

FCC 47 CFR PART 15 SUBPART C INDUSTRY CANADA RSS-247 ISSUE 1

CERTIFICATION TEST REPORT

FOR

BLUETOOTH HEADSET

MODEL NUMBER: WEARABLE CONCEPT 2

FCC ID: AL8-WC2 IC: 457A-WC2

REPORT NUMBER: 15U20565-E1V5

ISSUE DATE: FEBRUARY 25, 2016

Prepared for PLANTRONICS, INC. 345 ENCINAL STREET SANTA CRUZ, CA 95060 USA

Prepared by UL VERIFICATION SERVICES INC. 47173 BENICIA STREET FREMONT, CA 94538, U.S.A. TEL: (510) 771-1000 FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	10/01/2015	Initial Issue	C. Pang
V2	11/02/2015	Add duty cycle on spurious data and delete Yellow Highlighted section	C. Pang
V3	11/19/2015	Address TCB's Questions	C. Pang
V4	2/18/2016	Address TCB's Question on Section 7.2.4	C. Pang
V5	02/25/2016	Address TCB's Questions	C. Pang

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	PLANTRONICS INC. 345 ENCINAL STREET
	SANTA CRUZ, CA 95060
EUT DESCRIPTION:	BLUETOOTH HEADSET
MODEL:	WEARABLE CONCEPT 2
SERIAL NUMBER:	BLD2_COMP06 (CONDUCTED) & BLD2_COMP02 (RADIATED)
DATE TESTED:	APRIL 09-15, 2015

APPLICABLE STANDARDS					
STANDARD	TEST RESULTS				
CFR 47 Part 15 Subpart C	Pass				
INDUSTRY CANADA RSS-247 Issue 1	Pass				
INDUSTRY CANADA RSS-GEN Issue 4	Pass				

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL Verification Services Inc. By:

CHIN PANG SENIOR ENGINEER UL VERIFICATION SERVICES INC.

Tested By:

JOEY GOMEZ EMC ENGINEER UL VERIFICATION SERVICES INC.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, RSS-GEN Issue 4, and RSS-247 Issue 1.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
Chamber A	Chamber D
Chamber B	🛛 Chamber E
Chamber C	Chamber F
	🗌 Chamber G
	🛛 Chamber H

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <u>http://ts.nist.gov/standards/scopes/2000650.htm</u>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	± 3.52 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.94 dB
Radiated Disturbance, 1 to 6 GHz	± 3.86 dB
Radiated Disturbance, 6 to 18 GHz	± 4.23 dB
Radiated Disturbance, 18 to 26 GHz	± 5.30 dB
Radiated Disturbance, 26 to 40 GHz	± 5.23 dB

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth headset.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range Mode		Output Power	Output Power
(MHz)		(dBm)	(mW)
2402 - 2480	Basic GFSK	7.05	5.07
2402 - 2480	DQPSK	6.47	4.44
2402 - 2480	Enhanced 8PSK	6.67	4.65

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a monopole antenna, with a maximum gain of -6.1dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 10400

The test utility software used during testing was BlueTest3 2.5.0

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z position, it was determined that X (Flatbed) orientation was the worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List							
Description Manufacturer Model Serial Number FCC ID							
Laptop	Dell	D400	45426167881	N/A			
AC/DC Adapter Dell LA90PS0-00 0DF266-71615-67J-34B1 N/A							

I/O CABLES

I/O Cable List								
Cable	Cable Port # of identical Connector Cable Type Cable Length (m) Remarks							
No		ports	Туре					
1	DC	1	Barrel	Unshielded	1	N/A		
2	AC	1	3-Prong	Unshielded	1	N/A		
3	USB	1	USB	Unshielded	0.25	N/A		

TEST SETUP

The EUT is connected to a host laptop via USB cable, test software exercises the radio.

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SETUP DIAGRAM FOR TESTS



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List									
Description	Description Manufacturer Model T No. Cal Date Cal Due								
Horn Antenna 1-18 GHz	ETS Lindgren	3117	863	01/07/15	01/07/16				
Hybrid Antenna 30 - 2000MHz	Sunol Sciences	JB3	900	05/14/14	05/14/15				
3GHz HPF	Micro-Tronics	HPM17543	897	05/13/14	05/13/15				
Amplifier 1-18GHz	Miteq	AFS42-00101800-	495	06/05/14	06/05/15				
		25-S-42							
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight	N1921A	MY52200012	9/8/2014	9/8/2015				
Power Meter, P-series dual	Keysight	N1912A	MY55136012	6/8/2014	6/8/2015				
channel									
Amplifier 10kHz - 1GHz	Sonoma	310N	835	06/05/14	06/05/15				
Spectrum Analyzer PXA 3Hz -	Agilent	N9030A	906	05/07/14	05/07/15				
44GHz									
Horn Antenna 18-26GHz	ARA	MWH-1826	89	12/17/14	12/17/15				
Amplifier 1-26.5GHz	Agilent	8449B	404	06/05/14	06/05/15				
Spectrum Analyzer 40GHz	Agilent	8564E	106	08/06/14	08/06/15				
LISN	FCC	50/250-25-2	24	01/16/15	01/16/16				
EMI Receiver	Rohde & Schwartz	ESCI7	284	09/16/14	09/16/15				
	UL	SOFTWARE							
Radiated Software	UL	UL EMC	Ver	9.5, July 22, 2	2014				
Conducted Software	UL	UL EMC	Ver 2	.2, March 31,	2015				
AC Line Conducted Software	UL	UL EMC	Ver 9.5, April 3, 2015						

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7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

<u>LIMITS</u>

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

RESULTS

ON TIME AND DUTY CYCLE

Mode	ON Time	Period	Duty Cycle	Duty	Duty Cycle	1/B
	В		x	Cycle	Correction Factor	Minimum VBW
	(msec)	(msec)	(linear)	(%)	(dB)	(kHz)
2.4 GHz band (Hopping OFF)						
Bluetooth GFSK	2.890	3.750	0.771	77.07%	1.13	0.346
Bluetooth 8PSK	0.384	1.248	0.308	30.77%	5.12	2.604

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DUTY CYCLE PLOTS

HOPPING OFF

RL RF 50 Ω	DC	SENSE:INT	ALIGN AUTO	10:14:20 PM Apr 09, 2015	Erequency
	PNO: Fast ← IFGain:High	Trig: Free Run #Atten: 0 dB	#Avg Type: RMS	TRACE 1 2 3 4 5 6 TYPE WMWWWW DET P A A A A A	requirey
dB/div Ref -20.00 (iBm		ΔN	lkr3 3.750 ms 0.06 dB	Auto Tune
			_1∆2	3∆4	O antan Fran
1.0					2.441000000 GH
1.0			gen d. ha	hadret the start	
0.0			4 h. h. mb. J.n	u un den sitt in fran fi	Start Free 2.441000000 GH
1.0					
					Stop Free
10					2.441000000 GH
enter 2.441000000 G es BW 8 MHz	Hz #VB	W 50 MHz	Sweep 5.0	Span 0 Hz 00 ms (1001 pts)	CF Stej 8.000000 MH
R MODE TRC SCL	X 2.890 ms (A	Y Fl	UNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Mar
2 F 1 t	845.0 µs	-32.41 dBm			FregOffse
1 F 1 t	845.0 μs	-32.41 dBm			0 H
5 6				E	
7 R					
9					
0					



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7.2. BASIC DATA RATE GFSK MODULATION

7.2.1. 20 dB AND 99% BANDWIDTH

<u>LIMIT</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to \geq 1% of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency	20 dB Bandwidth	99% Bandwidth
	(MHz)	(kHz)	(kHz)
Low	2402	943.8	927.65
Middle	2441	955.6	935.64
High	2480	927.7	935.83

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20 dB AND 99% BANDWIDTH





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7.2.2. HOPPING FREQUENCY SEPARATION

<u>LIMIT</u>

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (2)

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

RESULTS

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HOPPING FREQUENCY SEPARATION



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7.2.3. NUMBER OF HOPPING CHANNELS

<u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.

