



Product Name	PointRacer	
Model No	VVKPBT	
FCC ID.	H79VVKPBT	

Applicant	DELTA ELECTRONICS, INC.
Address	3 Tungyuan Road Chungli Industrial Zone Taoyuan
	County 32063, Taiwan.

Date of Receipt	May 10, 2012
Issue Date	May 23, 2012
Report No.	125225R-RFUSP42V01
Report Version	V1.0



The test results relate only to the samples tested.

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Test Report Certification

Issue Date: May 23, 2012 Report No.: 125225R-RFUSP42V01



Accredited by NIST (NVLAP) NVLAP Lab Code: 200533-0

Product Name	PointRacer	
Applicant	DELTA ELECTRONICS, INC.	
Address	3 Tungyuan Road Chungli Industrial Zone Taoyuan County 32063,	
	Taiwan.	
Manufacturer	DELTA ELECTRONICS, INC.	
Model No.	VVKPBT	
EUT Rated Voltage	DC 1.5V (Power by Battery)	
EUT Test Voltage	AC 120V/ 60Hz	
Trade Name	Vivitek	
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2010	
	ANSI C63.4: 2003	
Test Result	Complied	

The test results relate only to the samples tested.

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- Attachment 1: EUT Test Photographs
- Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	PointRacer
Trade Name	Vivitek
Model No.	VVKPBT
FCC ID.	H79VVKPBT
Frequency Range	2401~2481MHz
Number of Channels	29CH
Channel Separation	1MHz
Type of Modulation	MSK
Antenna Type	Chip Antenna
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	YAGEO	CAN4311 895 05 245 2K	2.85dBi for 2.4 GHz

Note: The antenna of EUT is conform to FCC 15.203

Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01:	2401 MHz	Channel 02:	2402 MHz	Channel 03:	2403 MHz	Channel 04:	2407 MHz
Channel 05:	2408 MHz	Channel 06:	2417 MHz	Channel 07:	2422 MHz	Channel 08:	2423 MHz
Channel 09:	2427 MHz	Channel 10:	2428 MHz	Channel 11:	2432 MHz	Channel 12:	2433 MHz
Channel 13:	2442 MHz	Channel 14:	2443 MHz	Channel 15:	2447 MHz	Channel 16:	2448 MHz
Channel 17:	2458 MHz	Channel 18:	2462 MHz	Channel 19:	2463 MHz	Channel 20:	2467 MHz
Channel 21:	2468 MHz	Channel 22:	2472 MHz	Channel 23:	2473 MHz	Channel 24:	2476 MHz
Channel 25:	2477 MHz	Channel 26:	2478 MHz	Channel 27:	2479 MHz	Channel 28:	2480 MHz
Channel 29:	2481 MHz						

Note:

- 1. The EUT is a PointRacer.
- 2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
- 3. These tests are conducted on a sample for the purpose of demonstrating compliance of 2.4GHz transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices
- 4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode:	Mode 1: Transmit
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1.2. Operational Description

The EUT is a PointRacer, The Number of the channels is 29 in 2401~2481MHz. The device operation in 2.4GHz modulation is MSK. The Antenna is Chip type.

The interactive pen enables you to turn any wall into an interactive area. The device connects wirelessly to your projector. Easy to install and setup, the PointRacer interactive pen is the affordable solution to help you engage and excite your audience with interactive presentations. With off-surface interactivity of up to 9m (29.5 feet), audience members can participate by writing on the projected area from their seats simply by using the PointRacer.

1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	PC	DELL	DCNE	HTFYR1S	Non-Shielded, 0.8m
2	Printer	EPSON	StyLus C63	FAPY094255	Non-Shielded, 1.8m
3	Monitor	Dell	2407WFPb	CN-0FC255-46633-638-1MDS	Non-Shielded, 1.8m
4	Modem	ACEEX	DM-1414	0102027558	Non-Shielded, 1.8m
5	Microphone &	PCHOME	N/A	N/A	N/A
	Earphone				
6	Keyboard	Logitech	Y-SM46	867404-0121	N/A
7	Mouse	Logitech	M-SBM96B	810-000439	N/A

Signal Cable Type		Signal cable Description
А	Printer Cable	Non-Shielded, 1.2m
В	USB Cable	Non-Shielded, 1.8m
С	Microphone & Earphone Cable	Non-Shielded, 1.0m
D	Keyboard Cable	Non-Shielded, 1.8m
Е	Modem Cable	Non-Shielded, 1.5m
F	VGA Cable	Shielded, 1.8m, with one ferrite core bonded
G	USB Cable	Non-Shielded, 0.5m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in section 1.4.
- (2) Provide the DC Power Source.
- (3) Start transmits continually.
- (4) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : <u>http://tw.quietek.com/tw/emc/accreditations/accreditations.htm</u> The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : <u>http://www.quietek.com/</u>

