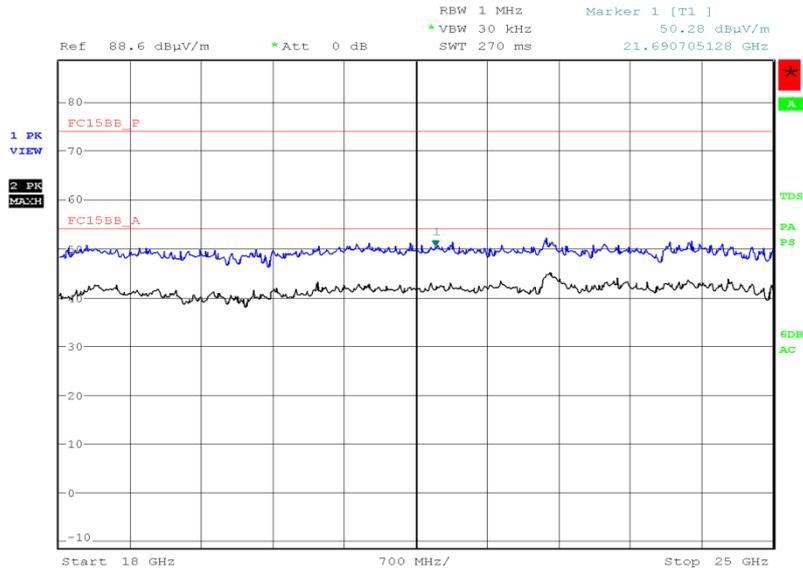


Date: 19.APR.2015 03:04:38



Product Service

Bluetooth, 2402 MHz, DH5, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



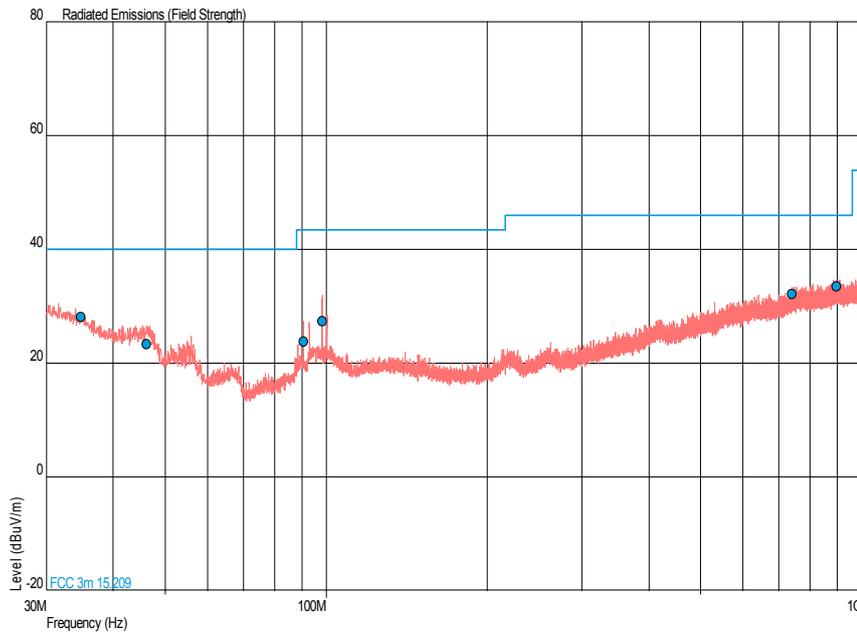
Date: 19.APR.2015 04:15:04



Bluetooth, 2441 MHz, DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dB μ V/m)	QP Margin (dB μ V/m)	QP Level (μ V/m)	QP Margin (μ V/m)	Angle (°)	Height (m)	Polarisation
34.849	28.2	-11.8	25.7	-74.3	360	1.00	Vertical
46.139	23.4	-16.6	14.8	-85.2	7	1.06	Vertical
90.676	23.8	-19.7	15.5	-134.5	195	1.00	Vertical
98.204	27.4	-16.1	23.4	-126.6	235	1.00	Vertical
740.122	32.2	-13.8	40.7	-109.3	1	1.00	Vertical
895.398	33.5	-12.5	47.3	-152.7	66	3.94	Vertical

Bluetooth, 2441 MHz, DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



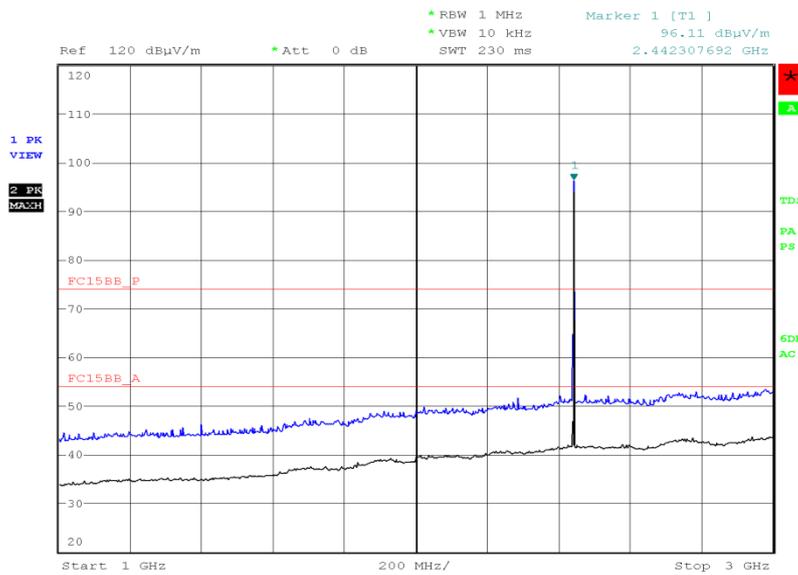


Bluetooth, 2441 MHz, DH5, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dB μ V/m)	Final Average (dB μ V/m)	Final Peak (μ V/m)	Final Average (μ V/m)	Angle (°)	Height (m)	Polarisation
*							

No emissions were detected within 6 dB of the limit.

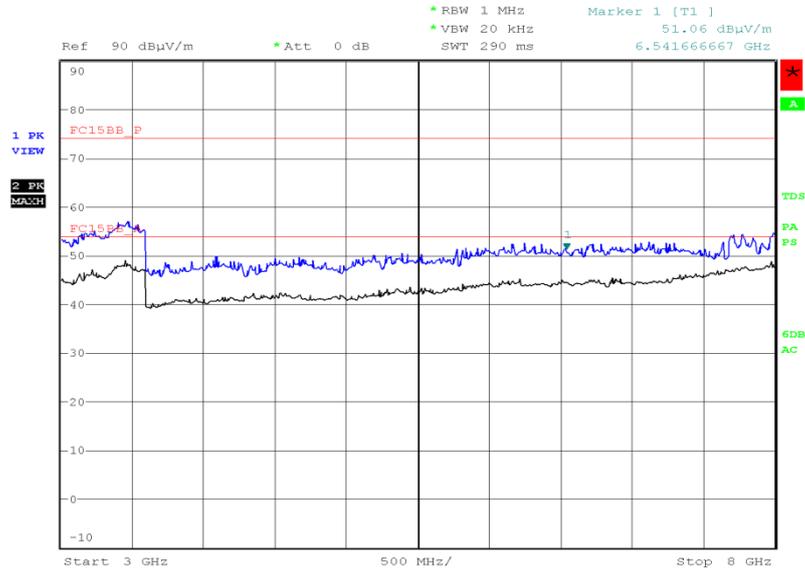
Bluetooth, 2441 MHz, DH5, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



Date: 18.APR.2015 04:40:06

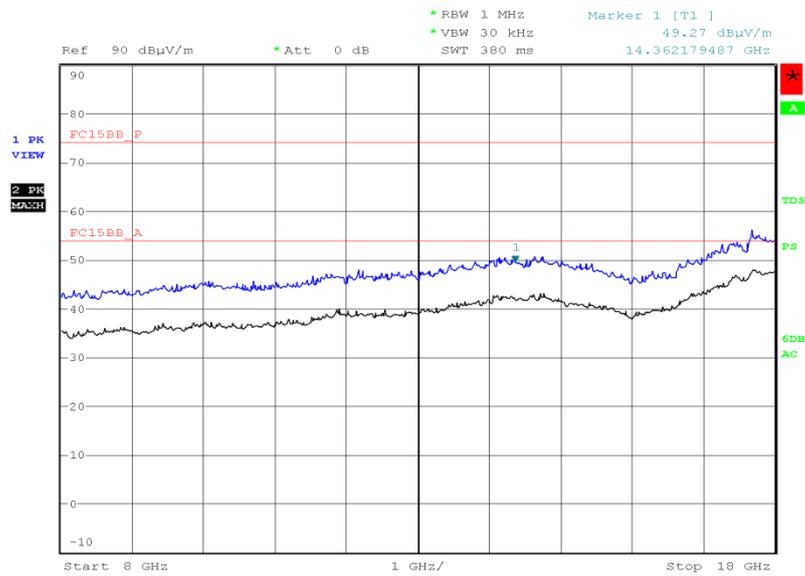


Bluetooth, 2441 MHz, DH5, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 18.APR.2015 04:12:16

