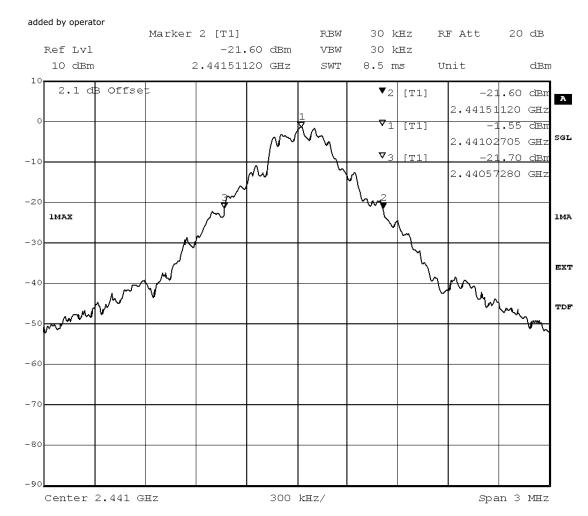


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

20 dB bandwidth MHz	
0.938	



Title: 20dB Bandwidth

Comment A: CH M: 2441 MHz; 20dB bandwidth (kHz):938.4

Date: 30.MAY.2012 09:41:51



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.3; Frequency = 2441, Mode = BT transmit using 2 Mbps with PI/4 DQPSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:09

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

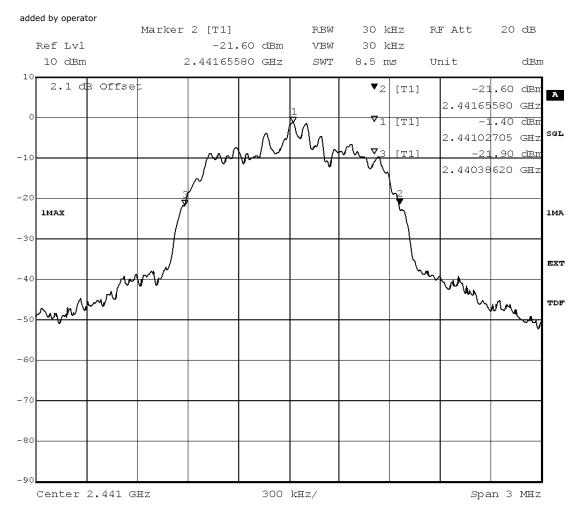


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

20 dB bandwidth MHz
1.270



Fitle: 20dB Bandwidth

Comment A: CH M: 2441 MHz; 20dB bandwidth (kHz):1269.6

Date: 30.MAY.2012 10:50:02



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.3; Frequency = 2441, Mode = BT transmit using 3 Mbps with 8DPSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:18

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

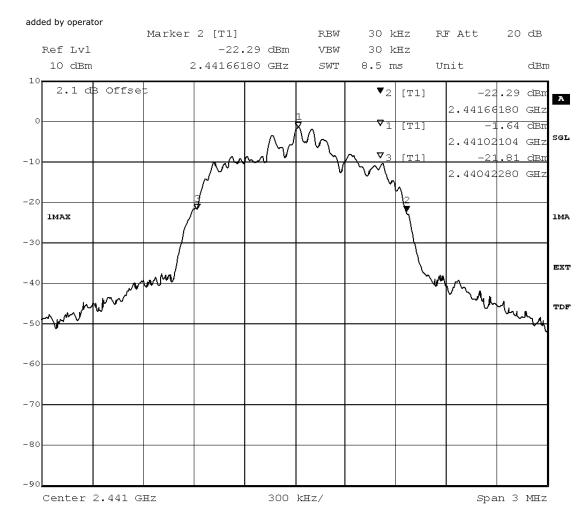


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

20 dB bandwidth MHz
1.239



Title: 20dB Bandwidth

Comment A: CH M: 2441 MHz; 20dB bandwidth (kHz):1239

Date: 30.MAY.2012 11:56:19



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.3; Frequency = 2480, Mode = BT transmit using 1 Mbps with GFSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 12:57

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

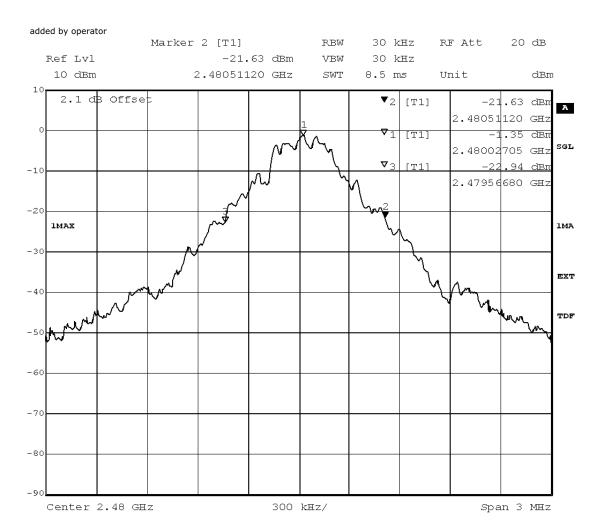


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

20	IB bandwidth MHz
	0.944



Title: 20dB Bandwidth

Comment A: CH T: 2480 MHz; 20dB bandwidth (kHz):944.4

Date: 30.MAY.2012 09:59:34



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.3; Frequency = 2480, Mode = BT transmit using 2 Mbps with PI/4 DQPSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:10

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

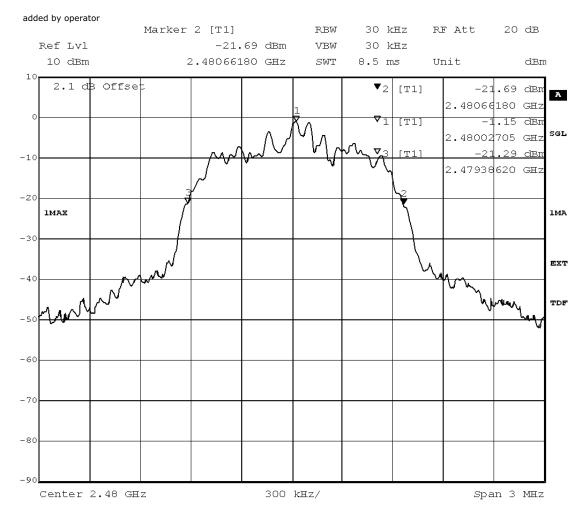


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

20 dB bandwidth MHz	
1.276	



Title: 20dB Bandwidth

Comment A: CH T: 2480 MHz; 20dB bandwidth (kHz):1275.6

Date: 30.MAY.2012 11:07:04



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.3; Frequency = 2480, Mode = BT transmit using 3 Mbps with 8DPSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:18

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

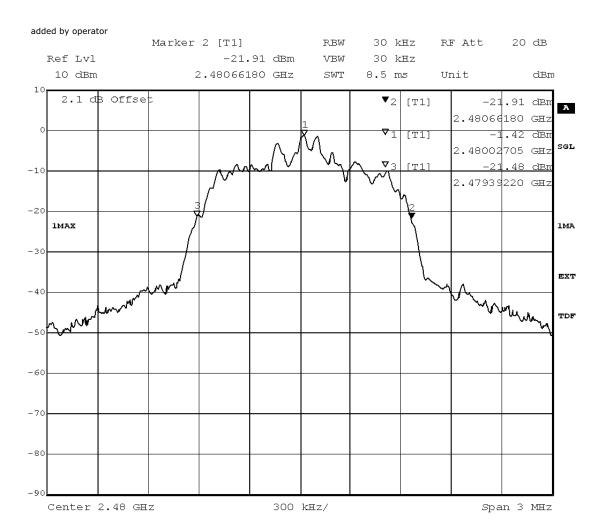


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

20 dB bandwidth MHz	
1.270	



Title: 20dB Bandwidth

Comment A: CH T: 2480 MHz; 20dB bandwidth (kHz):1269.6

Date: 30.MAY.2012 12:14:13



Setup No.:

Reference: ODE_MJP_KYOCE_1207_FCCa

According to

Title 47 CFR chapter I part 15 subpart C

3.5.4 15c.4 Peak power output §15.247 (b) (1)

Test: 15c.4; Frequency = 2402, Mode = BT transmit using 1 Mbps with GFSK modulation

S01_N01

Result: Passed

Date of Test: 2012/05/30 12:57

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

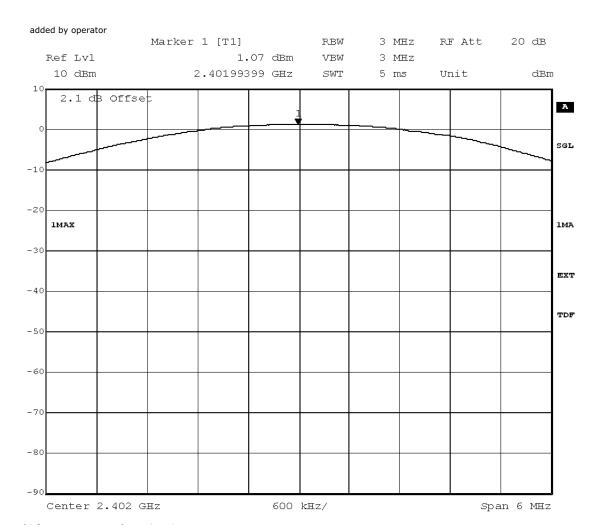


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

conducted peak output power value /dBm		peak value EIRP /dBm
1.07	0.00	1.07



Title: Peak outputpower Power Comment A: CH B: 2402 MHz
Date: 30.MAY.2012 09:11:56



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.4; Frequency = 2402, Mode = BT transmit using 2 Mbps with PI/4 DQPSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:10

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

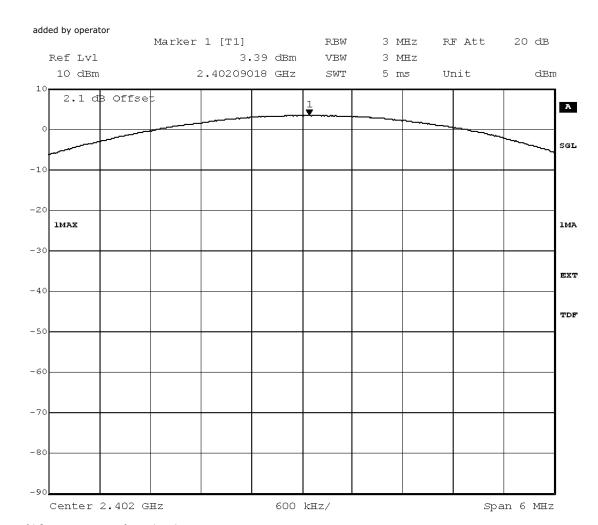


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

conducted peak output power value /dBm	Antenna	peak value EIRP /dBm
3.39	0.00	3.39



Title: Peak outputpower Power Comment A: CH B: 2402 MHz
Date: 30.MAY.2012 10:29:20