Site Description: File on

Federal Communications Commission FCC Engineering Laboratory 7435 Oakland Mills Road Columbia, MD 21046 Registration Number: 92195

Accreditation on NVLAP NVLAP Lab Code: 200533-0

Site Name:	Quietek Corporation
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	E-Mail : <u>service@quietek.com</u>

FCC Accreditation Number: TW1014

2. Conducted Emission

2.1. Test Equipment

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 2012	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2012	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2012	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2012	
5	No.1 Shielded Ro	om		N/A	

Note: All instruments are calibrated every one year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit					
Frequency	Limits				
MHz	QP	AVG			
0.15 - 0.50	66-56	56-46			
0.50-5.0	56	46			
5.0 - 30	60	50			

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.) Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement. Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product	:	PointRacer
Test Item	:	Conducted Emission Test
Power Line	:	Line 1
Test Mode	:	Mode 1: Transmit

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV	dB	dBuV
Line 1					
Quasi-Peak					
0.150	9.823	32.976	42.799	-23.201	66.000
0.174	9.820	30.586	40.406	-24.908	65.314
0.362	9.820	23.254	33.074	-26.869	59.943
0.550	9.820	29.764	39.584	-16.416	56.000
0.578	9.820	27.115	36.935	-19.065	56.000
18.198	10.130	22.873	33.003	-26.997	60.000
Average					
0.150	9.823	32.129	41.953	-14.047	56.000
0.174	9.820	29.844	39.664	-15.650	55.314
0.362	9.820	20.123	29.943	-20.000	49.943
0.550	9.820	22.029	31.849	-14.151	46.000
0.578	9.820	21.675	31.495	-14.505	46.000
18.198	10.130	17.199	27.329	-22.671	50.000

- 1. All Reading Levels are Quasi-Peak and average value.
- 2. "means the worst emission level.
- 3. Measurement Level = Reading Level + Correct Factor

Product Test Item Power Line Test Mode	 PointRacer Conducted Emission Test Line 2 Mode 1: Transmit 						
Frequency	Correct	Reading M	leasurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBuV	dBuV	dB	dBuV		
Line 2							
Quasi-Peak							
0.174	9.840	31.749	41.589	-23.725	65.314		
0.230	9.840	26.576	36.416	-27.298	63.714		
0.438	9.830	26.543	36.373	-21.398	57.771		
0.582	9.830	28.923	38.753	-17.247	56.000		
2.978	9.860	26.613	36.473	-19.527	56.000		
18.162	10.280	26.485	36.765	-23.235	60.000		
Average							
0.174	9.840	31.021	40.861	-14.453	55.314		
0.230	9.840	23.893	33.733	-19.981	53.714		
0.438	9.830	22.947	32.777	-14.994	47.771		
0.582	9.830	23.333	33.163	-12.837	46.000		
2.978	9.860	22.073	31.933	-14.067	46.000		
18.162	10.280	21.425	31.705	-18.295	50.000		

- 1. All Reading Levels are Quasi-Peak and average value.
- 2. "means the worst emission level.
- 3. Measurement Level = Reading Level + Correct Factor

3. Peak Power Output

3.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.		
Х	Power Meter	Anritsu	ML2495A/6K00003357	May, 2012		
Х	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2011		
Note:	1. All equipments are calibrated every one year.					

2. The test instruments marked by "X" are used to measure the final test results.

3.2. Test Setup



3.3. Limit

The maximum peak power shall be less 1Watt.

3.4. Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

3.5. Uncertainty

 \pm 1.27 dB

3.6. Test Result of Peak Power Output

Product	:	PointRacer
Test Item	:	Peak Power Output
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit

Channel No.	Frequency	Measurement	Required Limit	Result
	(MHz)	(dBm)		
Channel 01	2401	-7.72	1 Watt= 30 dBm	Pass
Channel 16	2448	-9.16	1 Watt= 30 dBm	Pass
Channel 29	2481	-8.79	1 Watt= 30 dBm	Pass

4. Radiated Emission

4.1. Test Equipment

The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 3	Х	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
	Х	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
	Х	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
	Х	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2012
	Х	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2011
	Х	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2012
	Х	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2012
	Х	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2011
	Х	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2012
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	Х	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

2. The test instruments marked with "X" are used to measure the final test results.

4.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz





4.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits									
Frequency MHz	uV/m @3m	dBuV/m@3m							
30-88	100	40							
88-216	150	43.5							
216-960	200	46							
Above 960	500	54							

Remarks: E field strength (dBuV/m) = 20 log E field strength (uV/m)

4.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Jan. 2012 KDB558074 for compliance to FCC 47CFR 15.247 requirements. The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range form 30MHz - 10th Harmonic of fundamental was investigated.