Bluetooth, 2441 MHz, DH5, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot

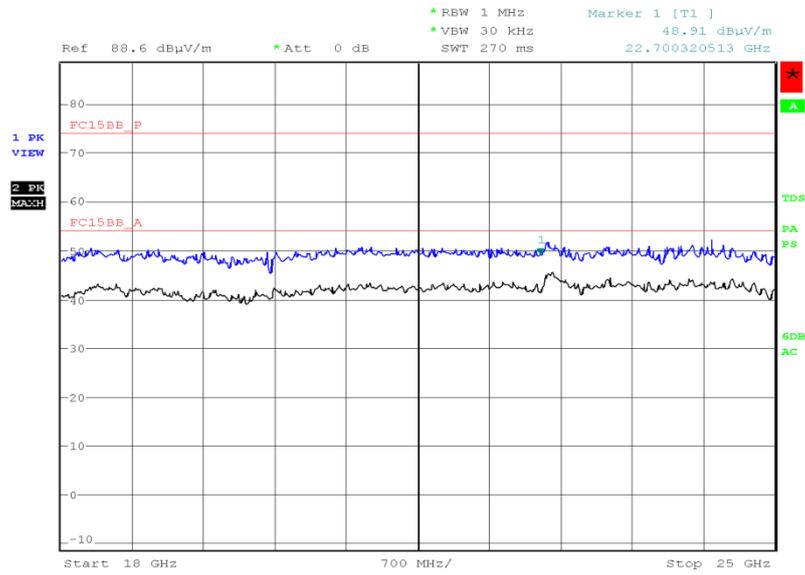


Date: 19.APR.2015 03:19:36



Product Service

Bluetooth, 2441 MHz, DH5, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



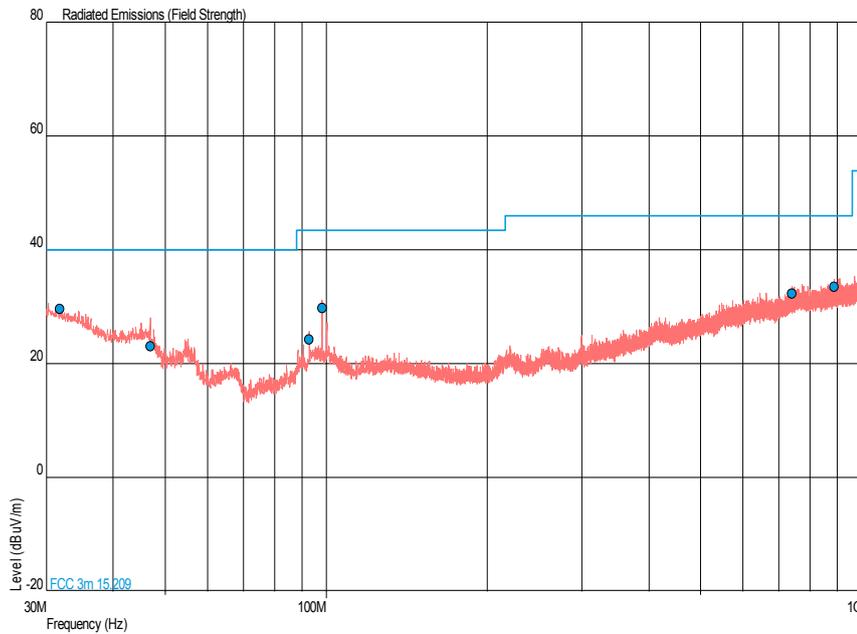
Date: 19.APR.2015 04:25:55



Bluetooth, 2480 MHz, DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dB μ V/m)	QP Margin (dB μ V/m)	QP Level (μ V/m)	QP Margin (μ V/m)	Angle (°)	Height (m)	Polarisation
31.789	29.6	-10.4	30.2	-69.8	189	1.00	Horizontal
46.927	23.1	-16.9	14.3	-85.7	41	1.00	Vertical
92.910	24.3	-19.2	16.4	-133.6	180	1.25	Vertical
98.199	29.8	-13.7	30.9	-119.1	24	1.03	Vertical
740.476	32.2	-13.8	40.7	-109.3	192	2.51	Horizontal
888.082	33.5	-12.5	47.3	-152.7	65	1.15	Vertical

Bluetooth, 2480 MHz, DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot





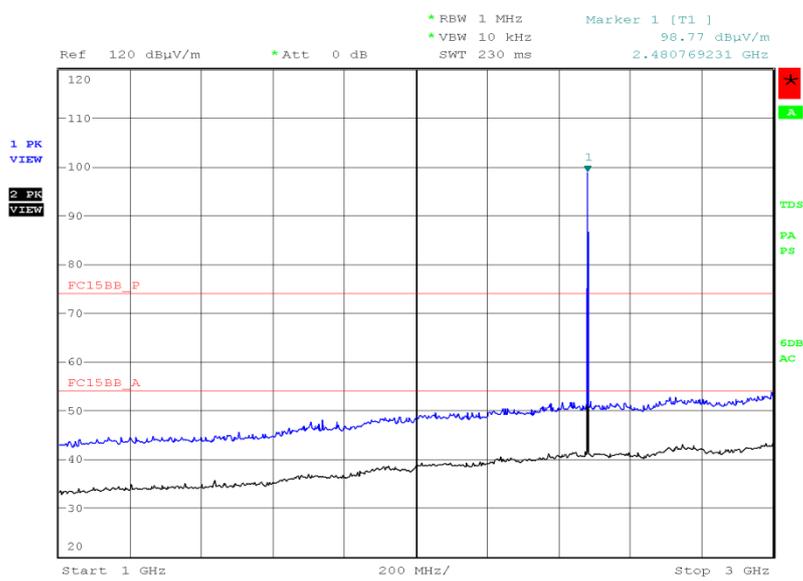
Product Service

Bluetooth, 2480 MHz, DH5, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
*							

*No emissions were detected within 6 dB of the limit.

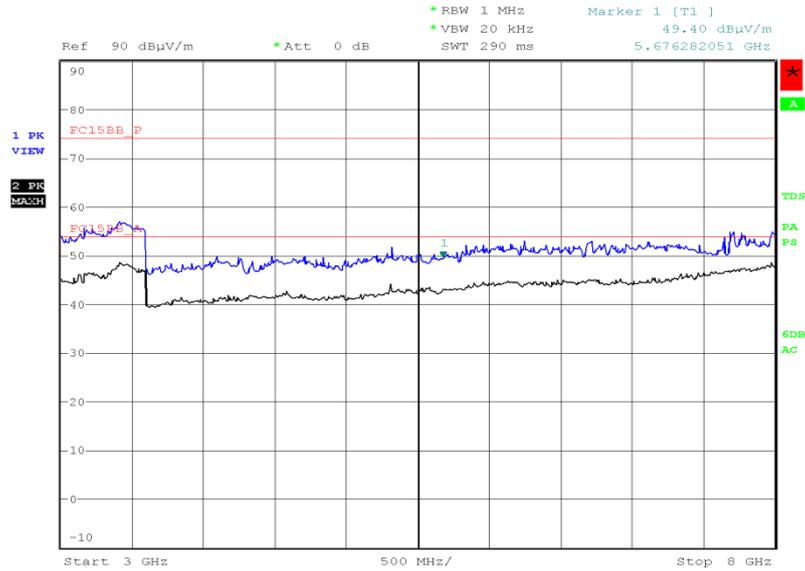
Bluetooth, 2480 MHz, DH5, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



Date: 18.APR.2015 04:30:39

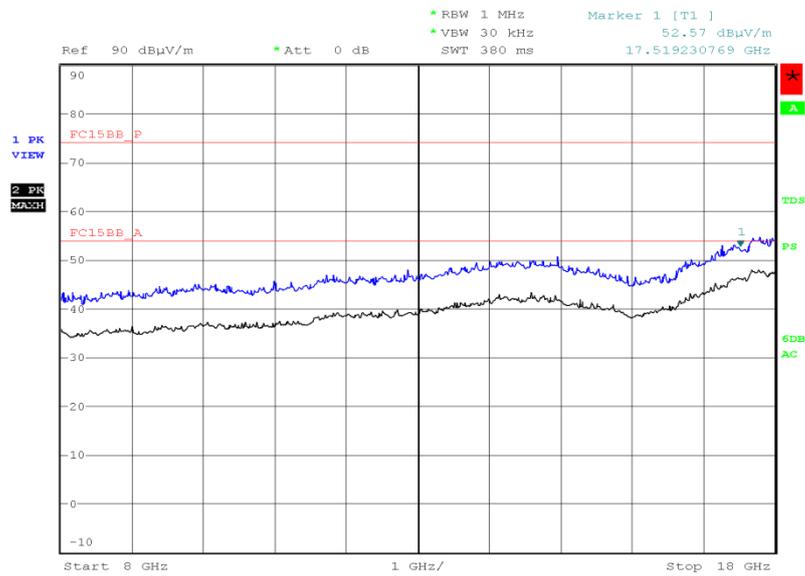


Bluetooth, 2480 MHz, DH5, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 18.APR.2015 04:23:47