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NUMBER OF HOPPING CHANNELS





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7.2.4. AVERAGE TIME OF OCCUPANCY

<u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to 10 * (# of pulses in 0.8 s) * pulse width

RESULTS

DH Packet	Pulse Width	Number of Pulses in	Average Time of Occupancy	Limit	Margin		
	(msec)	3.16	(sec)	(sec)	(sec)		
		seconds					
GFSK Norma	I Mode						
DH1	0.413	32	0.132	0.4	-0.268		
DH3	1.666	16	0.267	0.4	-0.133		
DH5	2.908	10	0.291	0.4	-0.109		
DH Packet	Pulse	Number of	Average Time	Limit	Margin		
	Width	Pulses in	of Occupancy				
	(msec)	0.8	(sec)	(sec)	(sec)		
		seconds					
GFSK AFH Mode							
DH1	0.413	8	0.033	0.4	-0.367		
DH3	1.666	4	0.067	0.4	-0.333		
DH5	2.908	2.5	0.073	0.4	-0.327		

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PULSE WIDTH - DH1

RF 50 S	ept SA 2 DC 000000 GHz		SENS	E:INT 100.0 µs	Avg Type	ALIGN AUTO E: Log-Pwr	10:34:08 A TRAC	M Apr 14, 2015 DE 1 2 3 4 5 6 PE WWWWWWWWWW	Frequency
Ref Offset 10	PNO IFGa 0.5 dB	:Wide 🕞 in:Low	Atten: 20 o	iB			ΔMkr1 4	TRADET PPPPPP	Auto Tune
Ref 20.00	dBm						-	2.93 dB	Contor Ero
								TRIG LVL	2.441000000 GH
2				1Δ2					Start Free 2.441000000 GH
nj				hiyikyay	Whatter of	al a start a st	nt mund	politiphenipol	Stop Fre 2.441000000 GH
141000000 Flattop) 1.0	GHz MHz	#VBV	/ 1.0 MHz		4	Sweep 1	S .000 ms (Span 0 Hz 1001 pts)	CF Stej 1.000000 MH Auto Ma
CISCL t (Δ) t	× 413. 92.0	0 μs (Δ) 0 μs	-2.93 d -28.53 dBi	FUN B n	CTION FUN	ICTION WIDTH	FUNCTI	ON VALUE	Freq Offse
								E	0 H
	Trum Analyzer - Su c req 2.44100 Ref Offset 11 Ref 20.00 4410000000 (c c c c c c c c c c c c c	trum Analyzer - Swept SA PF 50 Ω DC req 2.441000000 GHz PRO IFGa Ref Offset 10.5 dB Ref 20.00 dBm 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4	tum Analyzer - Swept SA PF 50 Ω C PR 50 Ω C PR 50 Ω C PR 50 Ω C PNO: Wide G IF Gain:Low Ref Offset 10.5 dB Ref 20.00 dBm 2	tum Analyzer - Swept SA RF 50 ≥ DC Sens req 2.441000000 GHz IF Gain:Low Trig Delays Ref 0ffset 10.5 dB Ref 20.00 dBm 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4	tum Ankyzer - Swept SA RF 50 0 C SENSELIWT req 2.441000000 GHz PNO: Wide Frig: Video Atten: 20 dB Ref 0ffset 10.5 dB Ref 20.00 dBm 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4	tum Analyzer - Swept SA RF 500 DC DC SENSELINT req 2.441000000 GHz PNO: Wide Trig: Video Atten: 20 dB Ref 20.00 dBm Ref 0ffset 10.5 dB Ref 20.00 dBm 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4	tum Anizer - Swept SA RF 599 DC SENSE:INT ALGN AUTO req 2.441000000 GHz PNO: Wide PFGain.Low Trig: Video Atten: 20 dB Ref 00ffset 10.5 dB Ref 20.00 dBm 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4	tum Analyzer - Swept SA RF 500 DC DC SENSE:INTI ALIGN AUTO 10:34:06 A req 2.441000000 GHz PNO: Wide Trig: Video Atten: 20 dB Avg Type: Log-Pwr IFGain:Low Atten: 20 dB COMMERCIAL SENSE:INTI ALIGN AUTO 10:34:06 A Ref 00ffset 10.5 dB COMMERCIAL SUB Avg Type: Log-Pwr Atten: 20 dB COMMERCIAL SUB Atten: 20 dB COMMERCIAL SENSE:INTI ALIGN AUTO 10:34:06 A Ref 00ffset 10.5 dB COMMERCIAL SUB Avg Type: Log-Pwr Atten: 20 dB COMMERCIAL SUB Avg Type: Log-Pwr Trace Trace Atten: 20 dB COMMERCIAL SUB Avg Type: Log-Pwr Atten: 20 dB COMMERCIAL SUB Avg Type: Log-Pwr Atten: 20 dB COMMERCIAL SUB Avg Type: Log-Pwr Trace Trace Atten: 20 dB COMMERCIAL SUB Avg Type: Log-Pwr Trace Trace Atten: 20 dB COMMERCIAL SUB Avg Type: Log-Pwr Trace Trace Atten: 20 dB COMMERCIAL SUB Avg Type: Log-Pwr Trace Atten: 20 dB COMMERCIAL SUB Avg Type: Log-Pwr Avg Type: Log-Pwr Avg Type: Log-Pwr Trace Atten: 20 dB COMMERCIAL SUB Avg Type: Log-Pwr Trace Atten: 20 dB COMMERCIAL SUB Avg Type: Log-Pwr Avg Type	tum Analyzer - Swept SA RF 50 DC DC SENSE:INT ALIGN AUTO 10:34:08 AM Apr14, 2015 req 2.441000000 GHz PNO: Wide Trig: Video HFGain:Low Atten: 20 dB ATT 12:34:56 AM Apr14, 2015 TRACE

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH1



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PULSE WIDTH – DH3

Agilent Spec	trum Analyzer - Swept S	A				
enter F	req 2.441000	000 GHz PNO: Wide C	Trig Delay-200.0 µs Trig: Video	ALIGN AUTO Avg Type: Log-Pwr	10:35:41 AM Apr14, 2015 TRACE 1 2 3 4 5 6 TYPE WWWWW DET P P P P P P	Frequency
dB/div	Ref Offset 10.5 Ref 20.00 dE	dB 3m	Atten: 10 db	Δ	Mkr1 1.666 ms 2.15 dB	Auto Tune
pg						Contor From
.00					TRIG LVL	2.441000000 GHz
0.0 0.0	2				1Δ2_	Start Freq 2.441000000 GHz
0.0 0.0 <mark>/***/#*</mark> *	hud					Stop Fred 2.441000000 GHz
enter 2.4 es BW (I	I41000000 GH Flattop) 1.0 M	lz Hz #VB	W 1.0 MHz	Sweep 2	Span 0 Hz .000 ms (1001 pts)	CF Step 1.000000 MHz <u>Auto</u> Mar
Δ2 1 2 N 1 3 4 5 6	t (Δ) t	1.666 ms (Δ 190.0 μs	.) 2.15 dB -28.18 dBm		E	Freq Offset 0 Hz
7 3 9 0						