4.5. Uncertainty

- ± 3.9 dB above 1GHz
- ± 3.8 dB below 1GHz

4.6. Test Result of Radiated Emission

Product	:	PointRacer
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (2401MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit	
	Factor	Level	Level			
MHz	dB	dBuV	dBuV/m	dB	dBuV/m	
Horizontal						
Peak Detector:						
4802.000	0.492	50.540	51.032	-22.968	74.000	
7203.000	7.534	42.260	49.794	-24.206	74.000	
9604.000	8.430	38.120	46.549	-27.451	74.000	
Vertical						
Peak Detector:						
4802.000	0.913	51.630	52.543	-21.457	74.000	
7203.000	8.012	39.070	47.083	-26.917	74.000	
9604.000	8.874	38.200	47.074	-26.926	74.000	

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.

2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.

3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.

4. Measurement Level = Reading Level + Correct Factor.

5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.

6. The average measurement was not performed when the peak measured data under the limit of average detection.

7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	: PointRacer								
Test Item	: Harmonic Radiated Emission Data								
Test Site	: No.3 O	ATS							
Test Mode	: Mode 1: Transmit (2448MHz)								
Frequency	Correct	Reading	Measurement	Margin	Limit				
	Factor	Level	Level						
MHz	dB	dBuV	dBuV/m	dB	dBuV/m				
Horizontal									
Peak Detector:									
4896.000	-0.034	47.950	47.917	-26.083	74.000				
7344.000	8.167	37.730	45.897	-28.103	74.000				
9792.000	7.794	38.840	46.634	-27.366	74.000				
Vertical									
Peak Detector:									
4896.000	0.450	49.610	50.061	-23.939	74.000				
7344.000	8.845	37.900	46.745	-27.255	74.000				
9792.000	8.428	38.800	47.227	-26.773	74.000				

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	: PointRacer								
Test Item	: Harmor	nic Radiated Emi	ission Data						
Test Site	: No.3 O/	ATS							
Test Mode	: Mode 1	: Transmit (2481	MHz)						
Frequency	Correct	Reading	Measurement	Margin	Limit				
	Factor	Level	Level						
MHz	dB	dBuV	dBuV/m	dB	dBuV/m				
Horizontal									
Peak Detector:									
4962.000	0.602	47.530	48.132	-25.868	74.000				
7443.000	8.567	37.830	46.397	-27.603	74.000				
9924.000	8.213	38.230	46.443	-27.557	74.000				
Vertical									
Peak Detector:									
4962.000	1.429	47.580	49.009	-24.991	74.000				
7443.000	9.212	37.880	47.092	-26.908	74.000				
9924.000	9.247	37.950	47.197	-26.803	74.000				

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product Test Item Test Site Test Mode	 PointRacer General Radiated Emission Data No.3 OATS Mode 1: Transmit (2448MHz) 							
Frequency	Correct	Reading	Measurement	Margin	Limit			
	Factor	Level	Level					
MHz	dB	dBuV	dBuV/m	dB	dBuV/m			
Horizontal								
359.800	-0.226	39.078	38.852	-7.148	46.000			
468.440	3.544	32.280	35.824	-10.176	46.000			
602.300	3.794	24.471	28.265	-17.735	46.000			
701.240	2.759	27.653	30.412	-15.588	46.000			
831.220	7.121	24.260	31.381	-14.619	46.000			
901.060	5.878	28.429	34.307	-11.693	46.000			
Vertical								
216.240	-6.051	41.059	35.008	-10.992	46.000			
365.620	0.282	31.755	32.037	-13.963	46.000			
509.180	0.804	32.082	32.886	-13.114	46.000			
617.820	0.958	29.179	30.137	-15.863	46.000			
747.800	1.665	29.926	31.591	-14.409	46.000			
901.060	1.858	29.805	31.663	-14.337	46.000			

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

5. RF antenna conducted test

5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2012

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

2. The test instruments marked with "X" are used to measure the final test results.

5.2. Test Setup

RF antenna Conducted Measurement:



5.3. Limits

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, based on either an RF conducted or a radiated measurement. 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)).

5.4. Test Procedure

The EUT was tested according to DTS test procedure of Jan. 2012 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW> RBW, scan up through 10th harmonic.