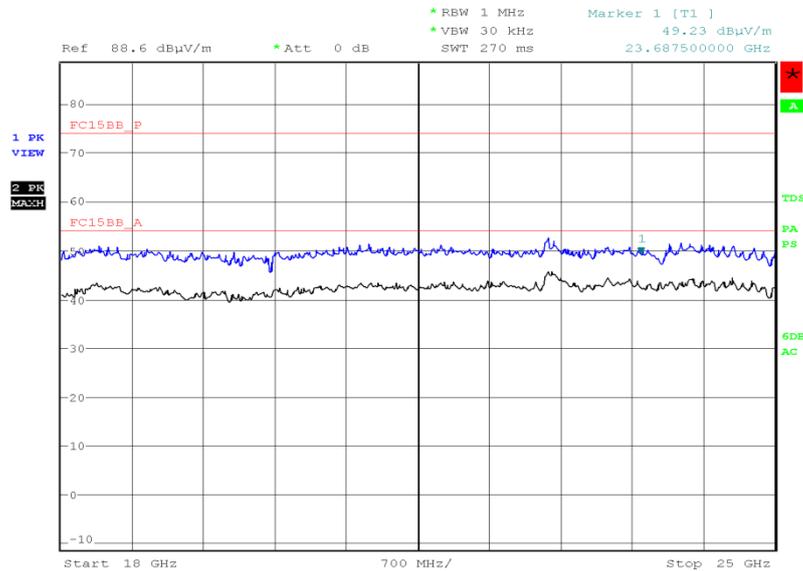
Bluetooth, 2480 MHz, DH5, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 19.APR.2015 03:25:48



Bluetooth, 2480 MHz, DH5, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



Date: 19.APR.2015 04:49:31

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

Emissions outside the restricted bands shall be at least 20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

FCC 47 CFR Part 15, Limit Clause 15.205

	Peak (dBμV/m)	Average (dBμV/m)
Restricted Bands of Operation	74	54

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength			Measurement Distance (m)
	(μV/m)	Average (dBμV/m)	Peak (dBμV/m)	
30-88	100	40.0	60.0	3
88-216	150	43.5	63.5	3
216-960	200	46.0	66.0	3
Above 960	500	54.0	74.0	3



Product Service

2.8 RESTRICTED BAND EDGES**2.8.1 Specification Reference**

FCC 47 CFR Part 15C, Clause 15.205

2.8.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406791 - Modification State 0

2.8.3 Date of Test

18 April 2015

2.8.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.5 Test Procedure

The test was performed in accordance with ANSI C63.10, clause 6.9.2.

2.8.6 Environmental Conditions

Ambient Temperature	20.4 - 20.5°C
Relative Humidity	29.4 - 29.8%



Product Service

2.8.7 Test Results

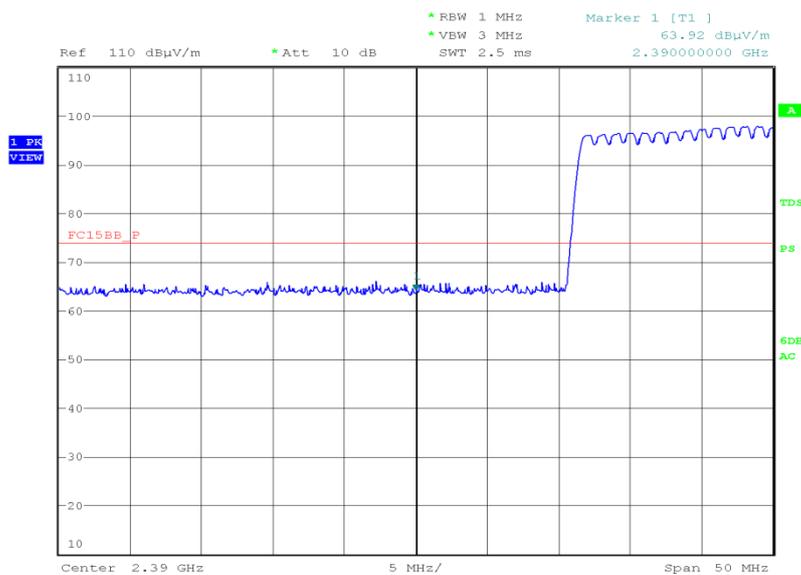
4.0 V DC Supply

Hopping Mode

Bluetooth, GFSK, Restricted Band Edges Results

2402 MHz		2480 MHz	
Measured Frequency 2390.00 MHz		Measured Frequency 2483.50 MHz	
dBµV/m		dBµV/m	
Final Peak	Final Average	Final Peak	Final Average
63.92	48.06	63.79	47.98

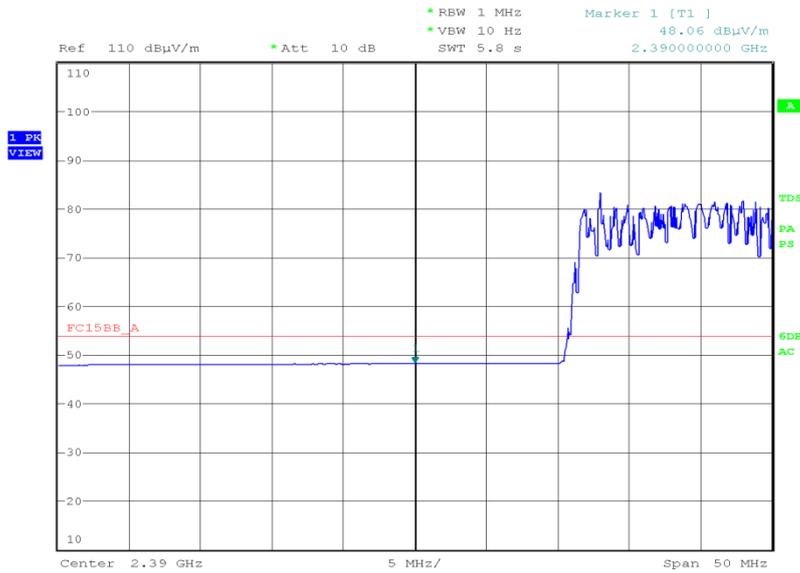
Bluetooth, 2402 MHz, Measured Frequency 2390.00 MHz, GFSK, Final Peak, Restricted Band Edges Plot



Date: 18.APR.2015 22:06:48

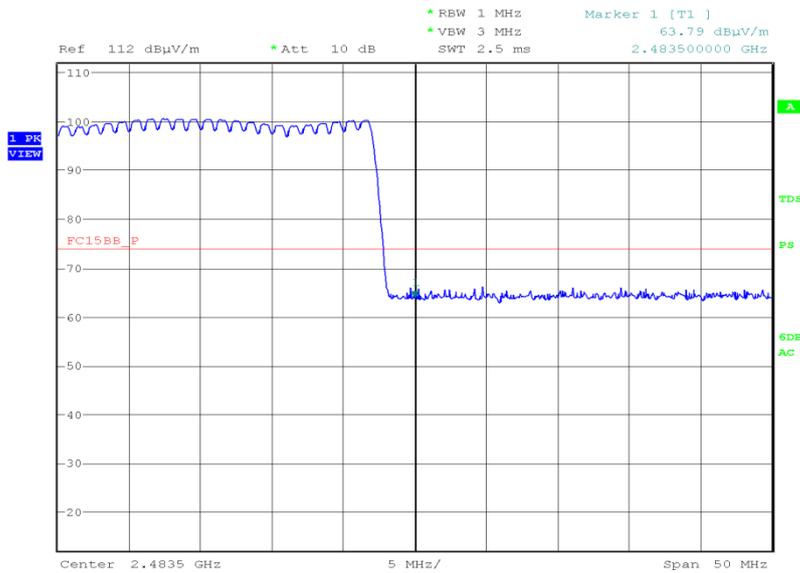


Bluetooth, 2402 MHz, Measured Frequency 2390.00 MHz, GFSK, Final Average, Restricted Band Edges Plot