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



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PULSE WIDTH – DH5

Agilent Spe R L	ctrum Analyze RF	r - Swept SA 50 Ω DC		SENSE:INT	ALIGN AUTO	10:36:55 A	M Apr 14, 2015	
			PNO: Wide	Trig Delay-400.0 μα	Avg Type: Log-Pwr	TRA TY	CE 1 2 3 4 5 6 PE WWWWWW	Frequency
			IFGain:Low	Atten: 20 dB				Auto Tune
) dB/div	Ref Offs Ref 20	et 10.5 dB .00 dBm				2 AWKET 2	.908 ms 8.97 dB	
						▲1∆2		Contor Fro
						- 7		2 441000000 GH:
0.0							TRIG LVL	2
1.0	2							
0.0	Y							Start Free
1.0								2.44 1000000 GH.
1.0								
3.0 44	mhl					Hypertreep	happenagenet	Stop Fred
0.0							· ·	2.441000000 GH:
anter 2	4410000						nan û Hz	CE Stor
es BW	(Flattop)	1.0 MHz	#VB	W 1.0 MHz	Sweep	4.000 ms ((1001 pts)	1.000000 MH
R MODE 1	RC SCL	х		Y FL	INCTION FUNCTION WIDT	H FUNCT	ON VALUE	<u>Auto</u> Mar
Δ2 2 N	1 t (Δ) 1 t		2.908 ms (Δ 388 0 us) 28.97 dB -25 26 dBm				
3								Freq Offse
5							E	0 H
5 7								
B 9								
0								
							*	

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH5



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7.2.5. OUTPUT POWER

<u>LIMIT</u>

§15.247 (b) (1)

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 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

RSS-247 (5.4) (2)

For frequency hopping systems operating in the band 2400-2483.5 MHz and employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W.

TEST PROCEDURE

The transmitter output is connected to a wideband gated power meter.

RESULTS

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	5.74	-6.10	21	-15.26
Middle	2441	6.42	-6.10	21	-14.58
High	2480	7.05	-6.10	21	-13.95

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7.2.6. AVERAGE POWER

<u>LIMIT</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a wideband gated power meter.

RESULTS

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Average Power
	(MHz)	(dBm)
Low	2402	5.60
Middle	2441	6.32
High	2480	6.95

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7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §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 desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

IC RSS-247 (5.5)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The band edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

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RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL





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SPURIOUS EMISSIONS, MID CHANNEL





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SPURIOUS EMISSIONS, HIGH CHANNEL





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SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





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7.3. ENHANCED DATA RATE QPSK MODULATION

7.3.1. OUTPUT POWER

<u>LIMIT</u>

§15.247 (b) (1)

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 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

RSS-247 (5.4) (2)

For frequency hopping systems operating in the band 2400-2483.5 MHz and employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W.

TEST PROCEDURE

The transmitter output is connected to a wideband gated power meter.

RESULTS

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency	Output Power	Directional	Limit	Margin
	(MHz)	(dBm)	Gain (dBi)	(dBm)	(dB)
Low	2402	4.70	-6.10	21	-16.30
Middle	2441	5.40	-6.10	21	-15.60
High	2480	6.05	-6.10	21	-14.95

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7.3.2. AVERAGE POWER

<u>LIMIT</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a wideband gated power meter.

RESULTS

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Average Power
	(MHz)	(dBm)
Low	2402	2.95
Middle	2441	3.78
High	2480	4.72

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7.4. ENHANCED DATA RATE 8PSK MODULATION

7.4.1. 20 dB AND 99% BANDWIDTH

<u>LIMIT</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to \geq 1% of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency	20 dB Bandwidth	99% Bandwidth
	(MHz)	(kHz)	(kHz)
Low	2402	1.340	1.2553
Middle	2441	1.287	1.2566
High	2480	1.260	1.3569

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20 dB AND 99% BANDWIDTH





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7.4.2. HOPPING FREQUENCY SEPARATION

<u>LIMIT</u>

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (2)

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

RESULTS

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HOPPING FREQUENCY SEPARATION

RI	ent sp	ectrun	RE	zer - swej	DC DC			_	SENSE-T	NT		ALIG		10.22	03 AM A	or 14 - 2	015	
ark	er	1Δ	1.0	25000	0000 N	IHz					Avg T	ype: Lo	g-Pwr	10.22	TRACE	1 2 3 4	5 6	Peak Search
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5 6																	E	
7 8																		Ma
9																		
0																	-	101

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7.4.3. NUMBER OF HOPPING CHANNELS

<u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.

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NUMBER OF HOPPING CHANNELS





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7.4.4. AVERAGE TIME OF OCCUPANCY

<u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

RESULTS

8PSK (EDR) Mode

DH Packet	Pulse	Number of	Average	Limit	Margin
	Width	Pulses in	Time of		-
	(msec)	3.16	(sec)	(sec)	(sec)
		seconds			
DH1	0.42	32	0.134	0.4	-0.266
DH3	1.676	16	0.268	0.4	-0.132
DH5	2.92	10	0.292	0.4	-0.108

<u>Note:</u> for AFH (8PSK) mode, please refer to the results of AFH (GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate on page 22 demonstrates compliance with channel occupancy when AFH is employed

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PULSE WIDTH - DH1

RL	RF	- Swept SA 50 Ω DC	CH2	SEN Trig Delay	ISE:INT		ALIGN AUTO	10:29:46 A	M Apr 14, 2015	Frequency
	ey 2.44	1000000	PNO: Wide IFGain:Low	Trig: Vide Atten: 20	o dB			TY	PE WWWWWWW ET P P P P P P	
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0.0 0.0 m//// 0.0	4				hyphph	*****	nhailteinte	Alter Article	happlichapp	Stop Fred 2.441000000 GH:
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6										
9 9										

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH1



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PULSE WIDTH – DH3

Agile	ent Spect	rum A	nalyzer	- Swept	SA				CE4	ICT. INT			10,01,00.0	N April 4, 2015	
ent	er Fr	eq	2.44	100	0000	GH	z	Ţ	rig Dela	y-200.0 µs	Avg Ty	be: Log-Pwr	10:31:30 A TRAI	DE 1 2 3 4 5 6	Frequency
						PN IFG	0:Wide ain:Low	₽ ¦	tten: 20	dB			D	ETPPPPP	
	<i>la</i> liu	Re	f Offse	et 10.	5 dB							2	Mkr1 1	.676 ms 3.21 dB	Auto Tune
	Juiv	NC	1 20.	00 u	Din										
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).0	M. L.	· ·												1.64.0	2.441000000 GHz
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ento es E	er 2.4 3W (F	410 Tatt	100001 (00	JU G 1.0 N	HZ 1Hz		#VE	SW 1.0) MHz			Sweep 2	ء 2.000 ms (span U Hz 1001 pts)	CF Step 1.000000 MHz
R M		d so	- 1- 7		X				Y	FU	NCTION F	JNCTION WIDTH	EUNCTI	ON VALUE	<u>Auto</u> Mar
4	2 1	t	(Δ)			1.67	'6 ms (/	(۵	-3.21	dB					
3						190	.υ μs	-4	.0.01 ut	5111					Freq Offset
1 5														E	0 Hz
5 7															
B															
0															

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



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PULSE WIDTH – DH5

Agilent Spectru	m Analyzer - Swe	pt SA							- 5 💌
enter Fre	a 2.4410	00000 GH	z	Trig Delay-500.	0 µs Avg Typ	be: Log-Pwr	10:23:11 AM TRAC	E 1 2 3 4 5 6	Frequency
		PN	O:Wide 🗔	Trig: Video Atten: 20 dB			TYP	T P P P P P P	
						Δ	<u>Mkr1 2.</u>	920 ms	Auto Tune
) dB/div	Ref 20.00	dBm					-23	3.86 dB	
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								TRIG LVL	2.441000000 GH2
J.U							1∆2		
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U.U									2.441000000 GH
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0.0	Land						a.b. a.a	and Norman	Stop Fred
210 - 16 16 11 1601	- *N						2464	M to a flagare	2.441000000 GH
0.0									
enter 2.44	1000000	GHz					S	pan 0 Hz	CF Step
es BW (Fla	attop) 1.0	MHz	#VBV	/ 1.0 MHz		Sweep 4.0	000 ms (1001 pts)	1.000000 MH
KR MODE TRC	SCL	Х		Y	FUNCTION FL	UNCTION WIDTH	FUNCTIO	N VALUE	Auto Mar
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o 7									
8 9									
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NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH5



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7.4.5. OUTPUT POWER

<u>LIMIT</u>

§15.247 (b) (1)

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 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

RSS-247 (5.4) (2)

For frequency hopping systems operating in the band 2400-2483.5 MHz and employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W.

TEST PROCEDURE

The transmitter output is connected to a wideband gated power meter.

RESULTS

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	5.12	-6.10	21	-15.88
Middle	2441	6.01	-6.10	21	-14.99
High	2480	6.67	-6.10	21	-14.33

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7.4.6. AVERAGE POWER

<u>LIMIT</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a wideband gated power meter.

RESULTS

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Average Power
	(MHz)	(dBm)
Low	2402	3.66
Middle	2441	5.21
High	2480	5.95

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7.4.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §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 desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

IC RSS-247 (5.5)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The band edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

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RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL





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SPURIOUS EMISSIONS, MID CHANNEL





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SPURIOUS EMISSIONS, HIGH CHANNEL





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SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





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8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN, Section 8.9 and 8.10.

Frequency Range	Field Strength Limit	Measurement distance (meters)
(MHz)	(microvolts/meter)	
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 3MHz video bandwidth with average detector for average measurements.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

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8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)



Trace Markers

Marke r	Frequen cy (GHz)	Meter Readin g (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/ m)	Margi n (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimut h (Degs)	Heigh t (cm)	Polarit Y
2	* 2.376	44	РК	32	-24.6	51.4	-	-	74	-22.6	169	223	н
4	* 2.376	29.71	VB1T	32	-24.6	37.11	54	-16.89	-	-	169	223	н
1	* 2.39	41.64	РК	32.1	-24.7	49.04	-	-	74	-24.96	169	223	Н
3	* 2.39	29.44	VB1T	32.1	-24.7	36.84	54	-17.16	-	-	169	223	н

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

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Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.376	29.61	VB1T	32	-24.6	37.01	54	-16.99	-	-	245	353	V
2	* 2.379	44.13	РК	32	-24.6	51.53	-	-	74	-22.47	245	353	V
1	* 2.39	42.03	РК	32.1	-24.7	49.43	-	-	74	-24.57	245	353	V
3	* 2.39	29.3	VB1T	32.1	-24.7	36.7	54	-17.3	-	-	245	353	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

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AUTHORIZED BANDEDGE (HIGH CHANNEL)



Trace Markers

Marker	Frequenc Y (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.66	РК	32.2	-24.3	49.56	-	-	74	-24.44	20	320	н
3	* 2.484	29.35	VB1T	32.2	-24.3	37.25	54	-16.75	-	-	20	320	Н
4	2.508	29.78	VB1T	32.2	-24.2	37.78	54	-16.22	-	-	20	320	н
2	2.529	44.3	РК	32.2	-24.1	52.4	-	-	74	-21.6	20	320	н

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

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Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.53	РК	32.2	-24.3	49.43	-	-	74	-24.57	82	400	V
3	* 2.484	29.25	VB1T	32.2	-24.3	37.15	54	-16.85	-	-	82	400	V
2	2.508	44.15	PK	32.2	-24.2	52.15	-	-	74	-21.85	82	400	V
4	2.508	29.78	VB1T	32.2	-24.2	37.78	54	-16.22	-	-	82	400	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

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HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



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REPORT NO: 15U20565-E1V5 FCC ID: AL8-WC2

Trace Markers

Marker	Frequency	Meter	Det	AF T712	Amp/Cbl/	Corrected	Avg Limit	Margin	Peak Limit	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading		(dB/m)	Fltr/Pad	Reading	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(Degs)	(cm)	
		(dBuV)			(dB)	(dBuV/m)							
1	* 1.468	43.46	PK3	27.9	-25.5	45.86	-	-	74	-28.14	360	100	н
	* 1.468	30.42	VB1T	27.9	-25.5	32.82	54	-21.18	-	-	360	100	Н
2	* 1.602	45.06	PK3	27.7	-25.1	47.66	-	-	74	-26.34	193	325	н
	* 1.601	34.11	VB1T	27.7	-25.1	36.71	54	-17.29	-	-	193	325	н
3	* 4.804	47.42	PK3	33.9	-32.5	48.82	-	-	74	-25.18	159	192	Н
	* 4.804	40.86	VB1T	33.9	-32.5	42.26	54	-11.74	-	-	159	192	Н
4	* 1.468	46.22	PK3	27.9	-25.5	48.62	-	-	74	-25.38	176	151	V
	* 1.468	38.15	VB1T	27.9	-25.5	40.55	54	-13.45	-	-	176	151	V
5	* 1.601	49.12	PK3	27.7	-25.1	51.72	-	-	74	-22.28	169	202	V
	* 1.601	39.53	VB1T	27.7	-25.1	42.13	54	-11.87	-	-	169	202	V
6	* 4.804	47.66	PK3	33.9	-32.5	49.06	-	-	74	-24.94	354	236	V
	* 4.804	41.08	VB1T	33.9	-32.5	42.48	54	-11.52	-	-	354	236	V

* - indicates frequency in CFR 47, Part 15 Restricted Band" and "Industry Canada RSS-Restricted Band

PK3 - KDB558074 Method: Maximum Peak

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

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MID CHANNEL

III Fremont - Chamber H							9 Apr 20	15 22:13:16
5 				Radiatec Project Num Client:Plan Config:EUT Made:GFSK 2 Tested by:J	l Emissi ber:150205 tronics Only 441MHz . Li	ons 3 65	-Meters	
.5								
5 Peak Limit (dBuV/m)								
5								
5 Avg Limit (dBuV/m)								
5 1 2	h hereiterte der andere blev		3					Note and Constitution of the owner of
5 Million Collection Providence		المتحقيل بالمعالية المعالية ا		in the second	ni pi pinini	al a second s		
.5								
1							10	18
Ronge (GHz) Det RBN UBN A- 1:1-3 PEAK IM(-6dB) 39k Par	rg Typ Sweep	Pts #Swps/Mode Position 6681 [nf/MAXH B-368deps	n Ronge H 3:3-18	(GHz) Det PEAK	RBW VBW 1M(-6dB) 3Bk	Avg Typ Pur Avg(RMS	Sweep Pts ∰ Auto/Cpled 18k I	ixps/Made Position inf/MAXH 8-368degsH
11MH- DOT 20215 7 1	ницинал насокраев							Paul 0 5 22
41MHz.DAT 30915 7 Jul 2014 RTICAL	nografija natovojne						0 ^ 20	Rev 9.5 22
41MHz.DAT 30915 7 Jul 2014 TICAL 5UL Fremont - Chamber H 15 15				Radiatec Project Num Client:Plan Config:EUT Mode:GFSK 2 Tested by:J	Emissi ber:15U205 tronics Only 441MHz Li	ons 3 65	9 Apr 20 -Meters	Rev 9.5 22
41MHz.DAT 30915 7 Jul 2014 TICAL 5 5 5 5 5 5 5 5 5 5 5 5 5				Radiatec Project Num Config:EUT Made:GFSK 2 Tested by:J	l Emissi ber: 15020 tronics Only . Li	ons 3 65	9 Apr 20 -Meters	Rev 9.5 22
HIMHz.DAT 30915 7 Jul 2014 TICAL 5 5 5 5 5 7 7 Jul 2014 1 7 1 7 1 7 1 7 1 1 1 1 1 1 1 1 1 1 1 1 1				Radiatec Project Num Client;Plan Mode:GFSK 2 Tested by;J	I Emissi ber:15/202 tronics Only 441MHz . Li	ons 3 65	9 Apr 20 -Meters	Rev 9.5 22
HIMHz.DAT 30915 7 Jul 2014 TICAL SUL Fremont - Chomber H 5 5 5 7 7 8 7 8 7 8 7 8 7 8 7 9 8 9 9 9 9 9 9 9 9 9 9 9 9 9				Radiatec Project Num Client:Plan Mode:GFSK 2 Tested by:J	l Emissi ber:15U28 tronics Only 441MHz . Li	ons 3	9 Apr 20 -Meters	Rev 9.5 22
41MHz.DAT 30915 7 Jul 2014 STICAL 5 5 5 5 6 7 7 8 7 9 9 9 9 9 9 9 9 9 9 9 9 9				Radiatec Project Num Client:Plan Mode:GFSK 2 Tested by:J	I Emissi ber:15U20 tronics Only 441MHz . Li	ons 3	9 Apr 20 -Meters	Rev 9.5 22
41MHz.DAT 30915 7 Jul 2014 ETICAL 5 5 5 7 7 7 7 8 7 8 7 9 7 9 7 9 9 9 9 9 9 9 9 9 9 9 9 9			6	Radiatec Project Num Client:Plan Gonfig:EUT Mode:GFSK 2 Tested by:J	I Emissi ber: 15020 tronics Only 441MHz . Li	ons 3	9 Apr 20 -Meters	Rev 9.5 22
A1MHz.DAT 30915 7 Jul 2014 TICAL 5 5 5 7 7 7 7 7 7 8 7 7 8 7 8 7 9 9 9 9 9 9 9 9 9 9 9 9 9				Radiatec Project Num Chient:Plan Config:EUT Mode:GFSK 2 Tested by:J	I Emissi ber: 15/20 tronics Only 441MHz . Li	ons 3	9 Apr 20 -Meters	Rev 9.5 22
AIMHz.DAT 30915 7 Jul 2014 TICAL 5 UL Fremont - Chamber H 5 				Radiatec Project Num Client: Plan Config:EUT Mode: GFSK 2 Tested by: J	I Emissi ber: 150200 tronics Only . Li	ons 3 65	9 Apr 20 -Meters	Rev 9.5 22
AIMHz.DAT 30915 7 Jul 2014 AIMHz.DAT 30915 7 Jul 2014 STICAL 5 5 5 6 7 7 7 8 7 8 7 8 7 8 7 8 7 9 9 9 9 9 9 9 9 9 9 9 9 9		Frequ	6 ency (6H	Radiatec Project Num Client:Plan Mode: GFSK 2 Tested by:J	I Emissi ber:15U20 tronics Only 441MHz . Li	ons 3	9 Apr 20 -Meters	Rev 9.5 22

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Marker	Frequency	Meter	Det	AF T712	Amp/Cbl/	Corrected	Avg Limit	Margin	Peak Limit	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading		(dB/m)	Fltr/Pad	Reading	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(Degs)	(cm)	
		(dBuV)			(dB)	(dBuV/m)							
1	* 1.469	44.06	PK3	27.9	-25.5	46.46	-	-	74	-27.54	198	311	н
	* 1.468	32.55	VB10	27.9	-25.5	34.95	54	-19.05	-	-	198	311	н
2	* 1.601	45	PK3	27.7	-25.1	47.6	-	-	74	-26.4	198	311	Н
	* 1.601	36.25	VB10	27.7	-25.1	38.85	54	-15.15	-	-	198	311	Н
3	* 4.882	46.22	PK3	33.8	-32.1	47.92	-	-	74	-26.08	160	183	н
	* 4.882	41.03	VB10	33.8	-32.1	42.73	54	-11.27	-	-	160	183	н
4	* 1.468	46.23	PK3	27.9	-25.5	48.63	-	-	74	-25.37	172	185	V
	* 1.468	38.99	VB10	27.9	-25.5	41.39	54	-12.61	-	-	172	185	V
5	* 1.601	49.13	PK3	27.7	-25.1	51.73	-	-	74	-22.27	175	277	V
	* 1.601	38.76	VB10	27.7	-25.1	41.36	54	-12.64	-	-	175	277	V
6	* 4.882	46.49	PK3	33.9	-32.1	48.29	-	-	74	-25.71	347	176	V
	* 4.882	41.18	VB10	33.8	-32.1	42.88	54	-11.12	-	-	347	176	V

* - indicates frequency in CFR 47, Part 15 Restricted Band" and "Industry Canada RSS-Restricted Band

PK3 - KDB558074 Method: Maximum Peak

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

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HIGH CHANNEL



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Marker	Frequency	Meter	Det	AF T712	Amp/Cbl/	Corrected	Avg Limit	Margin	Peak Limit	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading		(dB/m)	Fltr/Pad	Reading	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(Degs)	(cm)	
		(dBuV)			(dB)	(dBuV/m)							
1	* 1.47	44.04	PK3	27.9	-25.5	46.44	-	-	74	-27.56	360	100	н
	* 1.468	31.53	VB10	27.9	-25.5	33.94	54	-20.06	-	-	360	100	Н
2	* 1.603	43.98	PK3	27.8	-25.1	46.68	-	-	74	-27.32	360	100	н
	* 1.601	31.56	VB10	27.7	-25.1	34.16	54	-19.84	-	-	360	100	Н
3	* 4.96	45.37	PK3	33.9	-31.8	47.47	-	-	74	-26.53	163	164	Н
	* 4.96	39.54	VB10	33.9	-31.8	41.64	54	-12.36	-	-	163	164	Н
4	* 1.468	46.99	PK3	27.9	-25.5	49.39	-	-	74	-24.61	179	152	V
	* 1.468	39.21	VB10	27.9	-25.5	41.44	54	-12.56	-	-	179	152	V
5	* 1.602	48.75	PK3	27.7	-25.1	51.35	-	-	74	-22.65	170	303	V
	* 1.601	39.7	VB10	27.7	-25.1	42.3	54	-11.7	-	-	170	303	V
6	* 4.96	47.86	PK3	33.9	-31.8	49.96	-	-	74	-24.04	353	156	V
	* 4.96	43.04	VB10	33.9	-31.8	45.14	54	-8.86	-	-	353	156	V

* - indicates frequency in CFR 47, Part 15 Restricted Band" and "Industry Canada RSS-Restricted Band

PK3 - KDB558074 Method: Maximum Peak

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

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8.2.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)



Trace Markers

Mark er	Freque ncy (GHz)	Meter Readi ng (dBuV)	Det	AF T346 (dB/m)	Amp/Cb l/Fltr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margi n (dB)	Peak Limit (dBuV /m)	PK Margin (dB)	Azimut h (Degs)	Height (cm)	Polarity
2	* 2.375	44.52	РК	32	-24.6	51.92	-	-	74	-22.08	144	338	н
4	* 2.376	31.01	VB1T	32	-24.6	38.41	54	-15.59	-	-	144	338	н
1	* 2.39	41.65	РК	32.1	-24.7	49.05	-	-	74	-24.95	144	338	н
3	* 2.39	30.2	VB1T	32.1	-24.7	37.6	54	-16.4	-	-	144	338	н

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

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Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.361	44.08	PK	32	-24.8	51.28	-	-	74	-22.72	249	360	V
4	* 2.376	30.9	VB1T	32	-24.6	38.3	54	-15.7	-	-	249	360	V
1	* 2.39	40.76	РК	32.1	-24.7	48.16	-	-	74	-25.84	249	360	V
3	* 2.39	30.4	VB1T	32.1	-24.7	37.8	54	-16.2	-	-	249	360	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

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AUTHORIZED BANDEDGE (HIGH CHANNEL)



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/F ltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.42	РК	32.2	-24.3	49.32	-	-	74	-24.68	136	315	Н
3	* 2.484	30.91	VB1T	32.2	-24.3	38.81	54	-15.19	-	-	136	315	н
2	2.506	44.15	РК	32.2	-24.2	52.15	-	-	74	-21.85	136	315	н
4	2.508	31.44	VB1T	32.2	-24.2	39.44	54	-14.56	-	-	136	315	н

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

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Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/F ltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.6	РК	32.2	-24.3	48.5	-	-	74	-25.5	260	399	V
3	* 2.484	30.26	VB1T	32.2	-24.3	38.16	54	-15.84	-	-	260	399	V
4	2.508	31.02	VB1T	32.2	-24.2	39.02	54	-14.98	-	-	260	399	V
2	2.538	43.93	РК	32.2	-24.1	52.03	-	-	74	-21.97	260	399	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

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HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



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Frequency (GHz)	Meter Reading	Det	AF T346 (dB/m)	Amp/Cbl/F ltr/Pad	Corrected Reading	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	(ubuv)			(UB)	(ubuv/iii)							
* 1.504	43.6	РКЗ	28.2	-26.3	45.5	-	-	74	-28.5	360	101	н
* 1.506	32.46	VB1T	28.2	-26.3	34.36	54	-19.64	-	-	360	101	н
* 2.246	46.94	PK3	31.6	-25.2	53.34	-	-	74	-20.66	147	400	н
* 2.246	39.84	VB1T	31.6	-25.2	46.24	54	-7.76	-	-	147	400	н
* 4.804	48.9	РКЗ	34.1	-30.9	52.1	-	-	74	-21.9	239	323	н
* 4.804	43.81	VB1T	34.1	-30.9	47.01	54	-6.99	-	-	239	323	Н
* 4.804	47.08	PK3	34.1	-30.9	50.28	-	-	74	-23.72	251	314	V
* 4.804	41.23	VB1T	34.1	-30.9	44.43	54	-9.57	-	-	251	314	V
* 4.86	42.32	PK3	34.1	-31.1	45.32	-	-	74	-28.68	251	314	V
* 4.86	31.08	VB1T	34.1	-31.1	34.08	54	-19.92	-	-	251	314	V
2.558	47.61	РКЗ	32.3	-24.1	55.81	-	-	-	-	102	245	н
2.558	41.2	VB1T	32.3	-24.1	49.4	-	-	-	-	102	245	Н

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK3 FHSS Method: Maximum Peak

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

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MID CHANNEL



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Marker	Frequency (GHz)	Meter Reading	Det	AF T346 (dB/m)	Amp/Cbl/Fltr /Pad (dB)	DC Corr (dB)	Corrected Reading	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
		(dBuV)					(dBuV/m)							
1	* 1.503	43.93	PK3	28.2	-26.3	0	45.83	-	-	74	-28.17	360	101	н
	* 1.504	32.44	VB1T	28.2	-26.3	0	34.34	54	-19.66	-	-	360	101	н
2	* 2.285	46.97	PK3	31.8	-25.1	0	53.67	-	-	74	-20.33	123	305	н
	* 2.285	39.95	VB1T	31.8	-25.1	0	46.65	54	-7.35	-	-	123	305	н
4	* 1.519	44.44	PK3	28.2	-26.3	0	46.34	-	-	74	-27.66	108	247	V
	* 1.519	32.27	VB1T	28.2	-26.3	0	34.17	54	-19.83	-	-	108	247	V
5	* 4.882	47.82	PK3	34.1	-30.9	0	51.02	-	-	74	-22.98	108	258	н
	* 4.882	42.57	VB1T	34.1	-30.9	0	45.77	54	-8.23	-	-	108	258	н
6	* 4.882	48.8	PK3	34.1	-30.9	0	52	-	-	74	-22	250	308	V
	* 4.882	44.23	VB1T	34.1	-30.9	0	47.43	54	-6.57	-	-	250	308	V
3	2.597	46.08	PK3	32.4	-24.1	0	54.38	-	-	-	-	108	247	Н

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK3 -FHSS Method: Maximum Peak

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

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HIGH CHANNEL



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Trace Markers

Marker	Frequency (GHz)	Meter Reading	Det	AF T346 (dB/m)	Amp/Cbl/Fltr /Pad (dB)	DC Corr (dB)	Corrected Reading	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
		(dBuV)					(dBuV/m)							
1	* 1.483	44.72	PK3	28.3	-26.3	0	46.72	-	-	74	-27.28	360	101	н
	* 1.482	32.39	VB1T	28.3	-26.3	0	34.39	54	-19.61	-	-	360	101	Н
2	* 2.324	47.37	PK3	31.9	-25	0	54.27	-	-	74	-19.73	311	295	н
	* 2.324	40.02	VB1T	31.9	-25	0	46.92	54	-7.08	-	-	311	295	Н
4	* 4.96	47.04	PK3	34.1	-30.2	0	50.94	-	-	74	-23.06	356	274	Н
	* 4.96	42.44	VB1T	34.1	-30.2	0	46.34	54	-7.66	-	-	356	274	Н
5	* 4.96	47.35	PK3	34.1	-30.2	0	51.25	-	-	74	-22.75	226	309	V
	* 4.96	43.05	VB1T	34.1	-30.2	0	46.95	54	-7.05	-	-	226	309	V
6	* 5.077	41.31	PK3	34.2	-30.7	0	44.81	-	-	74	-29.19	226	309	V
	* 5.077	29.38	VB1T	34.2	-30.7	0	32.88	54	-21.12	-	-	226	309	V
3	2.636	39.54	РК	32.4	-24	0	47.94	-	-	-	-	0-360	200	Н

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK3 -FHSS Method: Maximum Peak

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

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8.3. WORST-CASE ABOVE 18GHz

SPURIOUS EMISSIONS 18GHz TO 26GHz MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

וכ	RIZON							
1	R5UL EMC					1	10 Apr 2015	22:26:41
1						RF Emissions		
	05					Order Number:15U20565		
	apl					Client:Plantronics		
						Mode:BT Worst Case		
	85					Tested by / SN:J. Li		
	75	imit (dbuV/m)						
	65							
	55 Avg Li	nit (dBuV/m)						
	45			2		2	h	1
	43	1			. Ark	may add and the more thank whether	When the work when a stranger and	and the second states and the
	Marman	por an an the adverse of the	manufund	Mr. M. Markan	Name Martha Corres	Point water addition of the second		
	35							
	25							
	15							
	18			F		24-2		26
	D (01)		7 6	DL 40	requency (C	L L-L-1
	1:18-26	1M(-3dB)/3M Ref/Httn Det/Hv 1M(-3dB)/3M 97/0 PEAK/ -	ng lup Sweep	Pts #Supa/Node	Label Kan	ge (afiz) KBW/VBW Ket/Httn Det/Hvg ly	р Эмеер Pts #Эмрь/Мос	de Lobel
or:	st Case.DAT	30915 6 Feb 2015	Auto	1282 NRAH	horizontai			Rev 9.5 16 Mar :
or:	st Case.DAT	30915 6 Feb 2015	Ruto	LZE NAM			10 Apr 2015	Rev 9.5 16 Mar :
1	Det Case.DAT	30915 6 Feb 2015	Auto	1282 19831		PE Emissions	10 Apr 2015	Rev 9.5 16 Mar :
1	UL EMC	30915 6 Feb 2015	Auto	1.282 19601		RF Emissions	10 Apr 2015	Rev 9.5 16 Mar : 22:26:41
1	Dat Case.DAT	30915 6 Feb 2015	Auto			RF Emissions Order Number:15U20565 "Client:Plantronics	10 Apr 2015	Rev 9.5 16 Mar : 22:26:41
1	85 UL EMC	30915 6 Feb 2015	Ruto			RF Emissions Order Number:15U20565 Client:Plantronics Configuration:EUT Only Made:BT Worst Cose	10 Apr 2015	Rev 9.5 16 Mar 3
1	05 UL EMC 95	30915 6 Feb 2015	Auto			RF Emissions Order Number:15U20565 Client:Plantronics Configuration:EUT Only Mode:BT Worst Case 	10 Apr 2015	Rev 9.5 16 Mar : 22:26:41
1	25 UL EMC 95 85	30915 6 Feb 2015	Auto			RF Emissions Order Number:15U20565 Cilient:Plantronics Configuration:EUT Only Mode:BT Worst Cose Tested by / SN:J. Li	10 Apr 2015	Rev 9.5 16 Mar : 22:26:41
1	25 UL EMC 25 05 000 25 000 000 000 000 25 000 000 000 000 25 000 000 000 000 25 000 000 000 000 000 25 000 000 000 000 000 25 000 000 000 000 000 000 25 000 000 000 000 000 000 25 000 000 000 000 000 000 000 000000000	30915 6 Feb 2015	Auto			RF Emissions Orden Number:15U20565 Cilent:Plantronics Configuration:EUT Only Mode:BT Worst Case Tested by / SN:J. Li	10 Apr 2015	Rev 9.5 16 Mar : 22:26:41
1	25 UL EMC 95 85 75 Peak L	30915 6 Feb 2015 imit (dBuU/m)	Ruto			RF Emissions Order Number:15U20565 Cilent:Plantronics Configuration:EUT Only Mode:BT Worst Case Tested by / SN:J. Li	10 Apr 2015	Rev 9.5 16 Mar : 22:26:41
1	85 75	38915 6 Feb 2015 imit (dBuU/m)	Auto			RF Emissions Order Number:15U20565 Cilent:Plantropics Configuration:EUT Only Made:ST Worst Case Tested by / SN:J. Li	10 Apr 2015	
1	85	30915 6 Feb 2015 imit (dBuU/m)				RF Emissions Order Number:15U20565 Client:Plantronics Configuration:EUT Only Mode:BT Worst Cose Tested by / SN:J. Li	10 Apr 2015	
1	85	30915 6 Feb 2015 imit (dBuU/m)				RF Emissions Order Number:15U20565 Client:Plantronics Configuration:EUT Only Mode:BT Worst Cose Tested by / SN:J. Li	10 Apr 2015	Rev 9.5 16 Mar 3
1	85 75 85 75 85 75 85 75 85 75 85	38915 6 Feb 2015 imit (dBuU/m) nit (dBuU/m)				RF Emissions Order Number:15U20565 Client:Plantronics Configuration:EUT Only Mode:BT Worst Cose Tested by / SN:J. Li	10 Apr 2015	22:26:41
1	25 Peak L 65 Avg Li	38915 6 Feb 2015 imit (dBuU/m) nit (dBuU/m)	Ruto			RF Emissions Orden Number:15U20565 Cilient:Plantronics Configuration:EUT Only Mode:BT Worst Case Tested by / SN:J. Li	10 Apr 2015	22:26:41
1	ast Case.DAT	30915 6 Feb 2015 imit (dBuU/m) mit (dBuU/m)	Auto		5	RF Emissions Order Number:15U20565 Cilent:Plantronics Configuration:EUT Only Mode:BT Worst Case Tested by / SN:J. Li	10 Apr 2015	22:26:41
1	At Case.DAT	38915 6 Feb 2015 imit (dBuU/m) mit (dBuU/m)		1.02C 1937	5 5 5 5 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	RF Emissions Order Number:15U20565 Cilient:Plontronics Configuration:EUT Only Mode:BT Worst Case Tested by / SN:J. Li	10 Apr 2015	22:26:41
1	at Case.DAT	30915 6 Feb 2015 imit (dBuU/m) mit (dBuU/m)	Auto			RF Emissions Order Number:15U20565 Client:Plantronics Configuration:EUT Only Mode:ST Worst Case Tested by / SN:J. Li	10 Apr 2015	22:26:41
1	ast Case.DAT	38915 6 Feb 2015	Auto			RF Emissions Order Number:15U28565 Client:Plantronics Configuration:EUT Only Mode:BT Worst Case Tested by / SN:J. Li	10 Apr 2015	22:26:41
1	at Cose.DAT	30915 6 Feb 2015	Auto		тори салон у Мила Фенерици, истори	RF Emissions Orden Number:15U20565 Cilient:Plantronics Configuration:EUT Only Mode:BT Worst Case Tested by / SN:J. Li	10 Apr 2015	22:26:41
1	as UL EMC 95 85 75 Peak L 65 55 Avg L i 45 25	30915 6 Feb 2015	Auto			RF Emissions Order Number:15U20565 Cilent:Plantronics Configuration:EUT Only Mode:BT Worst Case Tested by / SN:J. Li	10 Apr 2015	22:26:41
1	At Case.DAT	38915 6 Feb 2015	Auto		5 y///m ⁵	RF Emissions Order Number:15U20565 Cilent:Plontronics Configuration:EUT Only Mode:BT Worst Case Tested by / SN:J. Li	10 Apr 2015	22:26:41
1	At Case.DAT	38915 6 Feb 2015			тре лагода 	RF Emissions Order Number:15U20565 Cilient:Plantronics Configuration:EUT Only Mode:BT Worst Case Tested by / SN:J. Li	10 Apr 2015	22:26:41
1	ast Case.DAT	38915 6 Feb 2015	Auto		то салан 	RF Emissions Order Number:15U20565 Client:Plantronics Configuration:EUT Only Mode:ET Worst Cose Tested by / SN:J. Li	10 Apr 2015	22:26:41
1	at Cose.DAT	30915 6 Feb 2015	Auto			RF Emissions Orden Number:15U20565 Cilient:Plantronics Configuration:EUT Only Mode:BT Worst Case Tested by / SN:J. Li	10 Apr 2015	
<u></u>	at Cose.DAT	30915 6 Feb 2015	Auto		Trequency ((RF Emissions Order Number:15U20565 Cilient:Plantronics Configuration:EUT Only Mode:BT Worst Case Tested by / SN:J. Li	10 Apr 2015	
<u></u>	bt Case.DAT B5 B5 B5 Case.DAT B5 B5 B5 Avg Li Case.DAT B5 B5 B5 B5 B5 B7 B7 B7	38915 6 Feb 2015	якто 	الطلا (Rish)	5 yhr 19 	RF Emissions Order Number: 15U20565 Cilient: Plantronics Configuration: EUT Only Mode: BT Worst Case Tested by / SN: J. Li	10 Apr 2015	22:26:41
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REPORT NO: 15U20565-E1V5 FCC ID: AL8-WC2

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	19.032	41.07	Pk	32.9	-24.3	-9.5	40.17	49.5	-9.33	69.5	-29.33
2	21.024	42.67	Pk	33.3	-23.8	-9.5	42.67	49.5	-6.83	69.5	-26.83
3	22.703	42.27	Pk	33.8	-23.4	-9.5	43.17	49.5	-6.33	69.5	-26.33
4	19.665	41.57	Pk	32.9	-24.3	-9.5	40.67	49.5	-8.83	69.5	-28.83
5	21.391	41.57	Pk	33.3	-23.7	-9.5	41.67	49.5	-7.83	69.5	-27.83
6	22.596	41.5	Pk	33.7	-23.2	-9.5	42.50	49.5	-7.00	69.5	-27.00

PK - Peak detector

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8.4. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



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REPORT NO: 15U20565-E1V5 FCC ID: AL8-WC2

Trace Markers

Marker	Frequency	Meter	Det	AF T477	Amp/Cbl	Corrected	QPk Limit	Margin	Azimuth	Height	Polarity
	(MHz)	Reading		(dB/m)	(dB)	Reading	(dBuV/m)	(dB)	(Degs)	(cm)	
		(dBuV)				(dBuV/m)					
1	* 113.8525	53.72	РК	13.2	-30.4	36.52	43.52	-7	0-360	301	н
6	* 112.28	51.2	РК	13	-30.4	33.8	43.52	-9.72	0-360	100	V
3	* 266.9	48.16	РК	13	-29.3	31.86	46.02	-14.16	0-360	100	н
7	* 253.8	41.9	РК	11.5	-29.4	24	46.02	-22.02	0-360	201	V
8	* 400.3	38.56	РК	15.5	-28.6	25.46	46.02	-20.56	0-360	100	V
2	156.018	53.17	QP	12.4	-30	35.57	43.52	-7.95	97	169	н
4	399.6	41.88	РК	15.5	-28.6	28.78	46.02	-17.24	0-360	100	н
5	486.7	48.04	РК	17.7	-28.4	37.34	46.02	-8.68	0-360	100	н
9	534.1	44.55	РК	18.1	-28.2	34.45	46.02	-11.57	0-360	201	V
10	698.9	40.11	PK	20.2	-27.8	32.51	46.02	-13.51	0-360	100	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

QP - Quasi-Peak detector

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8.5. TX SPURIOUS FROM 0.15 TO 30 MHz



DATA

Marker	Freque	Meter	Det	Loop	Cbl (dB)	Dist Corr	Corrected	Peak Limit	Margin	Avg Limit	Margin	Azimuth
	ncy	Reading		Antenna		300m	Reading	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(Degs)
	(MHz)	(dBuV)		(dB/m)			(dBuVolts)					
FACE ON												
1	.0366	44.99	Pk	13.6	.1	-80	-21.31	56.33	-77.64	36.33	-57.64	0-360
2	.2734	39.61	Pk	10.3	.1	-80	-29.99	38.87	-68.86	18.87	-48.86	0-360
3	3.257	17.62	Pk	10.4	.3	-40	-11.68	29.54	-41.22	-	-	0-360
	09											
FACE OFF												
4	.0361	42.34	Pk	13.6	.1	-80	-23.96	56.45	-80.41	36.45	-60.41	0-360
5	.2722	39.57	Pk	10.3	.1	-80	-30.03	38.91	-68.94	18.91	-48.94	0-360
	3											
6	3.301	17.41	Pk	10.4	.3	-40	-11.89	29.54	-41.43	-	-	0-360
	1											

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8.6. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

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

Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

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6 WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz

Marker	Frequency	Meter	Det	T24 IL L1	LC Cables	Corrected	CISPR 22	Margin	CISPR 22	Margin
	(MHz)	Reading			1&3	Reading	Class B QP	(dB)	Class B	(dB)
		(dBuV)				dBuV			Avg	
1	.1905	44.68	Qp	1	0	45.68	-	-	54.01	-8.33
2	.1905	33.62	Ca	1	0	34.62	-	-	54.01	-19.39
3	.5055	35.57	Qp	.3	0	35.87	-	-	46	-10.13
4	.5055	28.46	Ca	.3	0	28.76	-	-	46	-17.24
5	1.0635	37.76	Pk	.2	0	37.96	-	-	46	-8.04
6	1.0635	26.73	Av	.2	0	26.93	56	-29.07	46	-19.07

Range 2: Line-L2 .15 - 30MHz

Marker	Frequency	Meter	Det	T24 IL L2	LC Cables	Corrected	CISPR 22	Margin	CISPR 22	Margin
	(MHz)	Reading			2&3	Reading	Class B QP	(dB)	Class B	(dB)
		(dBuV)				dBuV			Avg	
7	.2715	40.82	Pk	.7	0	41.52	-	-	51.07	-9.55
8	.2715	37.34	Av	.7	0	38.04	61.07	-23.03	51.07	-13.03
9	.6585	37.19	Pk	.3	0	37.49	-	-	46	-8.51
10	.6315	27.9	Av	.3	0	28.2	56	-27.8	46	-17.8
11	.87	37.35	Pk	.3	0	37.65	-	-	46	-8.35
12	.8655	29	Av	.3	0	29.3	56	-26.7	46	-16.7

Pk - Peak detector

Av - Average detection

Qp - Quasi-Peak detector

Ca - CISPR average detection

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LINE 1 RESULTS



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LINE 2 RESULTS



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