5.5. Uncertainty

The measurement uncertainty Conducted is defined as \pm 1.27dB

5.6. Test Result of RF antenna conducted test

Product	:	PointRacer
Test Item	:	RF antenna conducted test
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit

Channel 01 (2401MHz) 30M-25GHz

Agiler	nt Spectrur	n Analyzer - Sw	vept SA								
l≫ Sto	p Freq	RF 50 S	2 AC 0000 GHz	2	SE Trig: Free		Avg Type AvgHold:	LIGNAUTO	06:38:48 F • TRAC	M Apr 17, 2012	Frequency
10 di Log	B/div	Ref 0.00 d	P IFI Bm	NO: Fast 🖵 Gain:Low	Atten: 10	dB	Arginola.	MI	دr1 806.0 -58.6	00 MHz 90 dBm	Auto Tune
-10.0											Center Freq 515.000000 MHz
-20.0 -30.0										-33.72 dBm	Start Freq 30.000000 MHz
-40.0 -50.0									• 1		Stop Freq 1.00000000 GHz
-60.0 -70.0											CF Step 97.000000 MHz <u>Auto</u> Man
-80.0 90.0	n tinn an gun sin linder An an		na di kinasi ya tabuka ali								Freq Offset 0 Hz
Star #Re	t 30.0 M s BW 1	/Hz 00 kHz		#VBW	1.0 MHz			Sweep	Stop 1.0 90.0 ms (1	0000 GHz 0001 pts)	
MSG								STAT	us		

Agilen	t Spect	trum An	alyzer - Sw	vept SA									
<mark>⊯</mark> Disp	olay	RF Line	50 s	a AC		SE Tuin Fu	NSE:INT	Avg Type	ALIGNAUTO	06:38:23 F	M Apr 17, 2012		Display
10 dE	3/div	Ref	⁻ 0.00 d	Bm	PNO: Fast G	⊖ Trig: Free Atten: 10	idB	Avginoia:	Mk	r1 2.40′ -13.7	1 4 GHz 18 dBm		Annotation►
-10.0			∳ ¹ —										Title►
-20.0 -30.0											-33.72 dBm	<u>On</u>	Graticule Off
-40.0 -50.0												<u>On</u>	Display Line -33.72 dBm Off
-60.0													
-80.0	ka siki kutika Pananganak								home i Uptako peter pieres in peter er		is president de la contraction na contraction de la contraction na contraction de la contraction de la contraction de la contraction de la contra		System Display▶ Settings
-90.0 Star	t 1.0	00 GH	Z		#3/151/				Swaar	Stop 12	.000 GHz		
#Res MSG	SBW	100	KIIZ		#VBV	V 1.0 IVIMZ			Sweep	1.02 S (1	ooon pts)		

Agilent S	ipectrum Analyz	er - Swept SA								
Stop	RF Fred 25.0		GH7	SE	NSE:INT	Ava Tvpe	ALIGNAUTO	06:39:14 F	MApr 17, 2012	Frequency
10 dB/c	div Ref 0.	00 dBm	PNO: Fast IFGain:Low	┘ Trig: Free Atten: 10	e Run dB	Avg Hold:	10/100 Mkr	۲۲۲ DE 1 23.660 -61.1	6 2 GHz 25 dBm	Auto Tune
-10.0 —										Center Freq 18.50000000 GHz
-20.0									-33.72 dBm	Start Freq 12.000000000 GHz
-40.0 — -50.0 —										Stop Freq 25.00000000 GHz
-60.0 —	ما ت ا	mutheralities	n that have been started and							CF Step 1.30000000 GHz <u>Auto</u> Man
-80.0	della della sella della de Nationa della de	in the second	an a							Freq Offset 0 Hz
-90.0	12.000 GHz							Stop 25	.000 GHz	
#Res	BW 100 kH	z	#VBW	1.0 MHz			Sweep Status	1.20 s (1	0001 pts)	

Agilent Spectrur	n Analyzer - Swept SA								
Stop Fred	RF 50 Ω AC	7	SENS	E:INT	Avg Type	ALIGNAUTO	06:30:19 F TRAC	M Apr 17, 2012 E 1 2 3 4 5 6	Frequency
10 dB/div	Ref -10.00 dBm	PNO: Fast 😱 FGain:Low	Trig: Free F Atten: 10 d	Run IB	Avg Hold:	⊷100/100 Mkr	۳۲۲ 1 806.0 -57.4	00 MHz 56 dBm	Auto Tune
-20.0									Center Freq 515.000000 MHz
-30.0								-33.18 dBm	Start Freq 30.000000 MHz
-50.0							1		Stop Fred 1.000000000 GHz
-70.0	genetics and the second se		فالقيم وارتبار						CF Step 97.000000 MHz <u>Auto</u> Man
-90.0									Freq Offset 0 Hz
-100	<u>лн</u> 2						Ston 1 (000 GHz	
#Res BW 1	00 kHz	#VBW	1.0 MHz		#	Sweep 9	0.0 ms (1	0001 pts)	
мsg 🔱 File <2	2448-1.png> saved					STATUS			