Date: 18.APR.2015 22:10:39

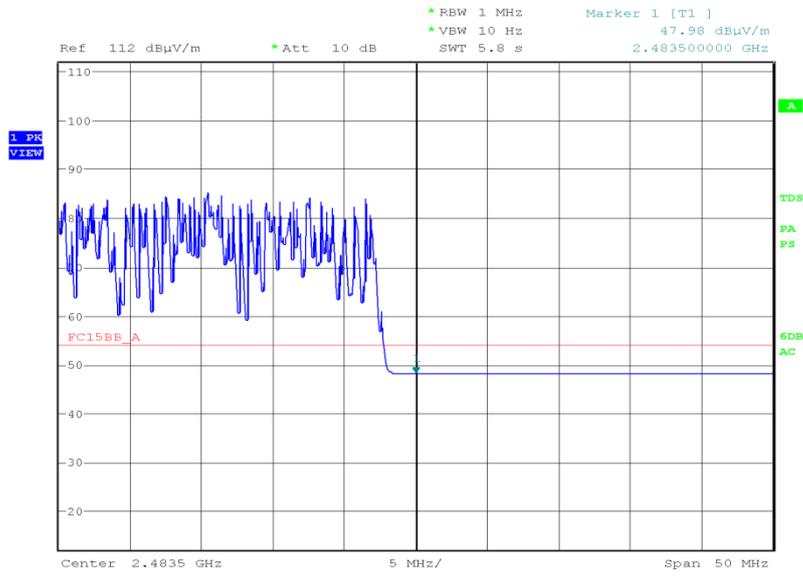
Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, GFSK, Final Peak, Restricted Band Edges Plot



Date: 18.APR.2015 23:47:23



Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, GFSK, Final Average, Restricted Band Edges Plot



Date: 18.APR.2015 23:49:06

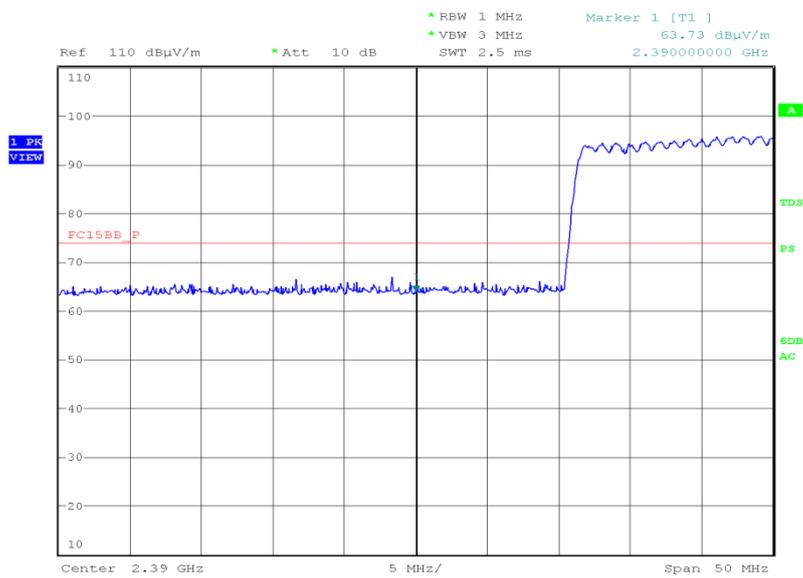


Product Service

Bluetooth, pi/4 DQPSK, Restricted Band Edges Results

2402 MHz	
Measured Frequency 2390.00 MHz	
dB μ V/m	
Final Peak	Final Average
63.73	48.08

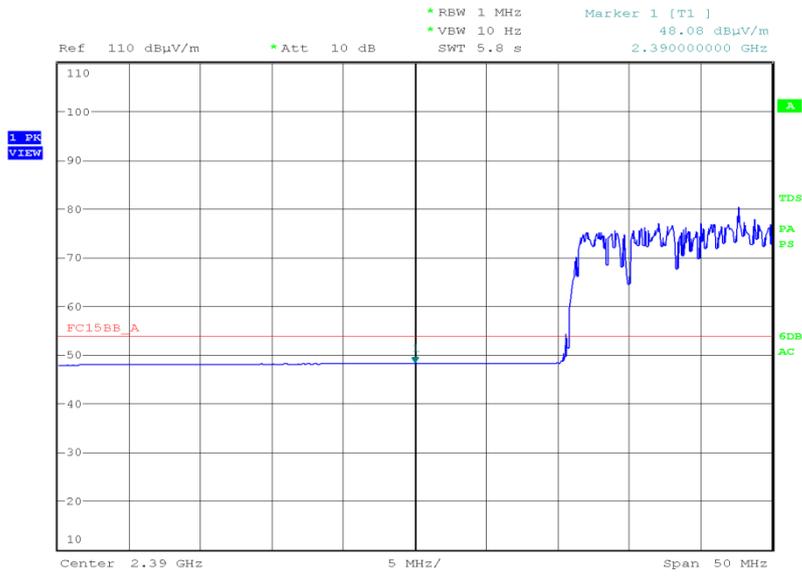
Bluetooth, 2402 MHz, Measured Frequency 2390.00 MHz, pi/4 DQPSK, Final Peak, Restricted Band Edges Plot



Date: 18.APR.2015 22:16:49



Bluetooth, 2402 MHz, Measured Frequency 2390.00 MHz, pi/4 DQPSK, Final Average, Restricted Band Edges Plot



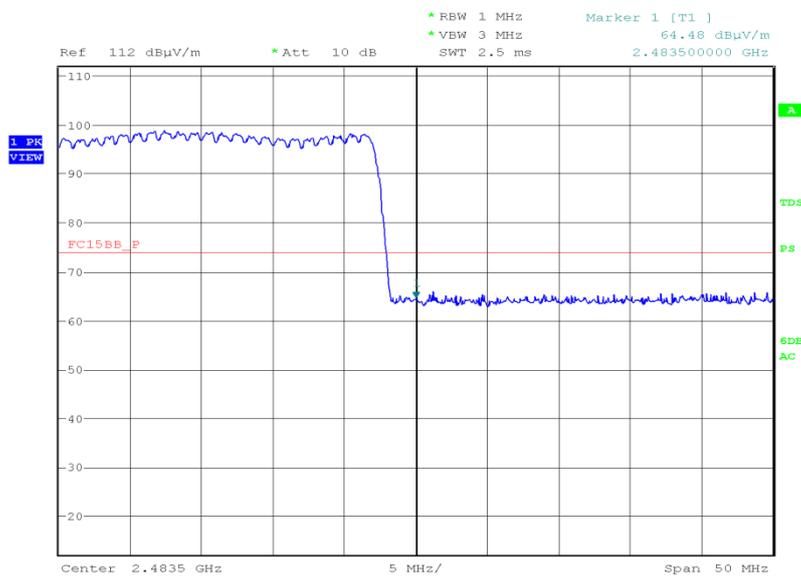
Date: 18.APR.2015 22:15:54



Bluetooth, 8-DPSK, Restricted Band Edges Results

2480 MHz	
Measured Frequency 2483.50 MHz	
dB μ V/m	
Final Peak	Final Average
64.48	47.99

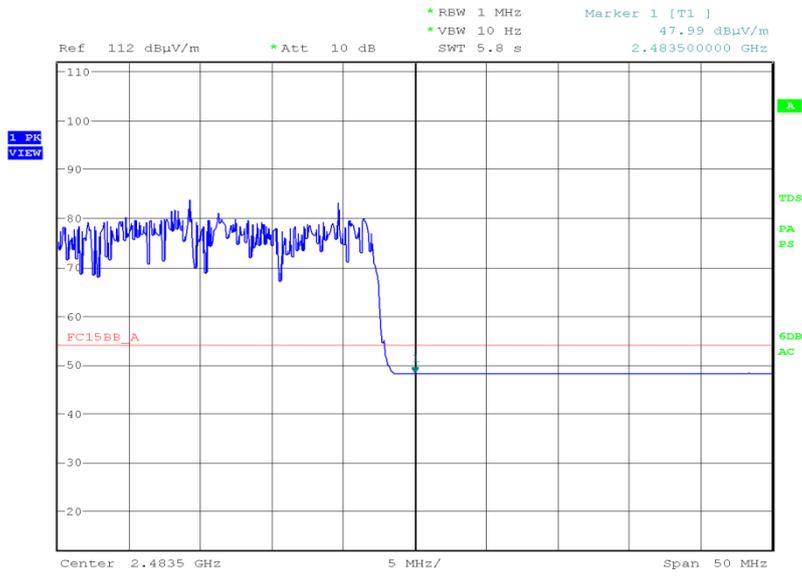
Bluetooth, 2480 MHz. Measured Frequency 2483.50 MHz, 8-DPSK, Final Peak, Restricted Band Edges Plot



Date: 19.APR.2015 00:15:06



Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, 8-DPSK, Final Average, Restricted Band Edges Plot