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.4; Frequency = 2402, Mode = BT transmit using 3 Mbps with 8DPSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:19

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

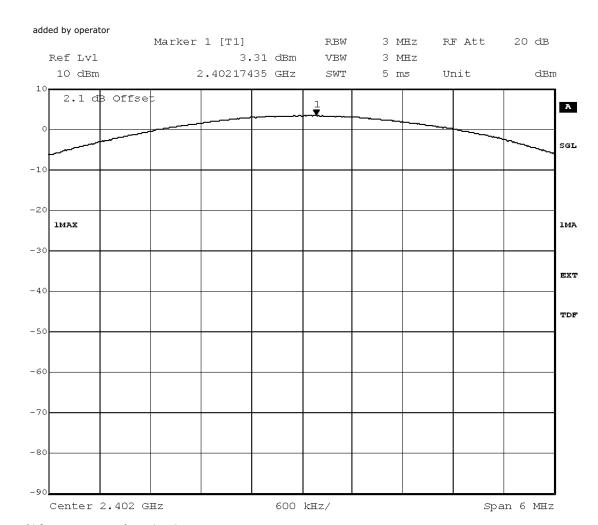


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

conducted peak output power value /dBm	Antenna	peak value EIRP /dBm
3.31	0.00	3.31



Title: Peak outputpower Power Comment A: CH B: 2402 MHz
Date: 30.MAY.2012 11:39:42



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.4; Frequency = 2441, Mode = BT transmit using 1 Mbps with GFSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 12:58

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

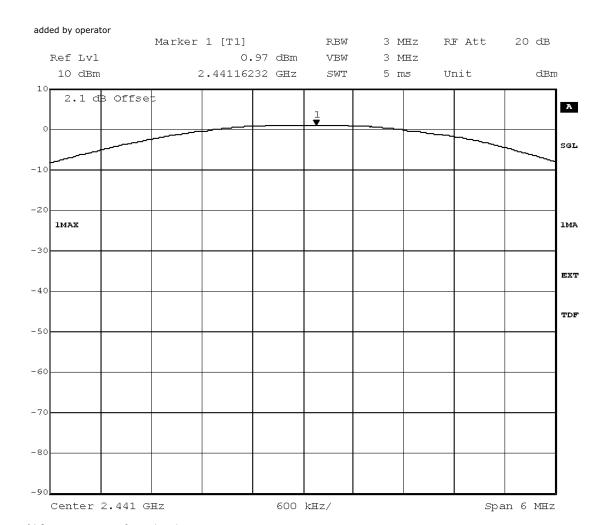


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

conducted peak output power value /dBm	Antenna	peak value EIRP /dBm
0.97	0.00	0.97



Title: Peak outputpower Power Comment A: CH M: 2441 MHz
Date: 30.MAY.2012 09:42:24



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.4; Frequency = 2441, Mode = BT transmit using 2 Mbps with PI/4 DQPSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:11

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

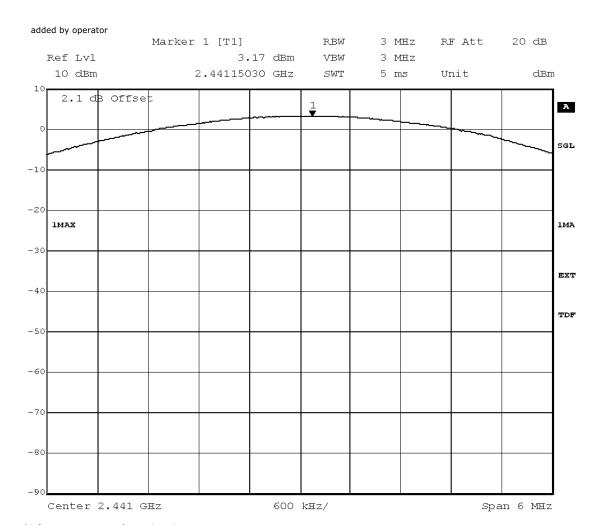


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

conducted peak output power value /dBm	Antenna	peak value EIRP /dBm
3.17	0.00	3.17



Title: Peak outputpower Power Comment A: CH M: 2441 MHz
Date: 30.MAY.2012 10:50:34



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.4; Frequency = 2441, Mode = BT transmit using 3 Mbps with 8DPSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:19

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

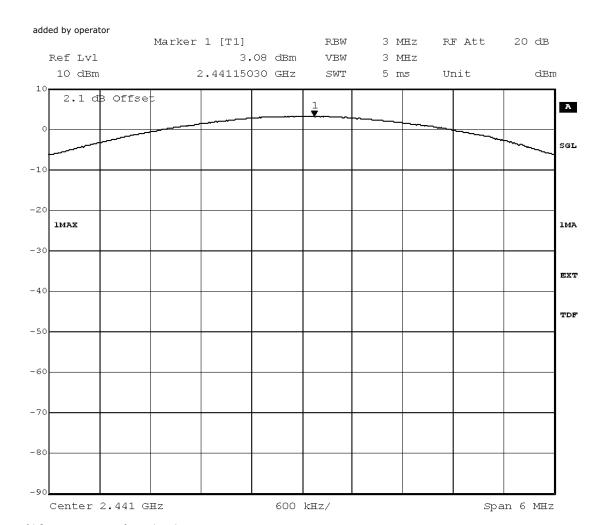


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

conducted peak output power value /dBm	Antenna	peak value EIRP /dBm
3.08	0.00	3.08



Title: Peak outputpower Power Comment A: CH M: 2441 MHz
Date: 30.MAY.2012 11:56:52



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.4; Frequency = 2480, Mode = BT transmit using 1 Mbps with GFSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 12:58

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

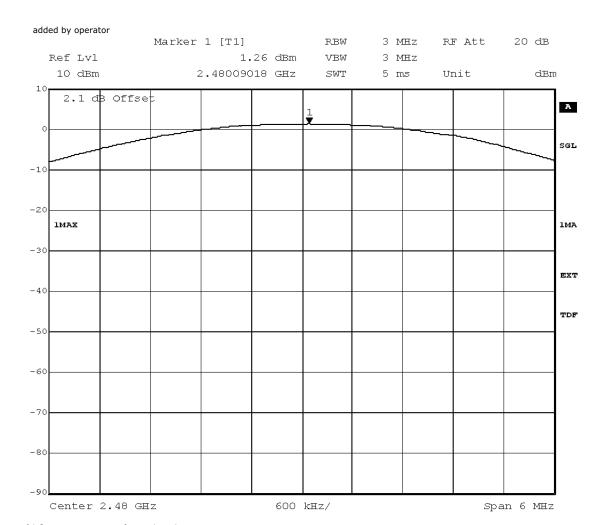


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

conducted peak output power value /dBm	Antenna	peak value EIRP /dBm	
1.26	0.00	1.26	



Title: Peak outputpower Power Comment A: CH T: 2480 MHz
Date: 30.MAY.2012 10:00:07



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.4; Frequency = 2480, Mode = BT transmit using 2 Mbps with PI/4 DQPSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:11

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

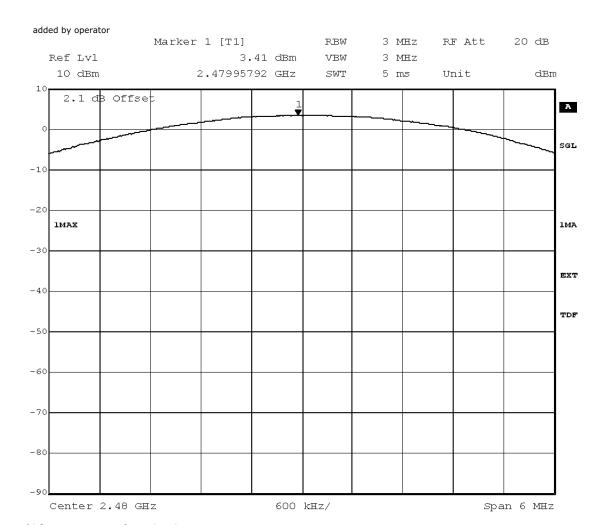


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

conducted peak output power value /dBm	Antenna	peak value EIRP /dBm	
3.41	0.00	3.41	



Title: Peak outputpower Power
Comment A: CH T: 2480 MHz
Date: 30.MAY.2012 11:07:37



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.4; Frequency = 2480, Mode = BT transmit using 3 Mbps with 8DPSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:19

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

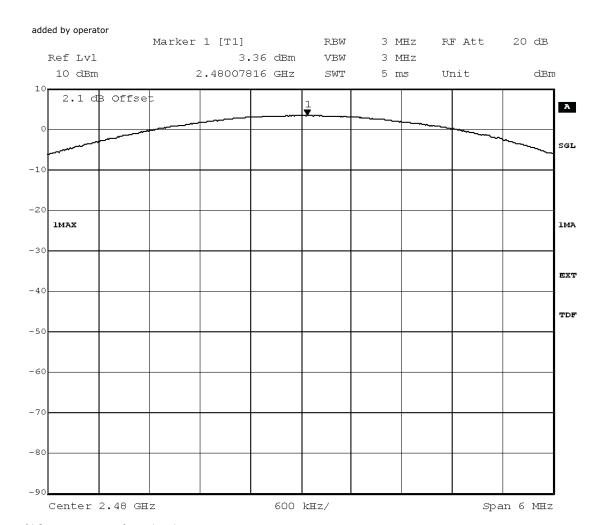


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

conducted peak output power value /dBm		peak value EIRP /dBm	
3.36	0.00	3.36	



Title: Peak outputpower Power Comment A: CH T: 2480 MHz
Date: 30.MAY.2012 12:14:47



According to

Title 47 CFR chapter I part 15 subpart C

3.5.5 15c.5 Spurious RF conducted emissions §15.247 (d)

Test: 15c.5; Frequency = 2402, Mode = BT transmit using 1 Mbps with GFSK modulation

 Result:
 Passed

 Setup No.:
 S01_N01

Date of Test: 2012/05/30 12:58

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

Test Specification: FCC part 2 and 15

Detailed Results:

etalled Results	5 :										
		Marker	1 [T1]		RBW	100 k	ΞEZ	RF Att	20) dB	
Ref Lv	1		0.	78 dBm	VBW	300 k	ΉZ				
10 dB:	m	2	2.381883	377 GHz	SWT	330	S	Unit		dBm	
10											
2.1	dB Offse	ŧ				▼ 1	[T1]		q.7ε	3 dBm	A
	1							2.38	188377		
0	1					v 2	[T1]		-39.67	dBm	
									380762		SGL
						⊽₃	[T1]		-53.94		
-10	1										
									553106		
-20 D1 -1		m				v 4	[T1]		-53.94		
1MAX								6.93	553106		1MA
IMAL										1	LIMA
-30											
	2									E	EXT
-40	1 7										
										l°	TDF
-50		3						+			
	∥	الآير									
-60		~~~~ "		بالويافساليريد	Managa	which	www	mharah	muru	man	
-60 Munul	U www.m.	- W	<u> </u>								
-70											
-80								_			
-90	<u> </u>					l	l				
Center	12.515	GHZ		2.497	GHz/			Span	24.97	GHZ	