Channel 16 (2448MHz) 30M-25GHz

Agilent Sp	ectrum An	alyzer - Sv	vept SA									
₩ Displa	v Line	-33.18	a ac B dBm		SE	NSE:INT	Avg Type	ALIGNAUTO : Log-Pwr	06:29:40 F TRAC	M Apr 17, 2012		Display
10 dB/di	iv Rei	f -10.00	dBm	PNO: Fast 🥌 -Gain:Low	Trig: Free Atten: 10	eRun dB	Avg Hold:	>100/100 Mk	r1 2.44 -13.1	7 6 GHz 77 dBm		Annotation►
-20.0		1										Title►
-30.0				5						-33.18 dBm		
-40.0 —											<u>On</u>	Graticule Off
-50.0											On	Display Line -33.18 dBm Off
-70.0	والمتعادية والمتحرك	البيد الجار			i a di stali kan mena kata si Manan menji kata menang t			lina kalikasi	. , La stile III disall al II ad al			
-80.0	COLOR AND	1						- 1				
-90.0 ——												System Display▶ Settings
-100 —												
Start 1. #Res B	.000 GH SW 100	lz kHz		#VBW	1.0 MHz		#	Sweep	Stop 12 1.02 s (1	.000 GHz 0001 pts)		
MSG								STATUS				

Agilent	t Spectrun	n Analyzer - Sw	rept SA								
w Stop	o Freq	RF 50 Ω	AC 00000 GH	lz	SEI		Avg Type AvgHold	ALIGNAUTO	06:30:47 F	M Apr 17, 2012	Frequency
10 dB	3/div	Ref -10.00	dBm	NO: Fast 🍙 Gain:Low	Atten: 10	dB		Mkr	⊓ 1 23.64 -59.5	67 GHz 44 dBm	Auto Tune
-20.0 -											Center Freq 18.50000000 GHz
-30.0 - -40.0 -										-33.18 dBm	Start Freq 12.000000000 GHz
-50.0 - -60.0 -										1 1	Stop Freq 25.000000000 GHz
-70.0 -	d data da									- 1999 () () () () () () () () ()	CF Step 1.30000000 GHz <u>Auto</u> Man
-90.0 +											Freq Offset 0 Hz
Start #Res	t 12.00 5 BW 1	0 GHz 00 kHz		#VBW	1.0 MHz		#	Sweep	Stop 25 1.20 s (1	.000 GHz 0001 pts)	

Agilen	t Spectrum	1 Analyzer - Swi	ept SA								
	Erea	RF 50 Ω		,	SEI	NSE:INT	Ava Type	ALIGNAUT	06:19:31 P r TRAC	MApr 17, 2012	Frequency
10 dE	3/div 1	Ref -10.00	dBm	L NO: Fast 😱 Gain:Low	Trig: Free Atten: 10	e Run dB	Avg Hold:	>100/100 MI	۲۷P De kr1 806.0 -59.66	00 MHz 55 dBm	Auto Tune
-20.0											Center Freq 515.000000 MHz
-30.0 -40.0										-36.91 dBm	Start Freq 30.000000 MHz
-50.0 -60.0									↓ 1		Stop Freq 1.000000000 GHz
-70.0	ن السلام ل في شدو		الا و الا الم الم	llist housed and the selection	Mary Mary Mary and All Mary						CF Step 97.000000 MHz <u>Auto</u> Man
-90.0		ting taking pana pina tin	and for the state of a state of a	and and the first second s	an a	ann fa staff fa Arlanda Ar					Freq Offset 0 Hz
-100 Star #Res	t 30.0 N s BW 10	/IHz 00 kHz		#VBW	1.0 MHz			Sweep	Stop 1.0 90.0 ms (1	000 GHz 0001 pts)	
MSG								STAT	US		

Channel 29 (2481MHz) 30M-25GHz

		20						Swept SA	rum Analyze	gilent Spec
Display	M Apr 17, 2012 E 1 2 3 4 5 6 E M W M M M M T P N N N N N	06:19:08 F TRAC TYF	ALIGNAUTO : Log-Pwr : 23/100	Avg Typ Avg Hold	Run	Trig: Free	PNO: Fast 😱	50 Ω AC 91 dBm	RF Line -30	a Display
Annotation	I7GHz 05dBm	r1 2.48 ⁻ -16.9	Mk		dВ	Atten: 10	FGain:Low	00 dBm	Ref -1	0 dB/div
Title									T	20.0
										-
Graticu	-36.91 dBm									30.0
<u>On</u> 0										40.0
Display Lir					-					50.0
-36.91 dB <u>On</u> O										60.0
							р.,			70.0
	a bi ta ta ta pa balikita Mana kana pana ka		i la la fuña sus dis J			a la fabrilla da anna anna anna anna anna anna ann				
System										
Display Settings										90.0
										-100
	.000 GHz	Stop 12	Swaan	1	1	1 0 MH-				Start 1.0
	000 i pis)	1.02 5 (1	STATUS			1.0 10172	#V DVV			ISG