Date: 19.APR.2015 00:14:16

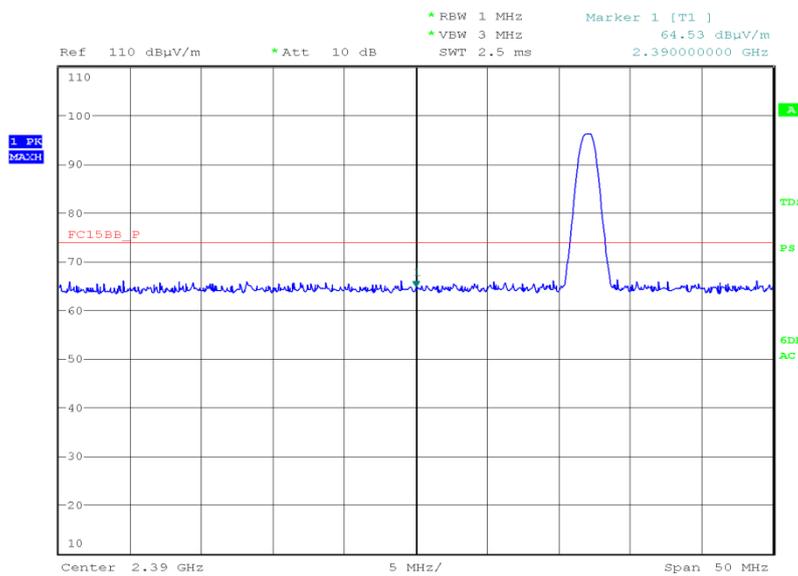


Static Mode

Bluetooth, GFSK, Restricted Band Edges Results

2402 MHz		2480 MHz	
Measured Frequency 2390.00 MHz		Measured Frequency 2483.50 MHz	
dBµV/m		dBµV/m	
Final Peak	Final Average	Final Peak	Final Average
64.53	48.02	65.20	47.95

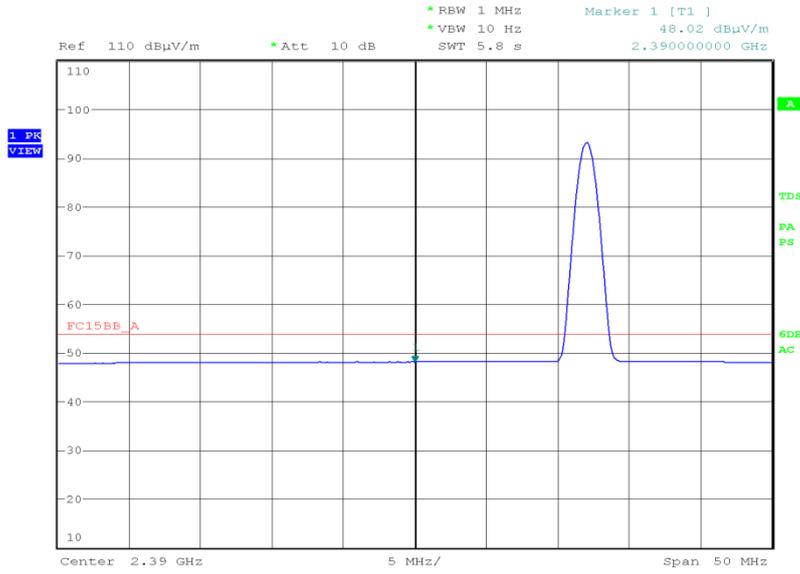
Bluetooth, 2402 MHz, Measured Frequency 2390.00 MHz, GFSK, Final Peak, Restricted Band Edges Plot



Date: 18.APR.2015 21:45:30

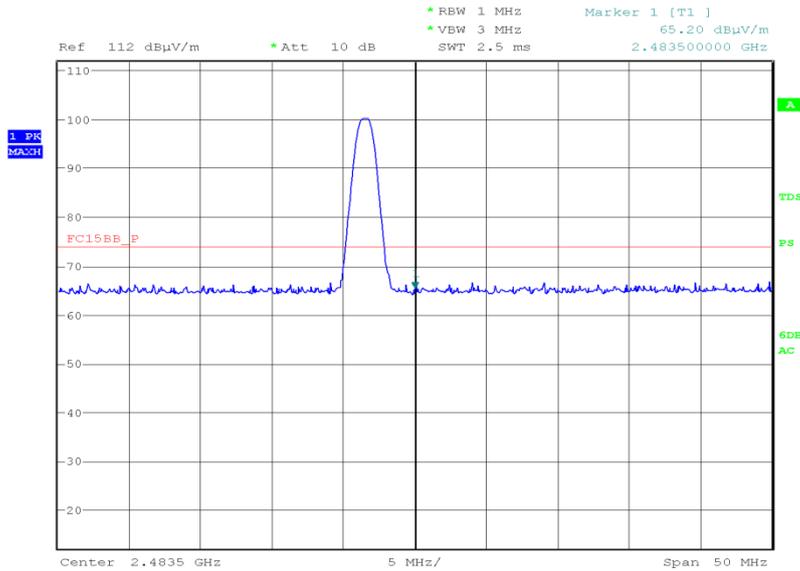


Bluetooth, 2402 MHz, Measured Frequency 2390.00 MHz, GFSK, Final Average, Restricted Band Edges Plot



Date: 18.APR.2015 21:46:19

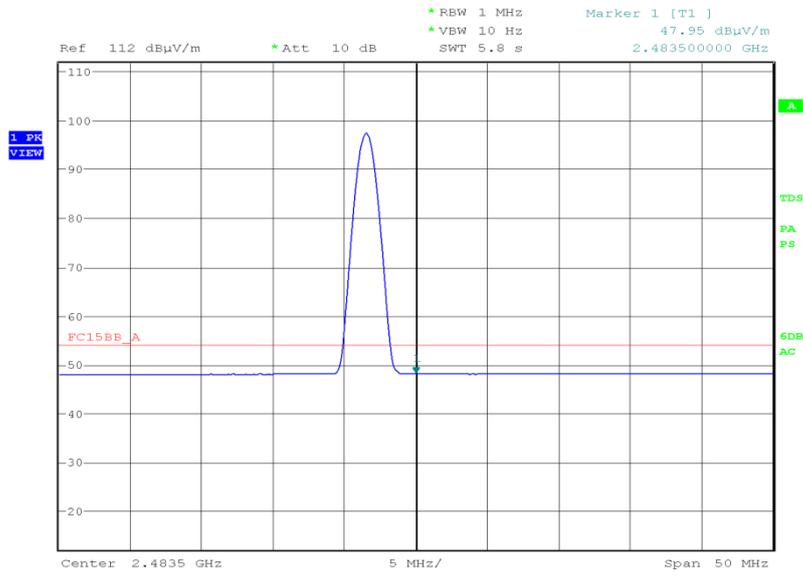
Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, GFSK, Final Peak, Restricted Band Edges Plot



Date: 18.APR.2015 23:25:31



Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, GFSK, Final Average, Restricted Band Edges Plot



Date: 18.APR.2015 23:26:26

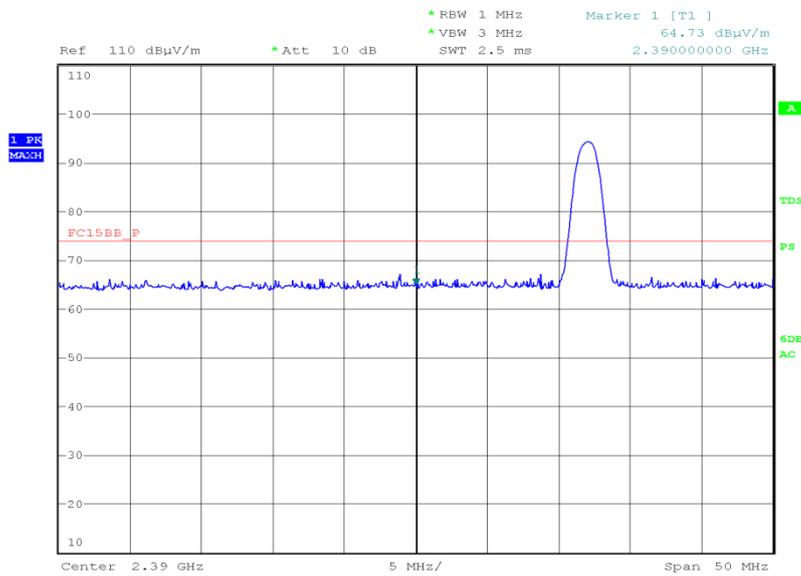


Product Service

Bluetooth, pi/4 DQPSK, Restricted Band Edges Results

2402 MHz	
Measured Frequency 2390.00 MHz	
dB μ V/m	
Final Peak	Final Average
64.73	48.05

Bluetooth, 2402 MHz, Measured Frequency 2390.00 MHz, pi/4 DQPSK, Final Peak, Restricted Band Edges Plot