Title: spurious emissions Comment A: CH B: 2402 MHz

Date: 30.MAY.2012 09:07:57



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.5; Frequency = 2402, Mode = BT transmit using 2 Mbps with PI/4 DQPSK modulation

Result: Passed

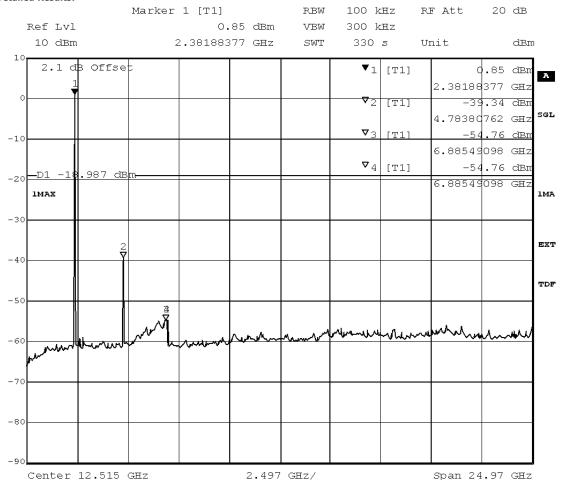
Setup No.: S01_N01

Date of Test: 2012/05/30 13:12

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

Test Specification: FCC part 2 and 15

Detailed Results:



Title: spurious emissions
Comment A: CH B: 2402 MHz
Date: 30.MAY.2012 10:25:38

added by operator

Test: 15c.5; Frequency = 2402, Mode = BT transmit using 3 Mbps with 8DPSK modulation

 Result:
 Passed

 Setup No.:
 \$01_N01

Date of Test: 2012/05/30 13:20

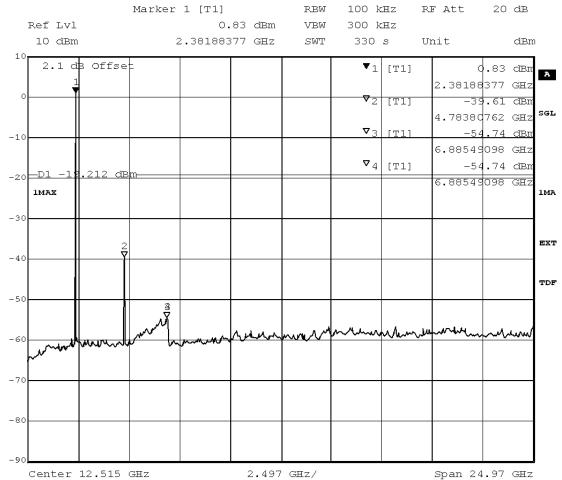
Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES



According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:



Title: spurious emissions Comment A: CH B: 2402 MHz Date: 30.MAY.2012 11:35:59

added by operator

Test: 15c.5; Frequency = 2441, Mode = BT transmit using 1 Mbps with GFSK modulation

 Result:
 Passed

 Setup No.:
 S01_N01

Date of Test: 2012/05/30 13:01

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

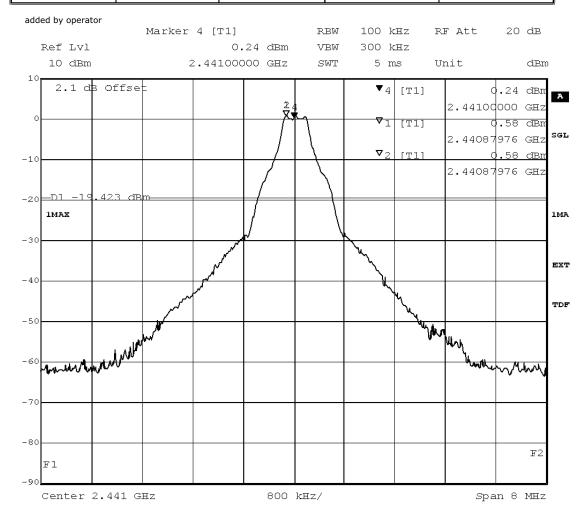


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

Frequency	Measured value	Reference value dBm	Limit	Margin to limit
MHz	dBm		dBm	dB
2441	0.24	0.58	-19.42	-19.66



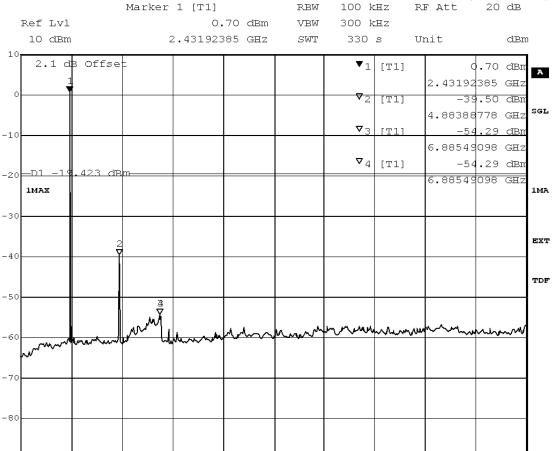
Title: Band Edge Compliance Comment A: CH M: 2441 MHz
Date: 30.MAY.2012 09:26:36



Span 24.97 GHz

According to

Title 47 CFR chapter I part 15 subpart C



2.497 GHz/

Title: spurious emissions
Comment A: CH M: 2441 MHz
Date: 30.MAY.2012 09:38:33

Center 12.515 GHz

added by operator

Test: 15c.5; Frequency = 2441, Mode = BT transmit using 2 Mbps with PI/4 DQPSK modulation

 Result:
 Passed

 Setup No.:
 \$01_N01

Date of Test: 2012/05/30 13:12

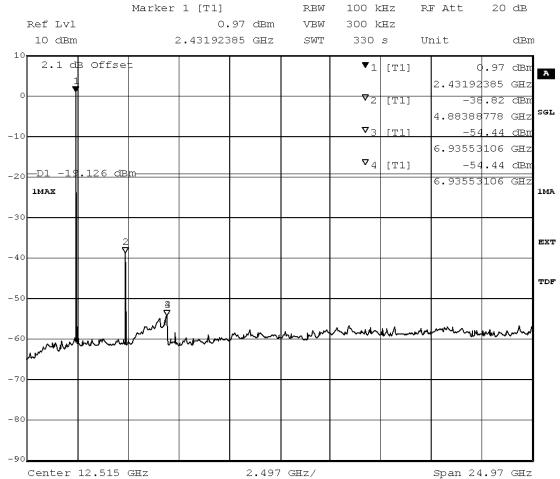
Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES



According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

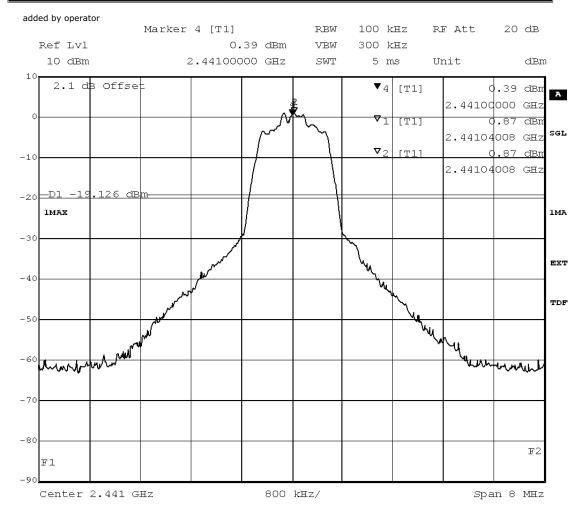


Title: spurious emissions
Comment A: CH M: 2441 MHz
Date: 30.MAY.2012 10:47:01



According to Title 47 CFR chapter I part 15 subpart C

Frequency	Measured value dBm	Reference value	Limit	Margin to limit
MHz		dBm	dBm	dB
2441	0.39	0.87	-19.13	-19.52



Title: Band Edge Compliance
Comment A: CH M: 2441 MHz
Date: 30.MAY.2012 10:35:05

added by operator

Test: 15c.5; Frequency = 2441, Mode = BT transmit using 3 Mbps with 8DPSK modulation

 Result:
 Passed

 Setup No.:
 S01_N01

Date of Test: 2012/05/30 13:20

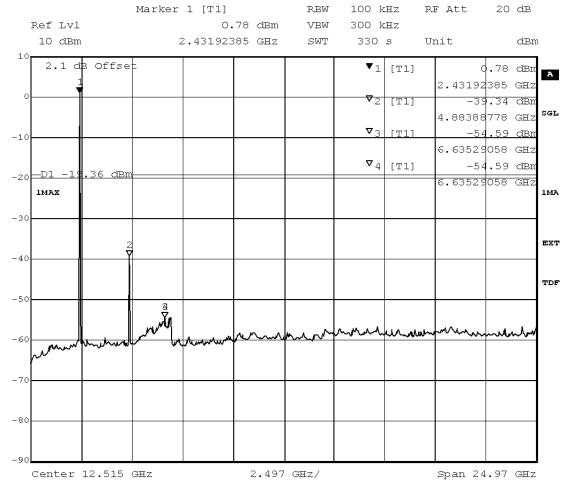
Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES



According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:



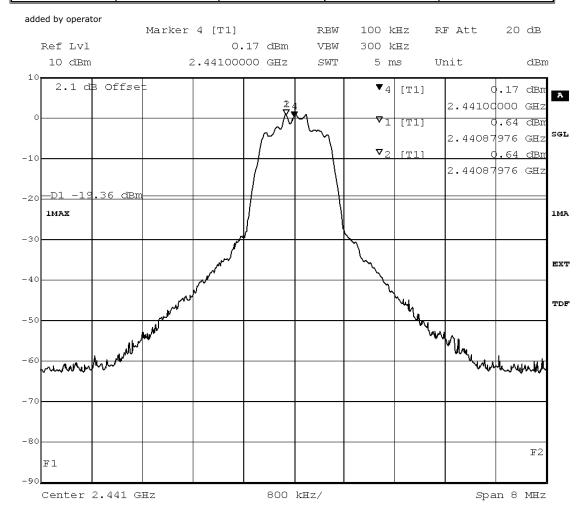
Title: spurious emissions
Comment A: CH M: 2441 MHz
Date: 30.MAY.2012 11:53:15



According to

Title 47 CFR chapter I part 15 subpart C

Frequency	Measured value	Reference value dBm	Limit	Margin to limit
MHz	dBm		dBm	dB
2441	0.17	0.64	-19.36	-19.53



Title: Band Edge Compliance
Comment A: CH M: 2441 MHz
Date: 30.MAY.2012 11:41:18

added by operator

Test: 15c.5; Frequency = 2480, Mode = BT transmit using 1 Mbps with GFSK modulation

 Result:
 Passed

 Setup No.:
 S01_N01

Date of Test: 2012/05/30 13:02

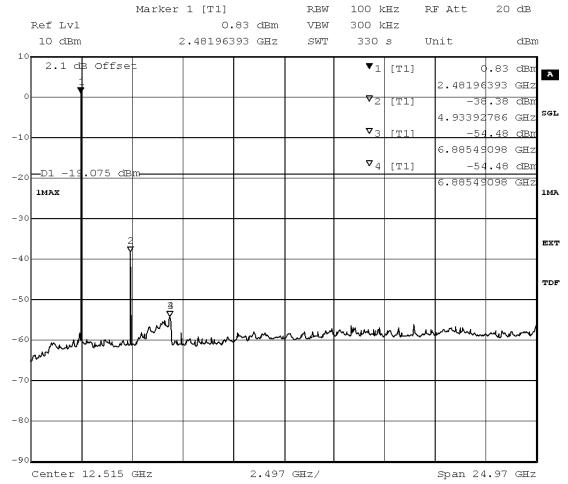
Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES



According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:



Title: spurious emissions
Comment A: CH T: 2480 MHz
Date: 30.MAY.2012 09:56:09

added by operator

Test: 15c.5; Frequency = 2480, Mode = BT transmit using 2 Mbps with PI/4 DQPSK modulation

 Result:
 Passed

 Setup No.:
 \$01_N01

Date of Test: 2012/05/30 13:13

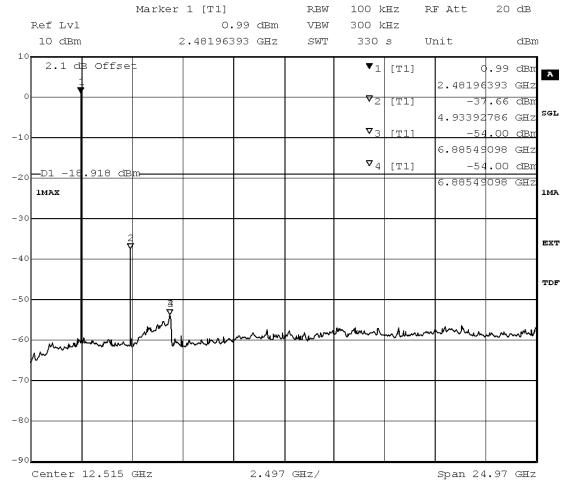
Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES



According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:



Title: spurious emissions
Comment A: CH T: 2480 MHz
Date: 30.MAY.2012 11:03:59

added by operator

Test: 15c.5; Frequency = 2480, Mode = BT transmit using 3 Mbps with 8DPSK modulation

 Result:
 Passed

 Setup No.:
 \$01_N01

Date of Test: 2012/05/30 13:20

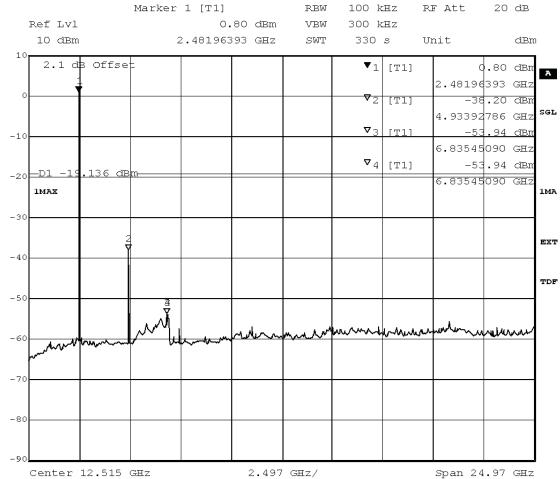
Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES



According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:



Title: spurious emissions
Comment A: CH T: 2480 MHz
Date: 30.MAY.2012 12:11:06



According to

Title 47 CFR chapter I part 15 subpart C

3.5.6 15c.6 Band edge compliance §15.247 (d)

Test: 15c.6; Frequency = 2402, Mode = BT transmit using 1 Mbps with GFSK modulation, Method = conducted

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:02

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES



According to

Title 47 CFR chapter I part 15 subpart C

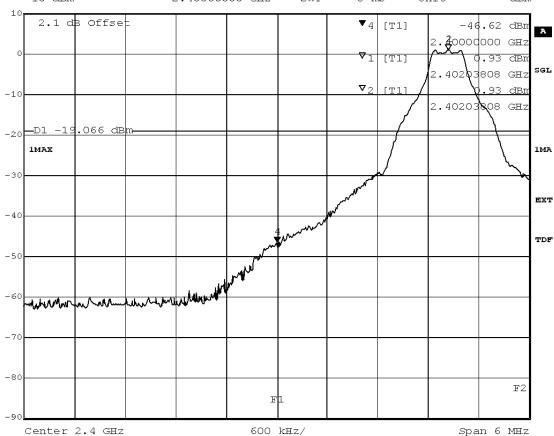
Detailed Results:

Frequency	Measured value	Reference value dBm	Limit	Margin to limit
MHz	dBm		dBm	dB
2400	-46.62	0.93	-19.07	27.55

added by operator

Marker 4 [T1] RBW 100 kHz RF Att 20 dB

Ref Lvl -46.62 dBm VBW 300 kHz



Pitle: Band Edge Compliance

Comment A: CH B: 2402 MHz
Date: 30.MAY.2012 08:55:59

added by operator

Test: 15c.6; Frequency = 2402, Mode = BT transmit using 2 Mbps with PI/4 DQPSK modulation, Method = conducted

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:13

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES



According to

Title 47 CFR chapter I part 15 subpart C

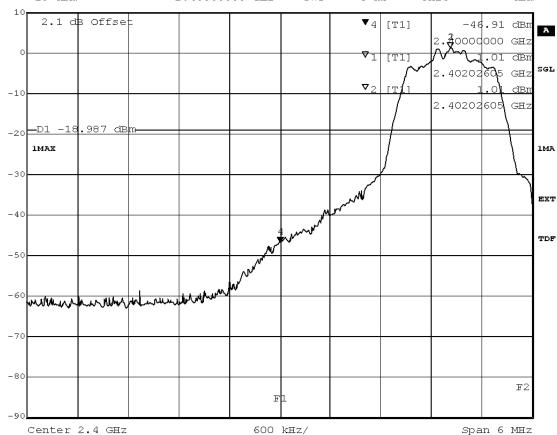
Detailed Results:

Frequency	Measured value	Reference value dBm	Limit	Margin to limit
MHz	dBm		dBm	dB
2400	-46.91	1.01	-18.99	27.93

added by operator

Marker 4 [T1] RBW 100 kHz RF Att 20 dB

Ref Lvl -46.91 dBm VBW 300 kHz



Fitle: Band Edge Compliance

Comment A: CH B: 2402 MHz
Date: 30.MAY.2012 10:13:42

added by operator

Setup No.:

Test: 15c.6; Frequency = 2402, Mode = BT transmit using 3 Mbps with 8DPSK modulation, Method = conducted

Result: Passed

Date of Test: 2012/05/30 13:21

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

S01_N01



According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

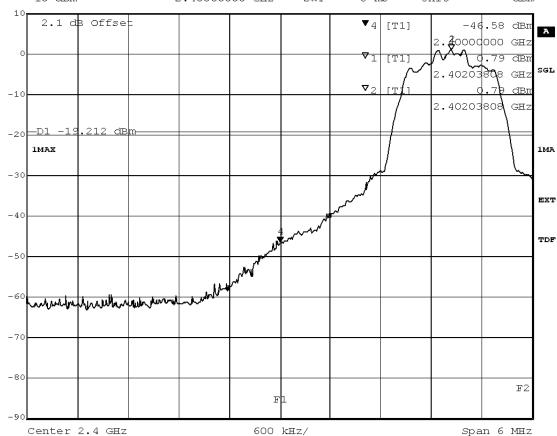
Frequency	Measured value	Reference value dBm	Limit	Margin to limit
MHz	dBm		dBm	dB
2400	-46.58	0.79	-19.21	27.36

added by operator

Marker 4 [T1] RBW 100 kHz RF Att 20 dB

Ref Lvl -46.58 dBm VBW 300 kHz

10 dBm 2.40000000 GHz SWT 5 ms Unit dBm



Fitle: Band Edge Compliance

Comment A: CH B: 2402 MHz

Date: 30.MAY.2012 11:24:03

added by operator

Setup No.:

Test: 15c.6; Frequency = 2480, Mode = BT transmit using 1 Mbps with GFSK modulation, Method = conducted

Result: Passed

Date of Test: 2012/05/30 13:02

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

S01_N01



According to

Title 47 CFR chapter I part 15 subpart C

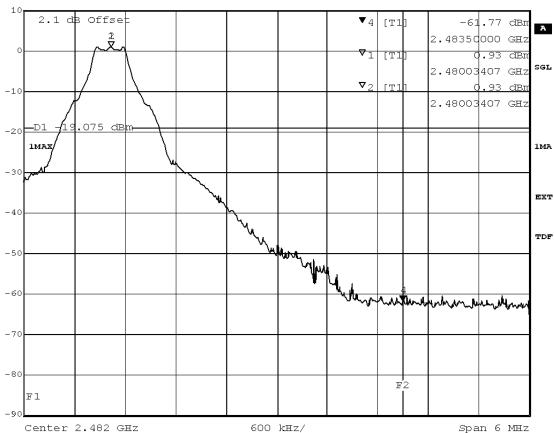
Detailed Results:

Frequency	Measured value	Reference value dBm	Limit	Margin to limit
MHz	dBm		dBm	dB
2484	-61.77	0.93	-19.07	42.69

added by operator

Marker 4 [T1] RBW 100 kHz RF Att 20 dB

Ref Lvl -61.77 dBm VBW 300 kHz



Pitle: Band Edge Compliance

Comment A: CH T: 2480 MHz
Date: 30.MAY.2012 09:44:09

added by operator

Test: 15c.6; Frequency = 2480, Mode = BT transmit using 1 Mbps with GFSK modulation, Method = radiated

 Result:
 Passed

 Setup No.:
 S01_A01

Date of Test: 2012/05/21 8:20

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

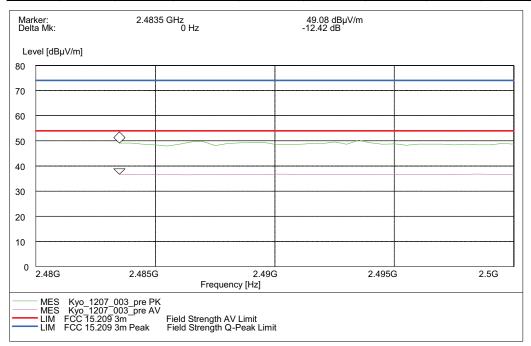


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

_		Limit PK [dBµV]			value PK			Margin AV [dB]	
2480 MHz	Ver + Hor	74	54	2483.5	49.08	36.66	24.92	17.34	Passed



Test: 15c.6; Frequency = 2480, Mode = BT transmit using 2 Mbps with PI/4 DQPSK modulation, Method = conducted

 Result:
 Passed

 Setup No.:
 \$01_N01

Date of Test: 2012/05/30 13:14

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

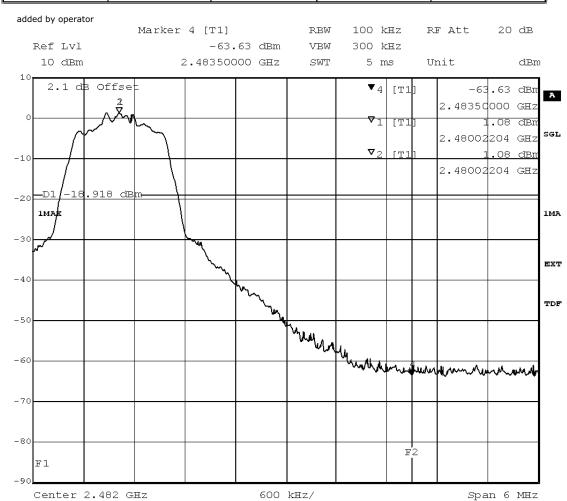


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

Frequency	Measured value	Reference value dBm	Limit	Margin to limit
MHz	dBm		dBm	dB
2484	-63.63	1.08	-18.92	44.72



Title: Band Edge Compliance

Comment A: CH T: 2480 MHz

Date: 30.MAY.2012 10:52:02



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.6; Frequency = 2480, Mode = BT transmit using 2 Mbps with PI/4 DQPSK modulation, Method = radiated

Result: Passed

The measurement was performed from 1 GHz up to 8 GHz because no significant spurious emissions were found outside this frequency range in

GFSK modes.

Setup No.: S01_A01

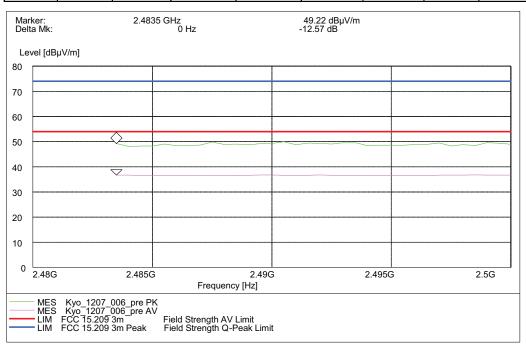
Date of Test: 2012/05/21 8:22

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

Test Specification: FCC part 2 and 15

Detailed Results:

		Limit PK [dBµV]			value PK			Margin AV [dB]	
2480 MHz	Ver + Hor	74	54	2483.5	49.22	36.65	24.78	17.35	Passed



Test: 15c.6; Frequency = 2480, Mode = BT transmit using 3 Mbps with 8DPSK modulation, Method = conducted

 Result:
 Passed

 Setup No.:
 S01_N01

Date of Test: 2012/05/30 13:21

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

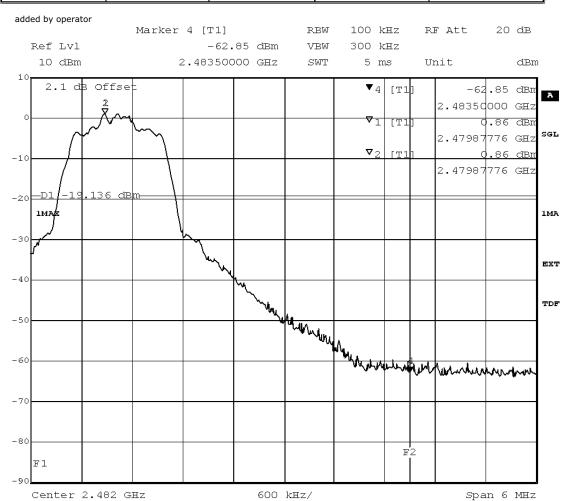


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

Frequency	Measured value	Reference value dBm	Limit	Margin to limit
MHz	dBm		dBm	dB
2484	-62.85	0.86	-19.14	43.71



Title: Band Edge Compliance

Comment A: CH T: 2480 MHz
Date: 30.MAY.2012 11:59:05



According to

Title 47 CFR chapter I part 15 subpart C

Test: 15c.6; Frequency = 2480, Mode = BT transmit using 3 Mbps with 8DPSK modulation, Method = radiated

Result: Passed

The measurement was performed from 1 GHz up to 8 GHz because no significant spurious emissions were found outside this frequency range in

GFSK modes.

Setup No.: S01_A01

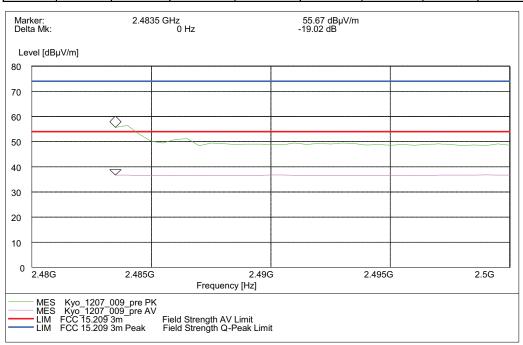
Date of Test: 2012/05/21 8:24

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

Test Specification: FCC part 2 and 15

Detailed Results:

1		Limit PK [dBµV]			value PK			Margin AV [dB]	
2480 MHz	Ver + Hor	74	54	2483.5	56.44	36.65	17.56	17.35	Passed





According to

Title 47 CFR chapter I part 15 subpart C

3.5.7 15c.7 Dwell time §15.247 (a) (1) (iii)

Test: 15c.7; Frequency = 2441, Mode = BT transmit using 1 Mbps with GFSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:03

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

Test Specification: FCC part 2 and 15

Detailed Results:

Packet type	Time slot length	Dwell time	Dwell time ms
DH5	2.93	time slot length * 1600/5 /79 * 31.6	374.51

added by operator

Test: 15c.7; Frequency = 2441, Mode = BT transmit using 2 Mbps with PI/4 DQPSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:14

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

Test Specification: FCC part 2 and 15

Detailed Results:

Packet type	Time slot length	Dwell time	Dwell time ms
DH5	2.93	time slot length * 1600/5 /79 * 31.6	374.51

added by operator

Test: 15c.7; Frequency = 2441, Mode = BT transmit using 3 Mbps with 8DPSK modulation

 Result:
 Passed

 Setup No.:
 S01_N01

Date of Test: 2012/05/30 13:22

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

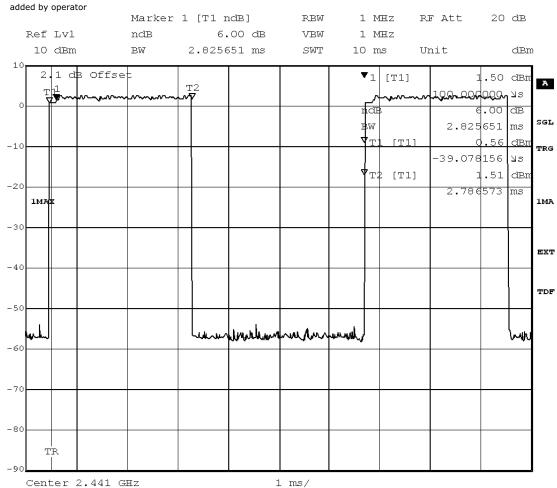


According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:

Packet type	Time slot length	Dwell time	Dwell time ms
DH5	2.83	time slot length * 1600/5 /79 * 31.6	361.68



Center 2.441 GHz

Title: Dwell time Comment A: CH M: 2441 MHz

Date: 30.MAY.2012 12:17:30



According to

Title 47 CFR chapter I part 15 subpart C

3.5.8 15c.8 Channel separation §15.247 (a) (1)

Test: 15c.8; Frequency = 2441, Mode = BT transmit using 1 Mbps with GFSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:04

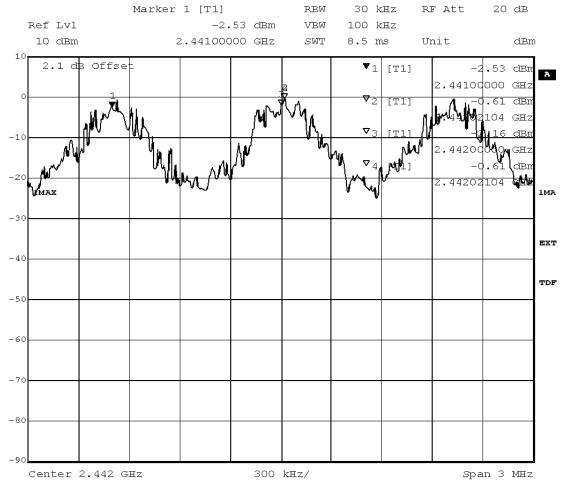
Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES



According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:



Title: Channel separation Comment A: CH H: Hopping

Date: 30.MAY.2012 10:09:24



According to

Title 47 CFR chapter I part 15 subpart C

Channel Seperation

1 MHz

Test: 15c.8; Frequency = 2441, Mode = BT transmit using 2 Mbps with PI/4 DQPSK modulation

 Result:
 Passed

 Setup No.:
 S01_N01

Date of Test: 2012/05/30 13:15

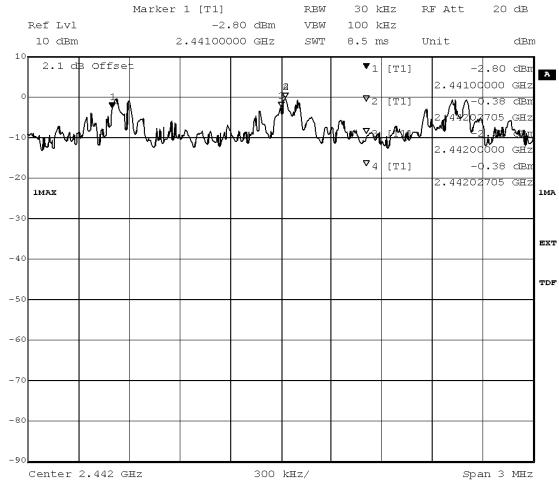
Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES



According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:



Title: Channel separation Comment A: CH H: Hopping

Date: 30.MAY.2012 11:20:09



According to

Title 47 CFR chapter I part 15 subpart C

Channel Seperation

1 MHz

Test: 15c.8; Frequency = 2441, Mode = BT transmit using 3 Mbps with 8DPSK modulation

 Result:
 Passed

 Setup No.:
 S01_N01

Date of Test: 2012/05/30 13:23

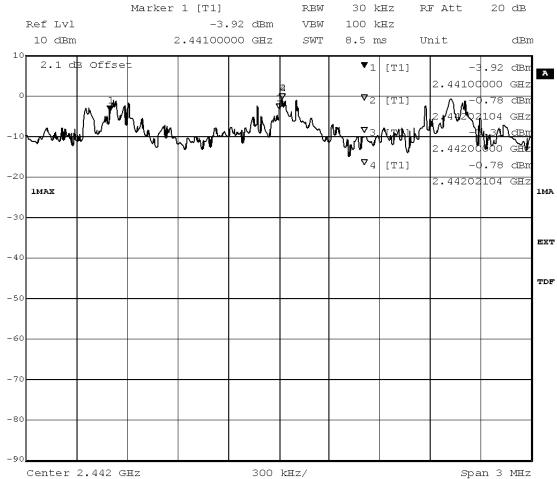
Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES



According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:



Title: Channel separation

Comment A: CH H: Hopping

Date: 30.MAY.2012 12:22:19



According to
Title 47 CFR chapter I part 15 subpart C

Channel Seperation

1 MHz



According to

Title 47 CFR chapter I part 15 subpart C

3.5.9 15c.9 Number of hopping frequencies §15.247 (a) (1) (iii)

Test: 15c.9; Frequency = 2441, Mode = BT transmit using 1 Mbps with GFSK modulation

 Result:
 Passed

 Setup No.:
 \$01_N01

Date of Test: 2012/05/30 13:05

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

Test Specification: FCC part 2 and 15

Detailed Results:

Number of Hopping Frequencies
79

Test: 15c.9; Frequency = 2441, Mode = BT transmit using 2 Mbps with PI/4 DQPSK modulation

Result: Passed

Setup No.: S01_N01

Date of Test: 2012/05/30 13:15

Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES

Test Specification: FCC part 2 and 15

Detailed Results:

Number of Hopping Frequencies
79

Test: 15c.9; Frequency = 2441, Mode = BT transmit using 3 Mbps with 8DPSK modulation

 Result:
 Passed

 Setup No.:
 S01_N01

Date of Test: 2012/05/30 13:23

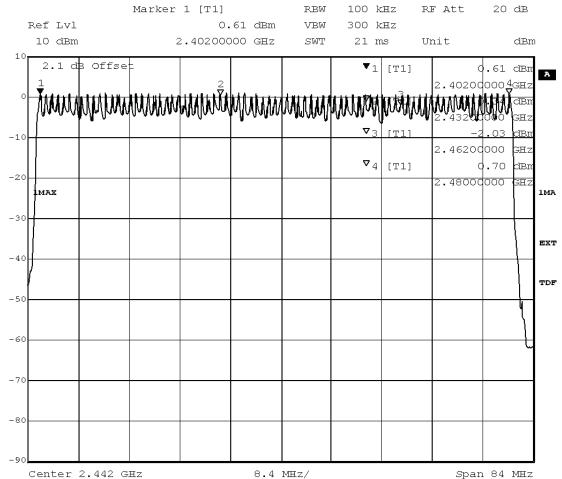
Body: FCC47CFRChIPART15c247RADIO FREQUENCY DEVICES



According to

Title 47 CFR chapter I part 15 subpart C

Detailed Results:



Title: Number of hopping frequencies

Comment A: CH H: Hopping

Date: 30.MAY.2012 12:24:47



According to
Title 47 CFR chapter I part 15 subpart C

Number of Hopping Frequencies

79



According to

Title 47 CFR chapter I part 15 subpart C

4 Test Equipment Details

4.1 List of Used Test Equipment

The calibration, hardware and software states are shown for the testing period.

Test Equipment Anechoic Chamber

Lab ID:Lab 2Manufacturer:Frankonia

Description: Anechoic Chamber for radiated testing

Type: 10.58x6.38x6.00 m³

Single Devices for Anechoic Chamber

Single Device Name	Туре	Serial Number	Manufacturer
Air compressor	none	-	Atlas Copco
Anechoic Chamber	10.58 x 6.38 x 6.00 m ³ Calibration Details	none	Frankonia Last Execution Next Exec.
	FCC listing 96716 3m Part15/18 IC listing 3699A-1 3m		2011/01/11 2014/01/10 2011/02/07 2014/02/06
Controller Maturo	MCU	961208	Maturo GmbH
EMC camera	CE-CAM/1	-	CE-SYS
EMC camera Nr.2	CCD-400E	0005033	Mitsubishi
Filter ISDN	B84312-C110-E1		Siemens&Matsushita
Filter Universal 1A	BB4312-C30-H3	-	Siemens&Matsushita

Test Equipment Auxiliary Equipment for Conducted emissions

Lab ID: Lab 1

Manufacturer: Rohde & Schwarz GmbH & Co.KG
Description: EMI Conducted Auxiliary Equipment

Single Devices for Auxiliary Equipment for Conducted emissions

Single Device Name	Туре	Serial Number	Manufacturer	
Cable "LISN to ESI"	RG214	W18.03+W48.03	Huber&Suhner	
	Calibration Details		Last Execution	Next Exec.
	Path Calibration		2011/11/11	2012/11/10
Two-Line V-Network	ESH 3-Z5	828304/029	Rohde & Schwa	rz GmbH &
			Co. KG	
Two-Line V-Network	ESH 3-Z5	829996/002	Rohde & Schwa	rz GmbH &
			Co. KG	
	Calibration Details		Last Execution	Next Exec.
	DKD calibration		2011/01/20	2013/01/19



According to

Title 47 CFR chapter I part 15 subpart C

Test Equipment Auxiliary Equipment for Radiated emissions

Lab ID: Lab 2

Description: Equipment for emission measurements

Serial Number: see single devices

Single Devices for Auxiliary Equipment for Radiated emissions

Single Device Name	Туре	Serial Number	Manufacturer
Antenna mast	AS 620 P	620/37	HD GmbH
Biconical dipole	VUBA 9117 Calibration Details	9117-108	Schwarzbeck Last Execution Next Exec.
	Standard Calibration		2008/10/27 2013/10/26
	Standard Calibration		2012/01/18 2015/01/17
Broadband Amplifier 18MHz-26GHz	JS4-18002600-32-5P	849785	Miteq
Broadband Amplifier 1GHz-4GHz	AFS4-01000400-1Q-10P-4	-	Miteq
Broadband Amplifier 30MHz-18GHz	JS4-00101800-35-5P	896037	Miteq
Cable "ESI to EMI Antenna"	EcoFlex10	W18.01- 2+W38.01-2	Kabel Kusch
Cable "ESI to Horn Antenna"	UFB311A+UFB293C	W18.02- 2+W38.02-2	Rosenberger Micro-Coax
Double-ridged horn	HF 906	357357/001	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		Last Execution Next Exec.
	Standard Calibration		2012/05/18 2015/05/17
Double-ridged horn	HF 906	357357/002	Rohde & Schwarz GmbH & Co. KG
High Pass Filter	4HC1600/12750-1.5-KK	9942011	Trilithic
High Pass Filter	5HC2700/12750-1.5-KK	9942012	Trilithic
High Pass Filter	5HC3500/12750-1.2-KK	200035008	Trilithic
High Pass Filter	WHKX 7.0/18G-8SS	09	Wainwright
Logper. Antenna	HL 562 Ultralog	830547/003	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		Last Execution Next Exec.
	Standard Calibration		2009/05/27 2012/05/26
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		Last Execution Next Exec.
	Standard calibration		2011/10/27 2014/10/26
Pyramidal Horn Antenna 26,5 GHz	3160-09	00083069	EMCO Elektronik GmbH
Pyramidal Horn Antenna 40 GHz	3160-10	00086675	EMCO Elektronik GmbH
Tilt device Maturo (Rohacell)	Antrieb TD1.5-10kg	TD1.5- 10kg/024/379070 9	Maturo GmbH



According to

Title 47 CFR chapter I part 15 subpart C

Test Equipment Auxiliary Test Equipment

Lab ID: Lab 2

Manufacturer: see single devices

Description: Single Devices for various Test Equipment

Type: various
Serial Number: none

Single Devices for Auxiliary Test Equipment

Single Device Name	Туре	Serial Number	Manufacturer
Broadband Power Divider N (Aux)	1506A / 93459	LM390	Weinschel Associates
Broadband Power Divider SMA	WA1515	A855	Weinschel Associates
Digital Multimeter 03 (Multimeter)	Fluke 177	86670383	Fluke Europe B.V.
,	Calibration Details		Last Execution Next Exec.
	Customized calibration		2011/10/19 2013/10/18
Fibre optic link Satellite (Aux)	FO RS232 Link	181-018	Pontis
Fibre optic link Transceiver (Aux)	FO RS232 Link	182-018	Pontis
Isolating Transformer	LTS 604	1888	Thalheimer Transformatorenwerke GmbH
Notch Filter Ultra Stable (Aux)	WRCA800/960-6EEK	24	Wainwright
Vector Signal Generator	SMIQ 03B	832492/061	Rohde & Schwarz GmbH & Co.KG



According to

Title 47 CFR chapter I part 15 subpart C

Test Equipment Digital Signalling Devices

Lab ID: Lab 1, Lab 2

Description: Signalling equipment for various wireless technologies.

Single Devices for Digital Signalling Devices

Single Device Name	Туре	Serial Number	Manufacturer	
Bluetooth Signalling Unit CBT	СВТ	100589	Rohde & Schwar Co. KG	z GmbH &
	Calibration Details		Last Execution	Next Exec.
	Standard calibration		2011/11/24	2014/11/23
Universal Radio Communication Tester	CMU 200	102366	Rohde & Schwar Co. KG	z GmbH &
	Calibration Details		Last Execution	Next Exec.
	Standard calibration		2011/05/26	2013/05/25
	HW/SW Status		Date of Start	Date of End
	B11, B21V14, B21-2, B41, B52V14, B53-2, B56V14, B68 3v04, PCMCIA, Software: K21 4v21, K22 4v21, K23 4v21, K24 4v21, K56 4v22, K57 4v22, K61 4v22, K62 4v22, K65 4v22, K66 4v22, K67 4v22, K66 4v22, K67 4v22, K68 4v22, K67 4v22, K68 4v22,	U65V04 1 4v21, K42 4v21, 7 4v22, K58 4v22, 8 4v22, K64 4v22,		
Universal Radio Communication Tester	CMU 200	837983/052	Rohde & Schwar Co. KG	z GmbH &
	Calibration Details		Last Execution	Next Exec.
	Standard calibration		2011/12/07	2014/12/06
	HW/SW Status		Date of Start	Date of End
	HW options: B11, B21V14, B21-2, B41, B52V14, B54V14, B56V14, B68 3v04, B95, P0 SW options: K21 4v11, K22 4v11, K23 4v11, K24 K28 4v10, K42 4v11, K43 4v11, K53 K66 4v10, K68 4v10, Firmware: μP1 8v40 01.12.05	CMCIA, U65V02 4 4v11, K27 4v10,	2007/01/02	
	SW:		2008/11/03	



According to

Title 47 CFR chapter I part 15 subpart C

Test Equipment Emission measurement devices

Lab ID: Lab 1, Lab 2

Description: Equipment for emission measurements

Serial Number: see single devices

Single Devices for Emission measurement devices

Single Device Name	Туре	Serial Number	Manufacturer	
Personal Computer	Dell	30304832059	Dell	
Power Meter	NRVD	828110/016	Rohde & Schwar Co.KG	rz GmbH &
Sensor Head A	NRV-Z1	827753/005	Rohde & Schwar Co.KG	rz GmbH &
Signal Generator	SMR 20	846834/008	Rohde & Schwar Co. KG	rz GmbH &
	Calibration Details		Last Execution	Next Exec.
	standard calibration		2011/05/12	2014/05/11
Spectrum Analyzer	ESIB 26	830482/004	Rohde & Schwai Co. KG	rz GmbH &
	Calibration Details		Last Execution	Next Exec.
	Standard Calibration		2011/12/05	2013/12/04
	HW/SW Status		Date of Start	Date of End
	Firmware-Update 4.34.4 from 3.45	during calibration	2009/12/03	-

Test Equipment Multimeter 12

 Lab ID:
 Lab 3

 Description:
 Ex-Tech 520

 Serial Number:
 05157876

Single Devices for Multimeter 12

Single Device Name	Туре	Serial Number	Manufacturer	
Digital Multimeter 12 (Multimeter)	EX520	05157876	Extech Instrume	ents Corp.
	Calibration Details		Last Execution	Next Exec.
	Customized calibration		2011/10/18	2013/10/17



According to

Title 47 CFR chapter I part 15 subpart C

Test Equipment Regulatory Bluetooth RF Test Solution

Lab ID: Lab 3

Description: Regulatory Bluetooth RF Tests

Type: Bluetooth RF

Serial Number: 001

Single Devices for Regulatory Bluetooth RF Test Solution

Single Device Name	Туре	Serial Number	Manufacturer	
ADU 200 Relay Box 7	Relay Box	A04380	Ontrak Control Systems Inc.	
Bluetooth Signalling Unit CBT	СВТ	100302	Rohde & Schwarz GmbH & Co.KG	
	Calibration Details		Last Execution	Next Exec.
	Standard Calibration		2011/08/17	2012/08/16
Power Meter NRVD	NRVD	832025/059		
	Calibration Details		Last Execution	Next Exec.
	Standard Calibration		2011/06/14	2012/06/13
Power Sensor NRV Z1 A	PROBE	832279/013		
	Calibration Details		Last Execution	Next Exec.
	Standard Calibration		2011/06/14	2012/06/13
Power Supply	NGSM 32/10	2725		
	Calibration Details		Last Execution	Next Exec.
	Standard Calibration		2011/06/15	2013/06/14
Rubidium Frequency Normal MFS	Datum MFS	002	Datum GmbH	
	Calibration Details		Last Execution	Next Exec.
	Standard Calibration		2011/08/17	2012/08/16
Signal Analyser FSIQ26	1119.6001.26	832695/007	Rohde & Schwar Co.KG	z GmbH &
Vector Signal Generator SMIQ03B	SMIQ03B	832870/017		
	Calibration Details		Last Execution	Next Exec.
	Standard Calibration		2010/06/23	2013/06/20

Test Equipment Shielded Room 02

Lab ID:Lab 1Manufacturer:Frankonia

Description: Shielded Room for conducted testing

Type: 12 qm Serial Number: none

Test Equipment Shielded Room 07

Lab ID: Lab 3

Description: Shielded Room 4m x 6m



According to

Title 47 CFR chapter I part 15 subpart C

Test Equipment T/H Logger 04

Lab ID:Lab 3Description:Lufft Opus10Serial Number:7481

Single Devices for T/H Logger 04

Single Device Name	Туре	Serial Number	Manufacturer
ThermoHygro	Opus10 THI (8152.00)	7481	Lufft Mess- und
Datalogger 04			Regeltechnik GmbH
(Environ)			

Test Equipment Temperature Chamber 01

Lab ID: Lab 3

Manufacturer: see single devices

Description: Temperature Chamber KWP 120/70

Type: Weiss

Serial Number: see single devices

Single Devices for Temperature Chamber 01

Single Device Name	Туре	Serial Number	Manufacturer	
Temperature Chamber Weiss 01	KWP 120/70	59226012190010	Weiss Umwelttechnik GmbH	
	Calibration Details		Last Execution	Next Exec.
	Customized calibration		2012/03/12	2014/03/11



According to
Title 47 CFR chapter I part 15 subpart C

- 5 Annex
- 5.1 **Additional Information for Report**



Test Description

Reference: ODE_MJP_KYOCE_1207_FCCa

According to
Title 47 CFR chapter I part 15 subpart C

Summary of Test	Results
The EUT complied	d with all performed tests as listed in the summary section of this report.
Technical Report	Summary
Type of Authoriza	ation:
Certification for a	n Intentional Radiator (Frequency Hopping Spread Spectrum).
Applicable FCC R	ules
	rdance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 2 wing subparts are applicable to the results in this test report
Part 2, Subpart J	- Equipment Authorization Procedures, Certification
Part 15, Subpart	C – Intentional Radiators
§ 15.201 E	Equipment authorization requirement
§ 15.207 C	Conducted limits
§ 15.209 F	Radiated emission limits; general requirements
§ 15.247 (Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz
additional docum	ents
	elected and performed with reference to the FCC Public Notice DA 00-705, released March d of applying ANSI C63.4-1992 which is referenced in the FCC Public Note, the newer ANSI plied.
Description of Me	ethods of Measurements
Conducted emiss	ions (AC power line)
Standard F	CC Part 15, Subpart C
The test was perf	formed according to: ANSI C 63.4,



According to

Title 47 CFR chapter I part 15 subpart C

The test set-up was made in accordance to the general provisions of ANSI C 63.4.

The Equipment Under Test (EUT) was setup in a shielded room to perform the conducted emissions measurements in a typical installation configuration. The EUT was powered from $50\mu\text{H}$ || 500 Ohm Line Impedance Stabilization Network (LISN). The LISN's unused connections were terminated with 500 Ohm loads. The measurement procedure consists of two steps. It is implemented into the EMI test software ES-K1 from R&S.

Step 1: Preliminary scan

Intention of this step is, to determine the conducted EMI-profile of the EUT.

EMI receiver settings:

- Detector: Peak Maxhold
- Frequency range: 150 kHz 30 MHz
- Frequency steps: 5 kHzIF-Bandwidth: 9 kHz
- Measuring time / Frequency step: 20 ms
- Measurement on phase + neutral lines of the power cords

On basis of this preliminary scan the highest amplitudes and the corresponding frequencies relative to the limit are identified. Emissions above the limit and emissions which are in the 10 dB range below the limit are considered.

Step 2: Final measurement

Intention of this step is, to determine the highest emissions with the settings defined in the test specification for the frequencies identified in step 1.

EMI receiver settings:

- Detector: Quasi-Peak
- IF Bandwidth: 9 kHz
- Measuring time: 1 s / frequency

At each frequency determined in step 1, four measurements are performed in the following combinations:

- 1) Neutral lead reference ground (PE grounded)
- 2) Phase lead reference ground (PE grounded)
- 3) Neutral lead reference ground (PE floating)
- 4) Phase lead reference ground (PE floating)

The highest value is reported.

Test Requirements / Limits

FCC Part 15, Subpart C, §15.207

Frequency Range (MHz)		QP Limit (dBµV)	AV Limit (dBµV)
0.15 - 0.5	66 to 56	56 to 46	
0.5 - 5	56	46	
5 - 30	60	50	

Used conversion factor: Limit (dB μ V) = 20 log (Limit (μ V)/1 μ V).

Occupied bandwidth

The test was performed according to: FCC §15.31

FCC Part 15, Subpart C

Test Description

Standard

The Equipment Under Test (EUT) was setup to perform the occupied bandwidth measurements.

The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.

The results recorded were measured with the modulation which produces the worst-case (widest) occupied bandwidth. The resolution bandwidth for measuring the reference level and the occupied bandwidth was 30 kHz.

The EUT was connected to the spectrum analyzer via a short coax cable.



According to

Title 47 CFR chapter I part 15 subpart C

Test Requirements / Limits

FCC Part 15, Subpart C, §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 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Implication by the test laboratory:

Since the Bluetooth technology defines a fixed channel separation of 1 MHz this design parameter defines the maximum allowed occupied bandwidth depending on the EUT's output power:

- Under the provision that the system operates with an output power not greater than 125 mW (21.0 dBm)
- : Implicit Limit: Max. 20 dB BW = 1.0 MHz / 2/3 = 1.5 MHz
- 2. If the system output power exceeds 125 mW (21.0 dBm): Implicit Limit: Max. 20 dB BW = 1.0 MHz

Used conversion factor: Output power (dBm) = 10 log (Output power (W) / 1mW)

The measured output power of the system is below 125 mW (21.0 dBm). For the results, please refer to the related chapter of this report. Therefore the limit is determined as $1.5 \, \text{MHz}$.

Peak power output

Standard FCC Part 15, Subpart C

The test was performed according to: FCC $\S15.31$

Test Description

The Equipment Under Test (EUT) was set up to perform the output power measurements. The resolution bandwidth for measuring the output power was set to 3 MHz. The reference level of the spectrum analyzer was set higher than the output power of the EUT. The EUT was connected to the spectrum analyzer via a short coax cable with a known loss.

Test Requirements / Limits

FCC Part 15, Subpart C, §15.247 (b) (1)

- (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt.

Used conversion factor: Limit (dBm) = $10 \log (Limit (W)/1mW)$

==> Maximum Output Power: 30 dBm

Spurious RF conducted emissions

Standard FCC Part 15, Subpart C

The test was performed according to: FCC §15.31

Test Description

The Equipment Under Test (EUT) was set up to perform the spurious emissions measurements. The EUT was connected to spectrum analyzer via a short coax cable with a known loss. Analyzer settings:

- Detector: Peak-Maxhold
- Frequency range: 30 25000 MHz
- Resolution Bandwidth (RBW): 100 kHz



According to

Title 47 CFR chapter I part 15 subpart C

- Video Bandwidth (VBW): 300 kHz
- Sweep Time: 330 s

The reference value for the measurement of the spurious RF conducted emissions is determined during the test "band edge compliance" (cf. chapter 3.6). This value is used to calculate the 20 dBc limit.

Test Requirements / Limits

FCC Part 15, Subpart C, §15.247 (c)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

Spurious radiated emissions

Standard FCC Part 15, Subpart C

The test was performed according to: ANSI C 63.4,

Test Description

The test set-up was made in accordance to the general provisions of ANSI C63.4–2009. The Equipment Under Test (EUT) was set up on a non-conductive table 1.0×2.0 m in the semi-anechoic chamber. The influence of the EUT support table that is used between 30-1000 MHz was evaluated. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The measurement procedure is implemented into the EMI test software ES-K1 from R&S. The radiated emissions measurements were made in a typical installation configuration. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body-worn or handheld EUT. The final test on all kind of EUTs is performed at 2 axes. A pre-check is also performed while the EUT is powered from both AC and DC (battery) power in order to find the worst-case operating condition.

1. Measurement up to 30 MHz

The test set-up was made in accordance to the general provisions of ANSI C63.4.

The Equipment Under Test (EUT) was set up on a non-conductive table in the anechoic chamber.

The radiated emissions measurements were made in a typical installation configuration.

The measurement procedure is implemented into the EMI test software ES-K1 from R&S.

The Loop antenna HFH2-Z2 is used.

Step 1: pre-measurement

- Anechoic chamber
- Antenna distance: 10 m
- Detector: Peak-Maxhold
- Frequency range: 0.009 0.15 and 0.15 30 MHz
- Frequency steps: 0.1 kHz and 5 kHz
- IF-Bandwidth: 0.2 kHz and 10 kHz
- Measuring time / Frequency step: 100 ms

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: final measurement

For the relevant emissions determined in step 1, an additional measurement with the following settings will be performed. Intention of this step is to find the maximum emission level.

- Open area test side
- Antenna distance: according to the Standard
- Detector: Quasi-Peak
- Frequency range: 0.009 30 MHz
- Frequency steps: measurement at frequencies detected in step ${\bf 1}$
- IF-Bandwidth: 200 Hz 10 kHz
- Measuring time / Frequency step: 100 ms
- 2. Measurement above 30 MHz and up to 1 GHz

Step 1: Preliminary scan

Preliminary test to identify the highest amplitudes relative to the limit.

Settings for step 1:

- Detector: Peak-Maxhold
- Frequency range: 30 1000 MHz
- Frequency steps: 60 kHz - IF-Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 μs (BT Timing 1.25 ms)
- Turntable angle range: –180 to +180°



According to

Title 47 CFR chapter I part 15 subpart C

- Turntable step size: 90°

- Height variation range: 1 - 3 m
- Height variation step size: 2 m
- Polarisation: Horizontal + Vertical

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: second measurement

For the relevant emissions determined in step 1, an additional measurement with the following settings will be performed. Intention of this step is, to find out the approximate turntable angle and antenna height for each frequency.

- Detector: Peak Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF Bandwidth: 120 kHz - Measuring time: 100 ms
- Turntable angle range: -180 to +180°
- Turntable step size: 45°
- Height variation range: 1 4 m
 Height variation step size: 0.5 m
 Polarisation: horizontal + vertical

After this step the EMI test system has determined the following values for each frequency (of step 1):

- Frequency
- Azimuth value (of turntable)
- Antenna height

The last two values have now the following accuracy:

- Azimuth value (of turntable): 45°
- Antenna height: 0.5 m

Step 3: final measurement

In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.

For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will be slowly varied by $+/-22.5^{\circ}$ around this value. During this action the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position the antenna height is also slowly varied by +/-25 cm around the antenna height determined. During this action the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.

- Detector: Peak Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF Bandwidth: 120 kHz
- Measuring time: 100 ms
- Turntable angle range: -22.5° to $+22.5^{\circ}$ around the determined value
- Height variation range: -0.25 m to +0.25 m around the determined value

Step 4: final measurement with QP detector

 ${\sf EMI}$ receiver settings for step 4:

- Detector: Quasi-Peak (< 1 GHz)
- Measured frequencies: in step 1 determined frequencies
- IF Bandwidth: 120 kHz - Measuring time: 1 s

3. Measurement above 1 GHz

The following modifications apply to the measurement procedure for the frequency range above 1 GHz: The measurement distance was reduced to 1 m. The results were extrapolated by the extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements, inverse linear-distance squared for the power reference level measurements). Due to the fact that in this frequency range a double ridged wave guided horn antenna (up to 18 GHz) and a horn antenna (18–25 GHz) are used, the steps 2–4 are omitted. Step 1 was performed with one height of the receiving antenna only.

EMI receiver settings:

- Detector: Peak, Average
- IF Bandwidth = 1 MHz

After the measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

For the enhanced data rate packets the test is performed as worst-case-check in order to verify that emissions have a comparable level as found at basic data rate. Typically, the measurement for these packets is performed in the frequency range 1 to 8 GHz but it depends on the emissions found during the test for the basic data rate. Please refer to the results for the used frequency range.



According to

Title 47 CFR chapter I part 15 subpart C

Test Requirements / Limits

FCC Part 15, Subpart C, §15.247 (d)

 \dots In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

FCC Part 15, Subpart C, §15.209, Radiated Emission Limits

Frequency in N	1Hz	Limit (µV/m)	Measurement distance (m)	Limit(dBµV/m @10m)
0.009 - 0.49	2400	O/F(kHz) 300	Limit (dBµV/m)+30d	dB
0.49 - 1.705	2400	00/F(kHz)	30 Limit (dBμV/m)+10dB
1.705 - 30	30	30	Limit (dBµV/m)+10dB	
Frequency in N	1U-	Limit (u)//m)	Measurement distance (m)	Limit (dBµV/m)
rrequency iii i	IΠZ	Limit (µV/m)	Measurement distance (III)	Littlic (ubpv/iii)
30 - 88	100	3	40.0	Little (dbpv/iii)
. ,		(, , ,	` '	Ellille (dbpv/iii)
30 - 88	100	3	40.0	Еппіс (аврутт)

§15.35(b)

..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor: Limit $(dB\mu V/m) = 20 \log (Limit (\mu V/m)/1\mu V/m)$

Band edge compliance

Standard FCC Part 15, Subpart C

The test was performed according to: ANSI C 63.4, FCC §15.31

Test Description

The procedure to show compliance with the band edge requirement is divided into two measurements: 1. Show compliance of the lower band edge by a conducted measurement and 2. show compliance of the higher band edge by a radiated and conducted measurement.

For the first measurement the EUT is set to transmit on the lowest channel (2402 MHz). The lower band edge is 2400 MHz.

Analyzer settings:

- Detector: Peak
- RBW= 100 kHz
- VBW= 300 kHz

For the second measurement the EUT is set to transmit on the highest channel (2480 MHz). The higher band edge is 2483.5 MHz.

Analyzer settings for conducted measurement:

- Detector: Peak
- RBW= 100 kHz
- VBW= 300 kHz

EMI receiver settings:

- Detector: Peak, Average
- IF Bandwidth = 1 MHz

Test Requirements / Limits

FCC Part 15.247 (d)

"In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the



According to

Title 47 CFR chapter I part 15 subpart C desired power, based on either an RF conducted or a radiated measurement, provided the transmitter

desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

•••

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

For the measurement of the lower band edge the RF power at the band edge shall be "at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power..."

For the measurement of the higher band edge the limit is "specified in Section 15.209(a)".

Dwell time

The test was performed according to: FCC §15.31

FCC Part 15, Subpart C

Test Description

Standard

The Equipment Under Test (EUT) was set up to perform the dwell time measurements. The EUT was connected to the spectrum analyzer via a short coax cable. The dwell time is calculated by:

Dwell time = time slot length * hop rate / number of hopping channels * 31.6 s

with:

- hop rate = 1600 * 1/s for DH1 packets = 1600 s-1 - hop rate = 1600/3 * 1/s for DH3 packets = 533.33 s-1 - hop rate = 1600/5 * 1/s for DH5 packets = 320 s-1

- number of hopping channels = 79

- 31.6 s = 0.4 seconds multiplied by the number of hopping channels = 0.4 s * 79

The highest value of the dwell time is reported.

Test Requirements / Limits

FCC Part 15, Subpart C, §15.247 (a) (1) (iii)

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 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. Since the Bluetooth technology uses 79 channels this period is calculated to be 31.6 seconds.

Channel separation

Standard FCC Part 15, Subpart C

The test was performed according to: FCC §15.31

Test Description

The Equipment Under Test (EUT) was set up to perform the channel separation measurements. The channel separation is independent from the modulation pattern.

The EUT was connected to spectrum analyzer via a short coax cable.

Analyzer settings:

- Detector: Peak-Maxhold
- Span: 3 MHz
- Centre Frequency: a mid frequency of the 2.4 GHz ISM band
- Resolution Bandwidth (RBW): 30 kHz
- Video Bandwidth (VBW): 100 kHz
- Sweep Time: Coupled

Test Requirements / Limits



According to

Title 47 CFR chapter I part 15 subpart C

FCC Part 15, Subpart C, §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 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Number of hopping frequencies

Standard FCC Part 15, Subpart C

The test was performed according to: FCC §15.31

Test Description

The Equipment Under Test (EUT) was set up to perform the number of hopping frequencies measurement.

The number of hopping frequencies is independent from the modulation pattern.

The EUT was connected to spectrum analyzer via a short coax cable.

Analyzer settings:

Detector: Peak-MaxholdCentre frequency: 2442 MHz

- Frequency span: 84 MHz

Resolution Bandwidth (RBW): 100 kHzVideo Bandwidth (VBW): 300 kHz

- Sweep Time: Coupled

Test Requirements / Limits

FCC Part 15, Subpart C, §15.247 (a) (iii)

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

The following tables show the correlation of measurement requirements for Bluetooth equipment and Digital Apparatus from FCC and IC standards.

Bluetooth® equipment:

FCC reference IC reference Measurement RSS-Gen: 7.2.4 Conducted emissions on AC mains § 15.207 Occupied bandwidth § 15.247 (a) (1) RSS-210: A8.1 § 15.247 (b) (1) Peak power output RSS-210: A8.4 Spurious RF conducted emissions § 15.247 (d) RSS-Gen: 6; RSS-210: A8.5 RSS-Gen: 6;RSS-210: A8.5 Spurious radiated emissions § 15.247 (d) RSS-210: A8.5 Band edge compliance § 15.247 (d) Dwell time § 15.247 (a) (1) (iii) RSS-210: A8.1 Channel separation RSS-210: A8.1 § 15.247 (a) (1) No. of hopping frequencies § 15.247 (a) (1) (iii) RSS-210: A8.1 Antenna requirement § 15.203 / 15.204 RSS-Gen: 7.1.2

Digital Apparatus:

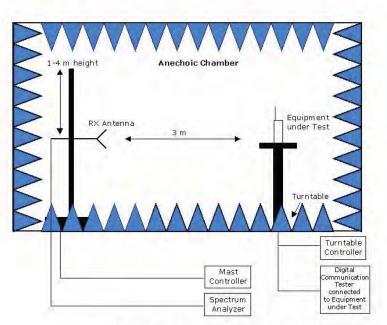
MeasurementFCC referenceIC referenceConducted Emissions(AC Power Line)§15.107ICES-003Spurious Radiated Emissions§15.109ICES-003



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Setup Drawings



Remark: Depending on the frequency range suitable antenna types, attenuators or preamplifiers are used.

Setup in the Anechoic chamber:

Measurements below 1 GHz: Semi-anechoic, conducting ground plane. Measurements above 1 GHz: Fully-anechoic, absorbers on all surfaces



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