Agilent	Spectru	ım Analyzer - Sv	vept SA								
w Stop	Frec	RF 50 S	2 AC 00000 GH	lz	SE	NSE:INT	Avg Type	ALIGNAUTO	06:19:56 P TRAC	M Apr 17, 2012 E 1 2 3 4 5 6	Frequency
10 dB	/div	Ref -10.00	р IFO dBm	NO: Fast () Gain:Low	Atten: 10	dB	Avginoid.	Mkr	1 23.644 -61.1	1 GHz 77 dBm	Auto Tune
-20.0 -											Center Freq 18.50000000 GHz
-30.0 - -40.0 -										-36.91 dBm	Start Freq 12.000000000 GHz
-50.0 - -60.0 -										1 1	Stop Freq 25.00000000 GHz
-70.0 - -80.0 -			а са ја Шалиј () () () () () (10 / 11 / 11 / 11 / 11 / 11 / 11 / 11 /			ndia di maharatikila Perjami yang perina					CF Step 1.30000000 GHz <u>Auto</u> Man
-90.0 -											Freq Offset 0 Hz
-100 - Start	12.00	D0 GHz		#\/D\M	A 0 BALL-			Swaan	Stop 25.	.000 GHz	
MSG	DVV			#VDVV				SWEEP	1.20 5 (1	0001 pts)	

6. Band Edge

6.1. Test Equipment

RF Conducted Measurement

The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2012

Note:

- 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
- 2. The test instruments marked with "X" are used to measure the final test results.

RF Radiated Measurement:

The following test equipments are used during the band edge tests:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
	Х	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
		Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2012
	Х	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2011
		Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2012
	Х	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2012
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2011
	Х	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2012
	Х	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	Х	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

Note: 1.

1. All instruments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

6.2. Test Setup

RF Conducted Measurement



RF Radiated Measurement:



6.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

6.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Jan. 2012 KDB558074 for compliance to FCC 47CFR 15.247 requirements. The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.

6.5. Uncertainty

- ± 3.9 dB above 1GHz
- ± 3.8 dB below 1GHz

6.6. Test Result of Band Edge

Product	:	PointRacer
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit

RF Radiated Measurement (Horizontal):

Channel No	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Posult
Channel No.	(MHz)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dBuV/m)	Result
01 (Peak)	2389.400	31.738	23.180	54.918	74.00	54.00	Pass
01 (Peak)	2390.000	31.739	22.122	53.861	74.00	54.00	Pass
01 (Peak)	2401.200	31.754	45.871	77.624			Pass



- 1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.

Frequency	Peak	Duty Cycle	Measurement	Margin	Limit
	Measurement	Correct Factor	Level		
MHz	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal					
2389.400	54.918	-13.398	41.52	-12.48	54.000

Average Detector:

- 1. AVG Measurement=Peak Measurement Duty Cycle Correct Factor
- 2. The Duty Cycle is refer to section 9.
- If Duty Cycle is smaller than -20dB,based on FCC part15 the duty cycle correction factor is -20dB for calculating average emission.
- 4. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product	:	PointRacer
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit

RF Radiated Measurement (Vertical):

Channel Ma	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Docult
Channel No.	(MHz)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dBuV/m)	Kesuit
01 (Peak)	2389.200	30.273	23.501	53.773	74.00	54.00	Pass
01 (Peak)	2390.000	30.267	21.749	52.016	74.00	54.00	Pass
01 (Peak)	2401.400	30.241	46.315	76.556			Pass

Figure Channel 01:

Vertical (Peak)



- 1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.



Product	:	PointRacer
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
28 (Peak)	2480.900	31.943	47.859	79.802			Pass
28 (Peak)	2483.500	31.951	28.261	60.211	74.00	54.00	Pass



Horizontal (Peak)



- 1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.

Frequency	requency Peak		Measurement	Margin	Limit
	Measurement	Correct Factor	Level		
MHz	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal					
2483.500	60.211	-13.398	46.813	-7.187	54.000

Average Detector:

- 1. AVG Measurement=Peak Measurement Duty Cycle Correct Factor
- 2. The Duty Cycle is refer to section 9.
- If Duty Cycle is smaller than -20dB,based on FCC part15 the duty cycle correction factor is -20dB for calculating average emission.
- 4. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product	:	PointRacer
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit

RF Radiated Measurement (Vertical):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Result
	(IVIIIZ)	(uD)	(uDuv)	(uDu v/III)	(uDu v/III)	(uDu v/III)	
28 (Peak)	2481.100	30.573	47.840	78.413			Pass
28 (Peak)	2483.500	30.586	28.919	59.504	74.00	54.00	Pass



- 1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.

Average Dete	ctor:				
Frequency	Peak	Duty Cycle	Measurement	Margin	Limit
	Measurement	Correct Factor	Level		
MHz	dBuV/m	dB	dBuV/m	dB	dBuV/m
Vertical					
2483.500	59.504	-13.398	46.106	-7.894	54.000

- 1. AVG Measurement=Peak Measurement Duty Cycle Correct Factor
- 2. The Duty Cycle is refer to section 9.
- If Duty Cycle is smaller than -20dB,based on FCC part15 the duty cycle correction factor is -20dB for calculating average emission.
- 4. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

7. Occupied Bandwidth

7.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2012

Note: 1. All instruments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

7.2. Test Setup



7.3. Limits

The minimum bandwidth shall be at least 500 kHz.