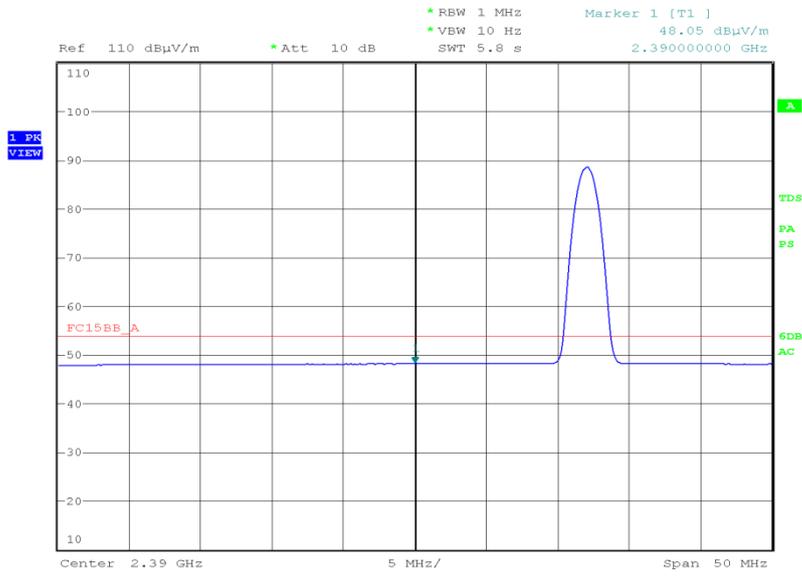


Date: 18.APR.2015 21:51:09



Product Service

Bluetooth, 2402 MHz, Measured Frequency 2390.00 MHz, pi/4 DQPSK, Final Average, Restricted Band Edges Plot



Date: 18.APR.2015 21:49:59

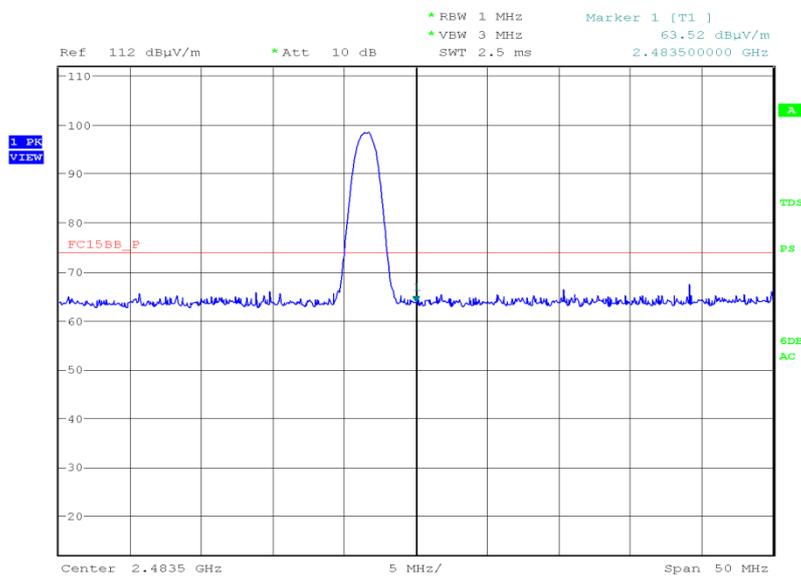


Product Service

Bluetooth, 8-DPSK, Restricted Band Edges Results

2480 MHz	
Measured Frequency 2483.50 MHz	
dB μ V/m	
Final Peak	Final Average
63.52	48.00

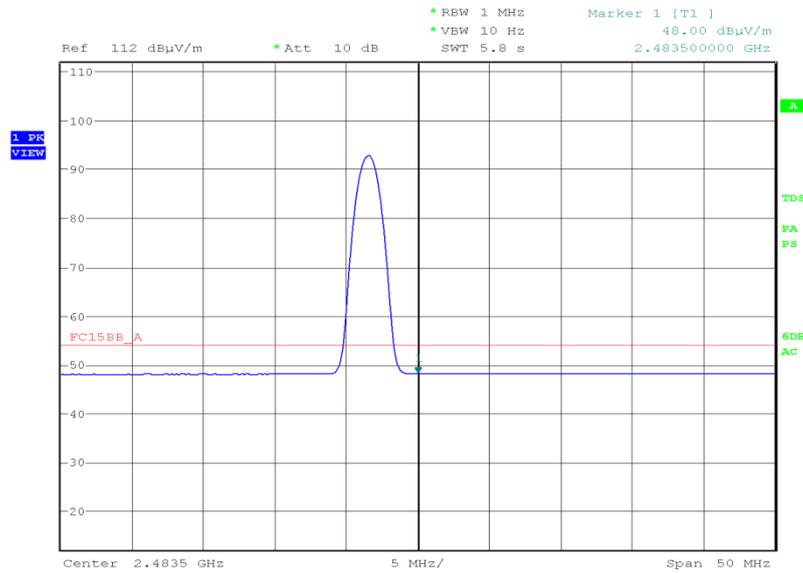
Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, 8-DPSK, Final Peak, Restricted Band Edges Plot



Date: 18.APR.2015 23:40:53



Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, 8-DPSK, Final Average, Restricted Band Edges Plot



Date: 18.APR.2015 23:40:04

Remark

Testing was performed on the bottom and top channels using GFSK modulation because this was the modulation which produced the highest level of conducted average power.

Testing was performed on the bottom channel using pi/4 DQPSK modulation because this was the modulation which produced the widest value of 20 dB bandwidth.

Testing was performed on the top channel using 8-DPSK modulation because this was the modulation which produced the widest value of 20 dB bandwidth.

FCC 47 CFR Part 15, Limit Clause 15.205

	Peak (dBμV/m)	Average (dBμV/m)
Restricted Bands of Operation	74	54



Product Service

2.9 AUTHORISED BAND EDGES**2.9.1 Specification Reference**

FCC 47 CFR Part 15C, Clause 15.247 (d)

2.9.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406791 - Modification State 0

2.9.3 Date of Test

18 April 2015

2.9.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.9.5 Test Procedure

The test was performed in accordance with ANSI C63.10, clause 7.7.9.

2.9.6 Environmental Conditions

Ambient Temperature	20.4°C
Relative Humidity	29.8%



Product Service

2.9.7 Test Results

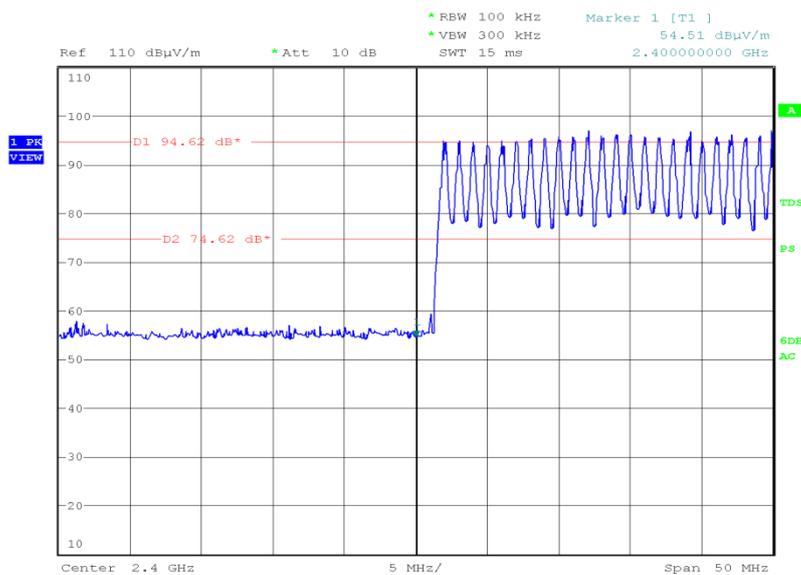
4.0 V DC Supply

Hopping Mode

Bluetooth, GFSK, Authorised Band Edges Results

2402 MHz	2480 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dBµV/m	dBµV/m
Final Peak	Final Peak
54.51	54.48

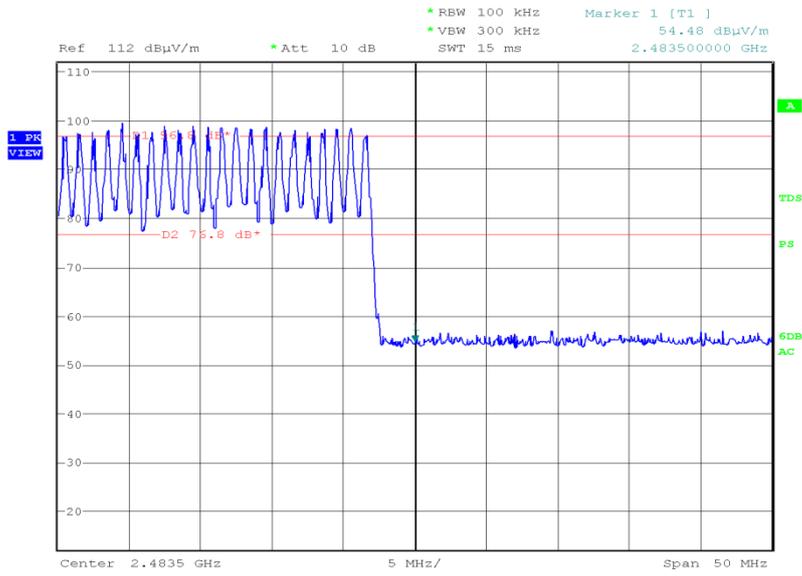
Bluetooth, 2402 MHz, Measured Frequency 2400.00 MHz, GFSK, Final Peak, Authorised Band Edges Plot



Date: 18.APR.2015 22:05:46



Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, GFSK, Final Peak, Authorised Band Edges Plot



Date: 18.APR.2015 23:45:26

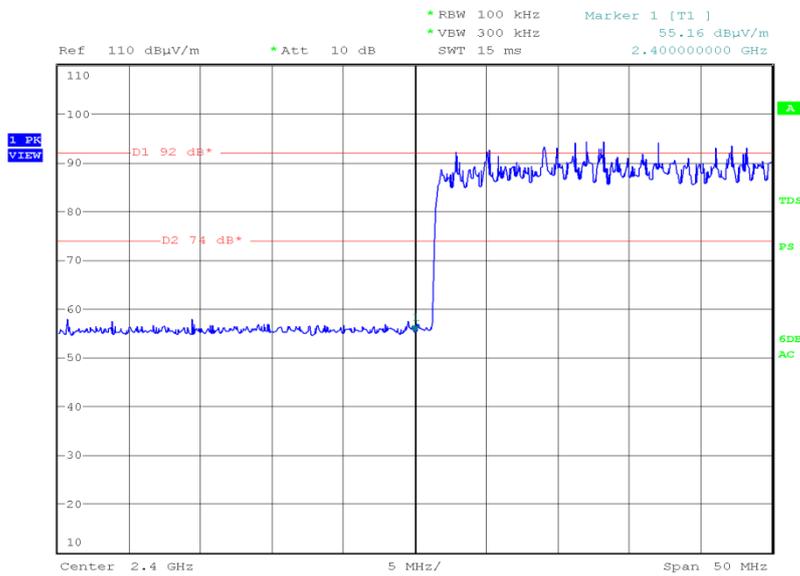


Product Service

Bluetooth, pi/4 DQPSK, Authorised Band Edges Results

2402 MHz
Measured Frequency 2400.00 MHz
dBµV/m
Final Peak
55.06

Bluetooth, 2402 MHz, Measured Frequency 2400.00 MHz, pi/4 DQPSK, Final Peak, Authorised Band Edges Plot



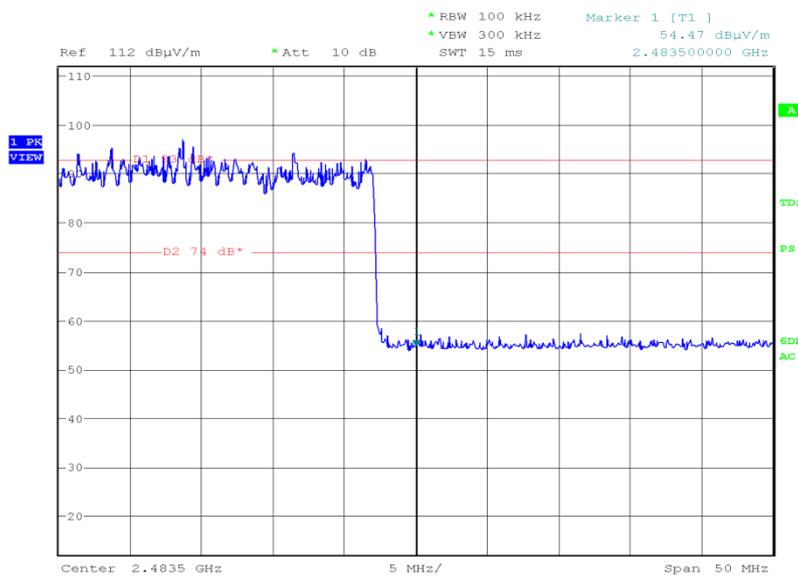
Date: 18.APR.2015 22:21:50



Bluetooth, 8-DPSK, Authorised Band Edges Results

2480 MHz
Measured Frequency 2483.50 MHz
dBµV/m
Final Peak
54.74

Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, 8-DPSK, Final Peak, Authorised Band Edges Plot



Date: 19.APR.2015 00:18:18

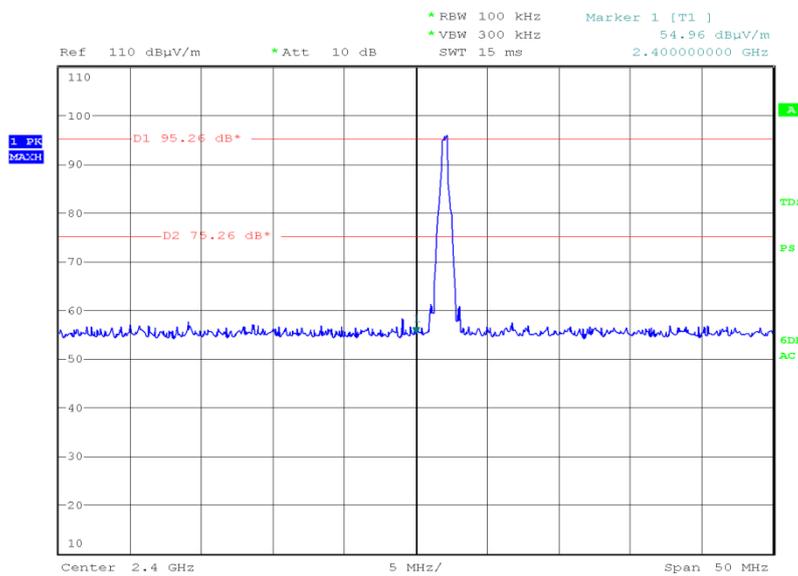


Static Mode

Bluetooth, GFSK, Authorised Band Edges Results

2402 MHz	2480 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dBµV/m	dBµV/m
Final Peak	Final Peak
54.96	53.66

Bluetooth, 2402 MHz, Measured Frequency 2400.00 MHz, GFSK, Final Peak, Authorised Band Edges Plot

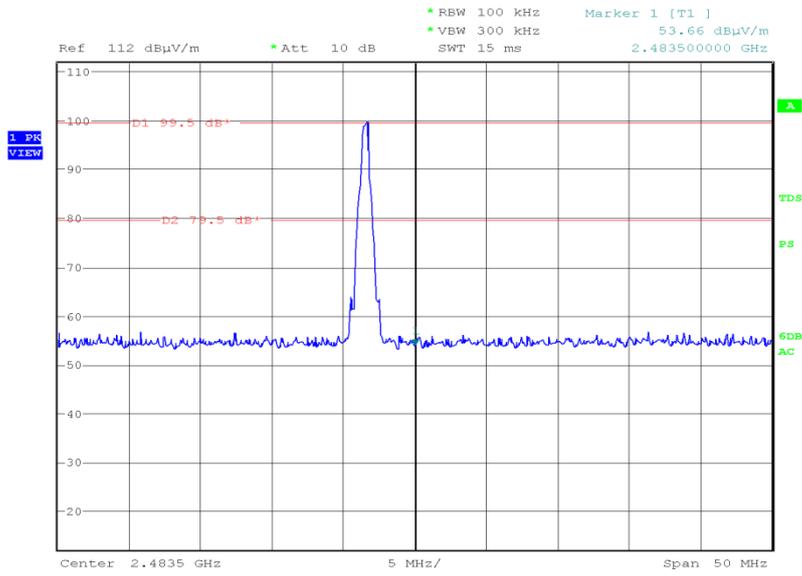


Date: 18.APR.2015 21:44:38



Product Service

Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, GFSK, Final Peak, Authorised Band Edges Plot



Date: 18.APR.2015 22:58:38

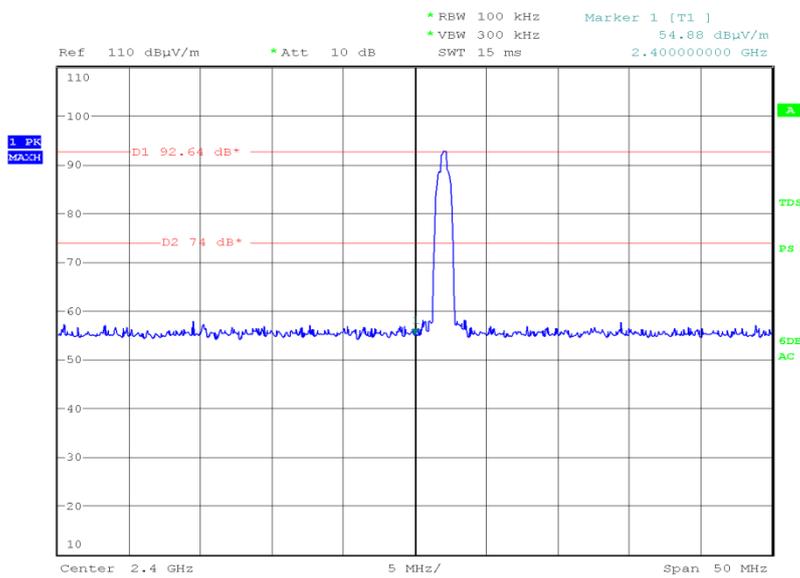


Product Service

Bluetooth, pi/4 DQPSK, Authorised Band Edges Results

2402 MHz
Measured Frequency 2400.00 MHz
dB μ V/m
Final Peak
54.88

Bluetooth, 2402 MHz, Measured Frequency 2400.00 MHz, pi/4 DQPSK, Final Peak, Authorised Band Edges Plot