7.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Jan. 2012 KDB558074 for compliance to FCC 47CFR 15.247 requirements. Set RBW = 1-5% of the emission bandwidth, VBW≥3*RBW

7.5. Uncertainty

 \pm 150Hz

7.6. Test Result of Occupied Bandwidth

Product	:	PointRacer
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (2401MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2401.00	560	>500	Pass

Figure Channel 01:

Agilent Spec	ctrum An	alyzer - Sw	ept SA								
₩ Marker	RF 1 2.4	50 Ω 011500	AC 000000 G	iHz	SE	NSE:INT	Avg T	ALIGNAUTO	06:33:03 I TRA	M Apr 17, 2012 E 1 2 3 4 5 6	Marker
			P IF:	'NO: Far Gain:Low	Atten: 10	e Run ∣dB	Avg H	old:>100/100	1 2 401		Select Marker
10 dB/div	Ref	0.00 di	Bm						-12.7	16 dBm	
-10.0						♦ ¹ ₃					
-20.0					\rightarrow	\sim		_		-18.72 dBm	Normal
-30.0					5	- m					
-40.0					~~~		Marray .				Delta
-60.0		- management	for the second second					- a hour of the state		and the second second	
-70.0							-			<u> </u>	
-80.0											Fixed⊳
-50.0									-		
#Res BV	2.4010 N 100	00 GHZ kHz		#VB	W 100 kHz			Sweep	Span 1 1.27 ms (0.00 MHZ 1001 pts)	Off
MKR MODE	TRC SCL		X		Y	FU	NCTION	FUNCTION WIDTH	FUNCTI	ON VALUE	01
1 N 2 N	1 f		2.401 1	5 GHz 3 GHz	-12.716 d -17.791 d	Bm Bm					
3 N 4	<u>1</u> t		2.401 2	9 GHz	-18.626 di	Bm					Properties►
6		55 				_					
8		7				_					Moro
10						_					1 of 2
12											
MSG								STATUS			

Product	:	PointRacer
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (2448MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
16	2448.00	550	>500	Pass

Figure Channel 15:

Agilent Spectr	rum Analyzer - Swept S	A	i e					
Marker 1	RF 50 Ω A	000 GHz	SENSE:I	Avg T	ALIGNAUTO	06:27:51 P TRAC	M Apr 17, 2012	Marker
	21110100000	PNO: Far G IFGain:Low	Trig: Free Run Atten: 10 dB	n Avg Ho	old:>100/100	TYF		Select Marker
10 dB/div	Ref -10.00 dB	m			Mkr	1 2.448 -12.8	16 GHz 17 dBm	1
-20.0			y241	3			-19.10 dBm	Normal
-50.0 -60.0	manna	and the second and the second				and the specific	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Delta
-80.0 -90.0 -100								Fixed⊳
Center 2.4 #Res BW	448000 GHz 100 kHz	#VB\	V 100 kHz	FUNCTION	Sweep	Span 1 1.27 ms (EUNOID	0.00 MHz 1001 pts) NVALUE	Off
1 N 1 2 N 1 3 N 1 4 5 6	f f f	2.448 16 GHz 2.447 73 GHz 2.448 28 GHz	-12.817 dBm -18.017 dBm -18.305 dBm					Properties▶
7 8 9 10 11 12								More 1 of 2
MSG		I		I	STATUS			

Product	:	PointRacer
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (2481MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
29	2481.00	560	>500	Pass

Figure Channel 28:

Agilent Spectr	um Analyzer - Swept SA							
Marker 1	RF 50 Ω AC 2.48116000000	0 GHz		INT AVg	ALIGNAUTO Type: Log-Pwr	06:15:05 PM TRACE	Apr 17, 2012	Marker
		PNO: Far 🕞 IFGain:Low	Atten: 10 dB	in Avgji	1010:>100/100	DE	PNNNNN	Select Marker
10 dB/div	Ref -10.00 dBm				Mkr	1 2.481 -16.06	16 GHz 2 dBm	1*
-20.0			$\langle 2 \rangle$	13			22.22 dBm	
-30.0				2				Normal
-40.0				- V				
-60.0		and the second s			man har and mar	-		Delta
-70.0								
-80.0								
-90.0								Fixed⊳
- 100								
Center 2.4 #Res BW	481000 GHz 100 kHz	#VBW	í 100 kHz		Sweep	Span 10 1.27 ms (1	001 pts)	Off
MKR MODE TR		94 46 CH=	Y 16.062 dBm	FUNCTION	FUNCTION WIDTH	FUNCTIO	N VALUE	
2 N	f 2.4 f 2.4	80 72 GHz	-16.062 dBm -22.009 dBm					
4 5	1 2.4		-21.700 0.011					Properties►
6								
8								More
10								1 of 2
12								
MSG					STATUS			

8. Power Density

8.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2012

Note: 1. All equipments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

8.2. Test Setup



8.3. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Jan. 2012 KDB558074 for compliance to FCC 47CFR 15.247 requirements. Set RBW= 100 kHz, VBW≥300KHz, SPAN to 5-30 % greater than the EBW, Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log (3 kHz/100 kHz = -15.2 dB).