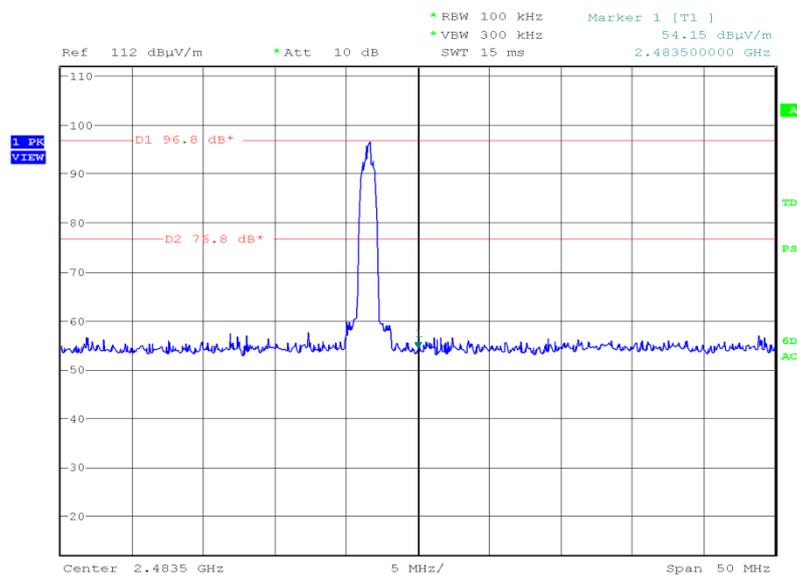
Date: 18.APR.2015 21:53:07



Bluetooth, 8-DPSK, Authorised Band Edges Results

2480 MHz
Measured Frequency 2483.50 MHz
dB μ V/m
Final Peak
54.15

Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, 8-DPSK, Final Peak, Authorised Band Edges Plot



Date: 18.APR.2015 23:43:42

Remark

Testing was performed on the bottom and top channels using GFSK modulation because this was the modulation which produced the highest level of conducted average power.

Testing was performed on the bottom channel using pi/4 DQPSK modulation because this was the modulation which produced the widest value of 20 dB bandwidth.

Testing was performed on the top channel using 8-DPSK modulation because this was the modulation which produced the widest value of 20 dB bandwidth.

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.



Product Service

SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 – AC Line Conducted Emissions					
Transient Limiter	Hewlett Packard	11947A	15	12	16-Dec-2015
LISN (1 Phase)	Chase	MN 2050	336	12	1-Apr-2016
Hygrometer	Rotronic	A1	2138	12	3-Dec-2015
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	27-Oct-2015
Section 2.2 - Frequency Hopping Systems - Number of Hopping Channels					
Power Supply Unit	Hewlett Packard	6267B	21	-	TU
Attenuator (10dB/10W)	Trilithic	HFP-50N	454	12	15-Aug-2015
Multimeter	Fluke	79 Series III	611	12	1-Sep-2015
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	28-Jul-2015
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	20-Jan-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	28-Jul-2015
Section 2.3 - Frequency Hopping Systems - 20 dB Bandwidth					
Power Supply Unit	Hewlett Packard	6267B	21	-	TU
Broadband Resistive Power Divider	Weinschel	1506A	601	12	24-Mar-2016
Multimeter	Fluke	79 Series III	611	12	1-Sep-2015
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	16-Sep-2015
Hygrometer	Rotronic	I-1000	3220	12	24-Jul-2015
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	3-Sep-2015
P-Series Power Meter	Agilent Technologies	N1911A	3981	12	22-Sep-2015
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	24-Sep-2015
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	16-Feb-2016
1 metre N-Type Cable	IW Microwave	NPS-1806LC-394-NPS	4505	12	26-Feb-2016
1 metre N-Type Cable	IW Microwave	NPS-1806LC-394-NPS	4506	12	26-Feb-2016
Section 2.4 - Frequency Hopping Systems - Channel Separation					
Power Supply Unit	Hewlett Packard	6267B	21	-	TU
Broadband Resistive Power Divider	Weinschel	1506A	601	12	24-Mar-2016
Multimeter	Fluke	79 Series III	611	12	1-Sep-2015
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	16-Sep-2015
Hygrometer	Rotronic	I-1000	3220	12	24-Jul-2015
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	3-Sep-2015
P-Series Power Meter	Agilent Technologies	N1911A	3981	12	22-Sep-2015
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	24-Sep-2015
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	16-Feb-2016
1 metre N-Type Cable	IW Microwave	NPS-1806LC-394-NPS	4505	12	26-Feb-2016
1 metre N-Type Cable	IW Microwave	NPS-1806LC-394-NPS	4506	12	26-Feb-2016



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.5 - Frequency Hopping Systems - Average Time of Occupancy					
Power Supply Unit	Hewlett Packard	6267B	21	-	TU
Broadband Resistive Power Divider	Weinschel	1506A	601	12	24-Mar-2016
Multimeter	Fluke	79 Series III	611	12	1-Sep-2015
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	16-Sep-2015
Hygrometer	Rotronic	I-1000	3220	12	24-Jul-2015
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	3-Sep-2015
P-Series Power Meter	Agilent Technologies	N1911A	3981	12	22-Sep-2015
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	24-Sep-2015
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	16-Feb-2016
1 metre N-Type Cable	IW Microwave	NPS-1806LC-394-NPS	4505	12	26-Feb-2016
1 metre N-Type Cable	IW Microwave	NPS-1806LC-394-NPS	4506	12	26-Feb-2016
Section 2.6 - Maximum Peak Conducted Output Power					
Power Supply Unit	Hewlett Packard	6267B	21	-	TU
Attenuator (10dB)	Weinschel	47-10-34	481	12	1-Apr-2016
Multimeter	Fluke	79 Series III	611	12	1-Sep-2015
Hygrometer	Rotronic	I-1000	3220	12	24-Jul-2015
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	3-Sep-2015
Combiner/Splitter	Weinschel	1506A	3877	12	24-Mar-2016
P-Series Power Meter	Agilent Technologies	N1911A	3980	12	22-Sep-2015
True RMS Multimeter	Fluke	179	4007	12	31-Jul-2015
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	24-Sep-2015
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	28-Jul-2015
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	16-Feb-2016
1 metre N-Type Cable	IW Microwave	NPS-1806LC-394-NPS	4505	12	26-Feb-2016
1 metre N-Type Cable	IW Microwave	NPS-1806LC-394-NPS	4506	12	26-Feb-2016
2 metre N-Type Cable	Florida Labs	NMS-235SP-78.8-NMS	4508	12	26-Feb-2016
Section 2.7 - Spurious Radiated Emissions					
Antenna (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	24	26-Nov-2015
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	2-May-2015
Dual Power Supply Unit	Thurlby	PL320	288	-	TU
Pre-Amplifier	Phase One	PS04-0086	1533	12	23-Dec-2015
Pre-Amplifier	Phase One	PS04-0087	1534	12	23-Dec-2015
Screened Room (5)	Rainford	Rainford	1545	24	26-Jun-2015
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	10-Jun-2015
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	27-Oct-2015
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	mature GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	mature GmbH	NCD	3917	-	TU
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	1-Oct-2015
2m K-Type Cable (Rx)	Scott Cables	KPS-1501-2000-KPS	4527	6	29-Jul-2015
0.5m SMA Cable (Rx)	Scott Cables	SLSLL18-SMSM-00.50M	4528	6	29-Jul-2015



Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.8 - Restricted Band Edges					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	2-May-2015
Screened Room (5)	Rainford	Rainford	1545	24	26-Jun-2015
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	27-Oct-2015
Tilt Antenna Mast	matur GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	matur GmbH	NCD	3917	-	TU
Section 2.9 - Authorised Band Edges					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	2-May-2015
Screened Room (5)	Rainford	Rainford	1545	24	26-Jun-2015
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	27-Oct-2015
Tilt Antenna Mast	matur GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	matur GmbH	NCD	3917	-	TU

TU – Traceability Unscheduled

O/P MON – Output Monitored with Calibrated Equipment



3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	MU
Frequency Hopping Systems - 20 dB Bandwidth	± 16.74 kHz
Frequency Hopping Systems - Average Time of Occupancy	-
AC Line Conducted Emissions	± 3.2 dB
Maximum Peak Conducted Output Power	± 0.70 dB
Spurious Radiated Emissions	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB
Authorised Band Edges	Conducted: ± 3.08 dB Radiated: 30 MHz to 1 GHz: ± 5.1 dB Radiated: 1 GHz to 40 GHz: ± 6.3 dB
Restricted Band Edges	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB
Frequency Hopping Systems - Channel Separation	± 16.74 kHz
Frequency Hopping Systems - Number of Hopping Channels	-



Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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