8.5. Uncertainty

 \pm 1.27 dB

8.6. Test Result of Power Density

Product	:	PointRacer
Test Item	:	Power Density Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit(2401MHz)

Channel No. Frequency		Measure Level	Limit	Result
(MHz)		(dBm)	(dBm)	
01	2401.00	-24.967	< 8dBm	Pass

Figure Channel 01:



Product	:	PointRacer
Test Item	:	Power Density Data
Test Site	:	No.3OATS
Test Mode	:	Mode 1: Transmit (2448MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
16	2448	-26.565	< 8dBm	Pass

Figure Channel 16:

Agilent	Spectrum Ar	alyzer - Swept	SA								
₩ Cent	ter Freq	50 Ω 2.448000	AC 0000 GI	Ηz	SE	NSE:INT	Avg Type	ALIGNAUTO : Log-Pwr	06:48:27 P	M May 28, 2012 E 1 2 3 4 5 6	Frequency
10 dB	Ret i/div Re	Offset -15.2 f -5.20 dB	ı⊧g ∶dB m	iain:Low	Trig: Free #Atten: 20	èRun)dB	Avg Hold: Ext Gain:	>100/100 -0.50 dB Mkr	1 2.448 -26.5	10 GHz 65 dBm	Auto Tune
-15.2 -				~		1					Center Freq 2.448000000 GHz
-25.2 - -35.2 -											Start Freq 2.438000000 GHz
-45.2 - -55.2 -											Stop Freq 2.458000000 GHz
-65.2 - -75.2 p	winnter	angetualiter	_ዋ ሞትራዲካኩት-ሰያ	pr Madifi Martin Start	where the	· ///	WWW WWWWW	Maryon by Maryon	aporton por for con	ᢍᡗᢧᡅᠩᢧᡶ᠋ᡀᡘᢦᡒ	CF Step 2.000000 MHz <u>Auto</u> Man
-85.2 -											Freq Offset 0 Hz
-95.2 -											
Cent #Res	er 2.4480 BW 100	0 GHz kHz		#VBW	300 kHz			Sweep	Span 2 1.93 ms (0.00 MHz 1001 pts)	
MSG								STATUS			

Product	:	PointRacer
Test Item	:	Power Density Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (2481MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
29	2481.00	-26.024	< 8dBm	Pass

Figure Channel 29:

Agilent Spectrum Analyz	er - Swept SA						
Cepter Fred 2		SENSE	EINT Avg Type	ALIGNAUTO	06:46:57 PM TRACE	May 28, 2012	Frequency
Ref Off 10 dB/div Ref -5	IFGain:Low	Trig: Free Ri #Atten: 20 di	un Avg Hold: B Ext Gain: -	-100/100 0.50 dB Mkr′	1 2.481 ⁴ -26.02	10 GHz 4 dBm	Auto Tune
-15.2							Center Freq 2.481000000 GHz
-25.2							Start Freq 2.471000000 GHz
-45.2							Stop Freq 2.491000000 GHz
-65.2	working how with a stand with the stand withe stand with the stand with the stand with the stand		Markan	and I way and a second s	JUR AND MARCINE	Yu-Mallandersh	CF Step 2.000000 MHz <u>Auto</u> Man
-85.2							Freq Offset 0 Hz
-95.2 Center 2.48100 C	GHz	N 300 KHZ		Sween	Span 20	0.00 MHz	
MSG	2 #VD			STATUS	1.95 115 (1	oor pisj	

9. Duty Cycle

9.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.	
Х	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2011	
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011	
	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2012	
Note:	1. All equipments are calibrated every one year.				

2. The test equipments marked by "X" are used to measure the final test results.

9.2. Test Setup



9.3. Uncertainty

± 150Hz

9.4. Test Result of Duty Cycle

Product	:	PointRacer
Test Item	:	Duty Cycle Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit



Date: 17.APR.2012 08:30:13



Date: 17.APR.2012 08:32:23

Time on of 100ms= (0.324ms*66) = 21.384 ms Duty Cycle= 21.384ms / 100ms= 0.21384 Duty Cycle correction factor= 20 LOG 0.21384= -13.398 dB

Duty Cycle correction factor	-13.398	dB	

10. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs