FCC Test Report

Product Name	Notebook
Model No.	U21
FCC ID.	JCK-U21

Applicant	GIGA-BYTE TECHNOLOGY CO., LTD.
Address	No.6, Bao Chiang Road, Hsin-Tien Dist., New Taipei City 231, Taiwan

Date of Receipt	July 13, 2013
Issued Date	Aug. 05, 2013
Report No.	136255R-RFUSP43V01
Report Version	V1.0



The Test Results relate only to the samples tested.

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Test Report Certification

Issued Date: Aug. 05, 2013 Report No.: 136255R-RFUSP43V01



Product Name	Notebook	
Applicant	GIGA-BYTE TECHNOLOGY CO., LTD.	
Address	No.6, Bao Chiang Road, Hsin-Tien Dist., New Taipei City 231, Taiwan	
Manufacturer	1. GIGA-BYTE TECHNOLOGY CO., LTD. (GBT)	
	2. G-STYLE Ltd.	
Model No.	U21	
FCC ID.	JCK-U21	
EUT Rated Voltage	AC 100-240V, 50-60Hz	
EUT Test Voltage	AC 120V/60Hz	
Trade Name	GIGABYTE	
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2012	
	ANSI C63.4: 2003, ANSI C63.10: 2009	
Test Result	Complied	

The Test Results relate only to the samples tested.

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Notebook		
Trade Name	GIGABYTE		
Model No.	U21		
FCC ID.	JCK-U21		
Frequency Range	2402 – 2480MHz		
Channel Number	V3.0+HS, V2.1+EDR: 79CH		
Type of Modulation	V3.0+HS, V2.1+EDR: GFSK(1Mbps) / π /4DQPSK(2Mbps) / 8DPSK(3Mbps)		
Antenna Type	PIFA Antenna		
Channel Control	Auto		
Antenna Gain	Refer to the table "Antenna List"		
Power Adapter	MFR: DELTA, M/N: ADP-65WH BB		
	Input: AC 100-240V, 1.5A, 50-60Hz		
	Output: DC 19V, 3.42A		
	Cable Out: Non-Shielded, 1.7m, with one ferrite core bonded.		
Contain Module	Intel / 7260HMW BN		

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Aristotle	RFA-22-P325 (Main)(Aux)	PIFA	2.2 dBi for 2.4 GHz

Note:

1. The antenna of EUT is conforming to FCC 15.203.

Center Frequency of Each Channel: (For V3.0+HS, V2.1+EDR)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00:	2402 MHz	Channel 20:	2422 MHz	Channel 40:	2442 MHz	Channel 60:	2462 MHz
Channel 01:	2403 MHz	Channel 21:	2423 MHz	Channel 41:	2443 MHz	Channel 61:	2463 MHz
Channel 02:	2404 MHz	Channel 22:	2424 MHz	Channel 42:	2444 MHz	Channel 62:	2464 MHz
Channel 03:	2405 MHz	Channel 23:	2425 MHz	Channel 43:	2445 MHz	Channel 63:	2465 MHz
Channel 04:	2406 MHz	Channel 24:	2426 MHz	Channel 44:	2446 MHz	Channel 64:	2466 MHz
Channel 05:	2407 MHz	Channel 25:	2427 MHz	Channel 45:	2447 MHz	Channel 65:	2467 MHz
Channel 06:	2408 MHz	Channel 26:	2428 MHz	Channel 46:	2448 MHz	Channel 66:	2468 MHz
Channel 07:	2409 MHz	Channel 27:	2429 MHz	Channel 47:	2449 MHz	Channel 67:	2469 MHz
Channel 08:	2410 MHz	Channel 28:	2430 MHz	Channel 48:	2450 MHz	Channel 68:	2470 MHz
Channel 09:	2411 MHz	Channel 29:	2431 MHz	Channel 49:	2451 MHz	Channel 69:	2471 MHz
Channel 10:	2412 MHz	Channel 30:	2432 MHz	Channel 50:	2452 MHz	Channel 70:	2472 MHz
Channel 11:	2413 MHz	Channel 31:	2433 MHz	Channel 51:	2453 MHz	Channel 71:	2473 MHz
Channel 12:	2414 MHz	Channel 32:	2434 MHz	Channel 52:	2454 MHz	Channel 72:	2474 MHz
Channel 13:	2415 MHz	Channel 33:	2435 MHz	Channel 53:	2455 MHz	Channel 73:	2475 MHz
Channel 14:	2416 MHz	Channel 34:	2436 MHz	Channel 54:	2456 MHz	Channel 74:	2476 MHz
Channel 15:	2417 MHz	Channel 35:	2437 MHz	Channel 55:	2457 MHz	Channel 75:	2477 MHz
Channel 16:	2418 MHz	Channel 36:	2438 MHz	Channel 56:	2458 MHz	Channel 76:	2478 MHz
Channel 17:	2419 MHz	Channel 37:	2439 MHz	Channel 57:	2459 MHz	Channel 77:	2479 MHz
Channel 18:	2420 MHz	Channel 38:	2440 MHz	Channel 58:	2460 MHz	Channel 78:	2480 MHz
Channel 19:	2421 MHz	Channel 39:	2441 MHz	Channel 59:	2461 MHz		

1 (T - $V_2 0 + US V_2 1 + EDD)$ ст α C

- 1. The EUT is a Notebook with a built-in WLAN > Bluetooth transceiver, this report for Bluetooth V3.0+HS, V2.1+EDR.
- 2. These tests were conducted on a sample for the purpose of demonstrating compliance of Bluetooth transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
- 3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
- 4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
- 5. Bluetooth operation was evaluated at both 1Mb/s and 3Mb/s data rates. 2Mb/s data rate was found, through pre-testing, to produce emissions similar to those for 3Mb/s.

Test Mode	Mode 1: Transmit - 1Mbps (GFSK)
	Mode 2: Transmit - 3Mbps (8DPSK)

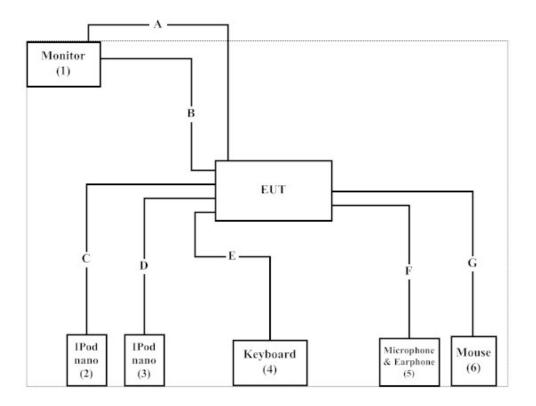
1.3. Tested System Details

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	Monitor	Dell	ST2320LF	CN-OMM2NN6-72872-22 I-C9WS	Non-Shielded, 1.8m
2	IPod nano	Apple	A1199	YM733325VQ5	N/A
3	IPod nano	Apple	A1199	5U728909VQ5	N/A
4	Keyboard	Logitech	Y-UR83	SY848UK	N/A
5	Microphone & Earphone	РСНОМЕ	N/A	N/A	N/A
6	USB Mouse	Logitech	M-BT85	LN5488800D8	N/A

Signal Cable Type		Signal cable Description	
А	VGA Card	Shielded, 1.6m, with two ferrite cores bonded.	
В	HDMI Card	Shielded, 1.8m	
С	IPod Cable	Non-Shielded, 1.2m	
D	IPod Cable	Non-Shielded, 1.2m	
E	Keyboard Cable	Non-Shielded, 1.8m	
F	Microphone & Earphone Cable	Non-Shielded, 1.2m	
G	Mouse Cable	Non-Shielded, 1.8m	

1.4. Configuration of Tested System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4.
- (2) Execute software "DRTU-v1.6.1" on the EUT
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Press "OK" to start the continuous Transmit.
- (5) Verify that the EUT works properly.

1.6. Test Facility

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	30-65
Barometric pressure (mbar)	860-1060	950-1000

Ambient conditions in the laboratory:

The related certificate for our laboratories about the test site and management system can be downloaded

from QuieTek Corporation's Web Site: <u>http://www.quietek.com/tw/ctg/cts/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>

File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
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Registration Number: 92195

Site Name:	Quietek Corporation
Site Address:	No.5-22, Ruishukeng,
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	TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
	E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

2. Conducted Emission

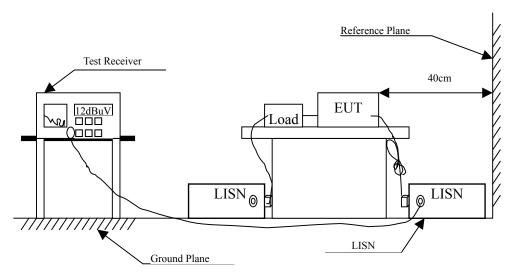
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
Х	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2012	
Х	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2013	Peripherals
Х	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2013	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2013	EUT
Х	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2013	
	No.1 Shielded Room				

Note:

- 1. All equipments are calibrated every one year.
- 2. The test instruments marked by "X" are used to measure the final test results.

2.2. Test Setup



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

2.3. Limits

Remarks: In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT and Peripherals 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 refer 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 the interface cables must be changed according to ANSI C63.10: 2009 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

2.5. Uncertainty

± 2.26 dB

Product

Test Item Power Line Test Mode	: Line 1	ed Emission Test Transmit - 3Mbp	s (8DPSK) (2441MH	z)	
Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.181	9.698	37.870	47.568	-17.546	65.114
0.193	9.698	34.650	44.348	-20.423	64.771
0.240	9.700	28.410	38.110	-25.319	63.429
0.255	9.701	28.250	37.951	-25.049	63.000
0.271	9.702	23.710	33.412	-29.131	62.543
16.982	9.900	13.450	23.350	-36.650	60.000
Average					
0.181	9.698	10.480	20.178	-34.936	55.114
0.193	9.698	3.540	13.238	-41.533	54.771
0.240	9.700	3.030	12.730	-40.699	53.429
0.255	9.701	2.850	12.551	-40.449	53.000
0.271	9.702	4.270	13.972	-38.571	52.543
16.982	9.900	8.840	18.740	-31.260	50.000

2.6. Test Result of Conducted Emission

:

Notebook

Note:

1. All Reading Levels are Quasi-Peak and average value.

2. " means the worst emission level.

3. Measurement Level = Reading Level + Correct Factor

Product	: Noteboo	: Notebook					
Test Item		ted Emission Test					
Power Line	: Line 2						
Test Mode	: Mode 2	: Transmit - 3Mbp	s (8DPSK) (2441MH	[z)			
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBuV	dBuV	dB	dBuV		
LINE 2							
Quasi-Peak							
0.177	9.678	39.310	48.988	-16.241	65.229		
0.201	9.679	34.270	43.949	-20.594	64.543		
0.232	9.680	30.740	40.420	-23.237	63.657		
0.263	9.682	26.480	36.162	-26.609	62.771		
0.439	9.690	21.360	31.050	-26.693	57.743		
1.201	9.734	19.990	29.724	-26.276	56.000		
Average							
0.177	9.678	31.870	41.548	-13.681	55.229		
0.201	9.679	11.100	20.779	-33.764	54.543		
0.232	9.680	4.660	14.340	-39.317	53.657		
0.263	9.682	12.800	22.482	-30.289	52.771		
0.439	9.690	11.340	21.030	-26.713	47.743		
1.201	9.734	13.260	22.994	-23.006	46.000		

- 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

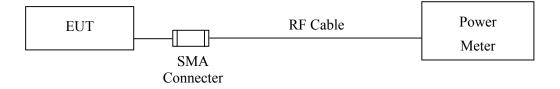
3.1. Test Equipment

_	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Х	Power Meter	Anritsu	ML2495A/6K00003357	May, 2013
Х	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2013

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 C63.10, 2009; 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	:	Notebook
Test Item	:	Peak Power Output
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK)

Channel No.	Frequency	Measurement	Required Limit	Result
	(MHz)	(dBm)		
Channel 00	2402.00	8.08	1 Watt= 30 dBm	Pass
Channel 39	2441.00	8.30	1 Watt= 30 dBm	Pass
Channel 78	2480.00	8.25	1 Watt= 30 dBm	Pass

Product	:	Notebook
Test Item	:	Peak Power Output
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK)

Channel No.	Frequency	Measurement	Required Limit	Result
	(MHz)	(dBm)		
Channel 00	2402.00	6.71	1 Watt= 30 dBm	Pass
Channel 39	2441.00	7.00	1 Watt= 30 dBm	Pass
Channel 78	2480.00	6.84	1 Watt= 30 dBm	Pass

4. Radiated Emission

4.1. Test Equipment

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

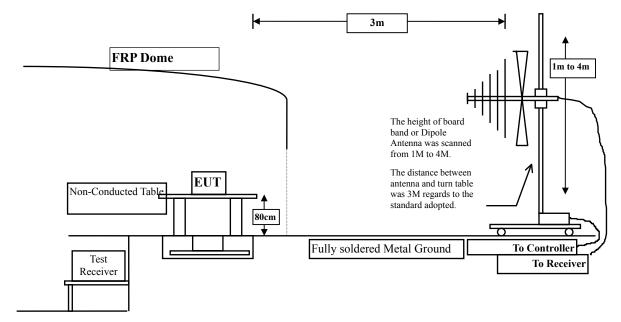
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 3	X Loop Antenna		Teseq	HLA6120 / 26739	Jul., 2013
	Х	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2012
	Х	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
	X Horn Antenna		Schwarzbeck	BBHA9170/208	Jul., 2013
	Х	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2012
	Х	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2013
	Х	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	Х	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2013
	Х	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	Х	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

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

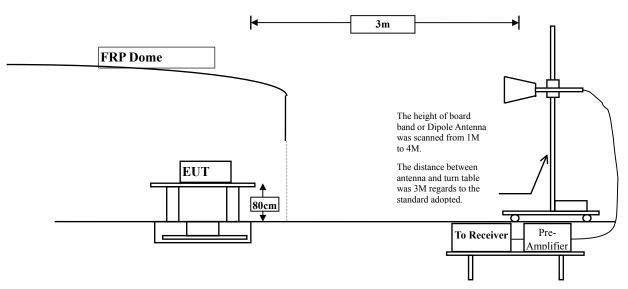
2. The test instruments marked by "X" are used to measure the final test results.

4.2. Test Setup

Below 1GHz



Above 1GHz



4.3. Limits

➤ General Radiated Emission 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 Limits					
Frequency MHz	Field strength	Measurement distance			
11112	(microvolts/meter)	(meter)			
0.009-0.490	2400/F(kHz)	300			
0.490-1.705	24000/F(kHz)	30			
1.705-30	30	30			
30-88	100	3			
88-216	150	3			
216-960	200	3			
Above 960	500	3			

Remarks: 1. RF Voltage $(dBuV) = 20 \log RF$ Voltage (uV)

- 2. In the Above Table, the tighter limit applies at the band edges.
- 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.4. Test Procedure

The EUT was setup according to ANSI C63.10, 2009 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 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 C63.10:2009 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~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 on the Final Measurement.

The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

4.5. Uncertainty

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

Product Test Item Test Site Test Mode	 Notebook Harmonic Radiated Emission No.3 OATS Mode 1: Transmit - 1Mbps (GFSK)(2402MHz) 					
Frequency	Correct	Reading	Measurement	Margin	Limit	
	Factor	Level	Level			
MHz	dB	dBuV	dBuV/m	dB	dBuV/m	
Horizontal						
Peak Detector:						
4804.000	3.327	38.570	41.897	-32.103	74.000	
7206.000	10.136	36.730	46.866	-27.134	74.000	
9608.000	13.706	35.890	49.596	-24.404	74.000	
Average						
Detector:						
Vertical						
Peak Detector:						
4804.000	6.638	38.000	44.637	-29.363	74.000	
7206.000	11.005	37.040	48.045	-25.955	74.000	
9608.000	14.103	35.630	49.733	-24.267	74.000	
Average						
Detector:						

4.6. Test Result of Radiated Emission

- 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	NotebookHarmonic Radiated Emission						
Test Site	: No.3 OATS						
Test Mode	: Mode 1:	Transmit - TMbp	os (GFSK)(2441MHz)				
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBuV	dBuV/m	dB	dBuV/m		
Horizontal							
Peak Detector:							
4882.000	3.001	36.480	39.481	-34.519	74.000		
7323.000	11.846	36.800	48.647	-25.353	74.000		
9764.000	12.563	36.150	48.713	-25.287	74.000		
Average							
Detector:							
Vertical							
Peak Detector:							
4882.000	5.713	37.120	42.834	-31.166	74.000		
7323.000	12.727	36.570	49.298	-24.702	74.000		
9764.000	13.028	37.510	50.538	-23.462	74.000		
Average							
Detector:							

- 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	: Notebook						
Test Item	: Harmonic Radiated Emission						
Test Site	: No.3 OATS						
Test Mode	: Mode 1:	Transmit - 1Mbp	os (GFSK)(2480MHz))			
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBuV	dBuV/m	dB	dBuV/m		
Horizontal							
Peak Detector:							
4960.000	2.760	36.330	39.090	-34.910	74.000		
7440.000	12.567	35.840	48.406	-25.594	74.000		
9920.000	13.456	35.670	49.126	-24.874	74.000		
Average							
Detector:							
Vertical							
Peak Detector:							
4960.000	5.557	37.850	43.407	-30.593	74.000		
7440.000	13.426	36.150	49.575	-24.425	74.000		
9920.000	13.958	37.620	51.578	-22.422	74.000		
Average							
Detector:							

- 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	 Notebook Harmonic Radiated Emission No.3 OATS Mode 2: Transmit - 3Mbps (8DPSK)(2402MHz) 					
Frequency	Correct	Reading	Measurement	Margin	Limit	
	Factor	Level	Level			
MHz	dB	dBuV	dBuV/m	dB	dBuV/m	
Horizontal						
Peak Detector:						
4804.000	3.327	36.690	40.017	-33.983	74.000	
7206.000	10.136	36.050	46.186	-27.814	74.000	
9608.000	13.706	35.920	49.626	-24.374	74.000	
Average						
Detector:						
Vertical						
Peak Detector:						
4804.000	6.638	38.070	44.707	-29.293	74.000	
7206.000	11.005	36.660	47.665	-26.335	74.000	
9608.000	14.103	36.580	50.683	-23.317	74.000	
Average						
Detector:						

- 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	 Notebook Harmonic Radiated Emission No.3 OATS Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz) 					
Frequency	Correct	Reading	Measurement	Margin	Limit	
	Factor	Level	Level			
MHz	dB	dBuV	dBuV/m	dB	dBuV/m	
Horizontal						
Peak Detector:						
4882.000	3.001	36.890	39.891	-34.109	74.000	
7323.000	11.846	35.040	46.887	-27.113	74.000	
9764.000	12.563	36.990	49.553	-24.447	74.000	
Average						
Detector:						
Vertical						
Peak Detector:						
4882.000	5.713	37.160	42.874	-31.126	74.000	
7323.000	12.727	36.570	49.298	-24.702	74.000	
9764.000	13.028	37.450	50.478	-23.522	74.000	
Average						
Detector:						

- 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	 Notebook Harmonic Radiated Emission 				
Test Site Test Mode	: No.3 OAT : Mode 2: T		a (ODDSV) (7400MU		
Test Widde	. Widde 2. 1	ransmit - Swiop	s (8DPSK) (2480MH	Z)	
Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4960.000	2.760	36.130	38.890	-35.110	74.000
7440.000	12.567	35.710	48.276	-25.724	74.000
9920.000	13.456	35.790	49.246	-24.754	74.000
Average					
Detector:					
Vertical					
Peak Detector:					
4960.000	5.557	37.320	42.877	-31.123	74.000
7440.000	13.426	36.680	50.105	-23.895	74.000
9920.000	13.958	37.330	51.288	-22.712	74.000
Average					
Detector:					

- 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	:	Notebook
Test Item	:	General Radiated Emission
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK) (2441MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
224.000	-10.339	44.022	33.683	-12.317	46.000
321.000	-4.369	43.300	38.931	-7.069	46.000
418.000	-3.234	37.937	34.703	-11.297	46.000
513.060	1.550	29.022	30.572	-15.428	46.000
608.120	4.384	27.530	31.914	-14.086	46.000
906.880	5.848	33.763	39.611	-6.389	46.000
Vertical					
30.000	1.020	27.550	28.570	-11.430	40.000
256.980	-7.573	44.834	37.261	-8.739	46.000
352.040	-3.833	43.675	39.842	-6.158	46.000
482.020	-3.985	34.031	30.046	-15.954	46.000
773.020	2.746	27.999	30.745	-15.255	46.000
906.880	2.498	35.865	38.363	-7.637	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.
- 8. No emission found between lowest internal used/generated frequency to 30MHz.

Product	: Notebook					
Test Item	: General Radiated Emission					
Test Site	: No.3 O	ATS				
Test Mode	: Mode 2	: Transmit - 3Mbp	s (8DPSK) (2441MH	[z)		
Frequency	Correct	Reading	Measurement	Margin	Limit	
	Factor	Level	Level			
MHz	dB	dBuV	dBuV/m	dB	dBuV/m	
Horizontal						
191.020	-10.040	38.445	28.405	-15.095	43.500	
352.040	-2.403	42.268	39.865	-6.135	46.000	
449.040	-2.238	35.953	33.715	-12.285	46.000	
513.060	1.550	27.977	29.527	-16.473	46.000	
629.460	1.560	29.859	31.419	-14.581	46.000	
906.880	5.848	32.675	38.523	-7.477	46.000	
Vertical						
321.000	-6.899	43.358	36.459	-9.541	46.000	
352.040	-3.833	43.009	39.176	-6.824	46.000	
385.020	-2.820	39.802	36.982	-9.018	46.000	
513.060	-0.670	32.500	31.830	-14.170	46.000	
685.720	2.319	28.329	30.647	-15.353	46.000	
906.880	2.498	36.174	38.672	-7.328	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.
- 8. No emission found between lowest internal used/generated frequency to 30MHz.

5. **RF Antenna Conducted Test**

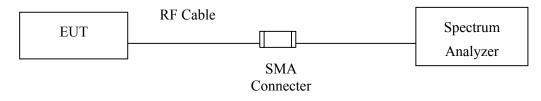
5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2013
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2013
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

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

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

5.2. Test Setup



5.3. Limits

According to FCC Section 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 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

5.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

5.5. Uncertainty

± 150Hz

5.6. Test Result of RF Antenna Conducted Test

Product	:	Notebook
Test Item	:	RF Antenna Conducted Test
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK)

Figure Channel 00:

	rum Analyzer - Swept SA								
(XI RL	RF 50 Ω AC	MILL_	SEN	ISE:INT	Avg Type:			PM Jul 22, 2013	Frequency
Center F	req 515.000000	PNO: Fast IFGain:Low	Trig: Free #Atten: 30		Avg type.	Log-Fwi	TY		
10 dB/div Log	Ref 20.00 dBm					Mł	(r1 833.4 -54.	51 MHz 56 dBm	Auto Tune
									Center Freq
10.0									515.000000 MHz
0.00									Start Freq
-10.0								-14.84 dBm	30.000000 MHz
-20.0									Stop Freq
-30.0									1.000000000 GHz
-40.0									CF Step 97.000000 MHz
-50.0							1		<u>Auto</u> Man
-60.0		il La little Harrison and Prior	letter _{tet} and an interplet	-		y Alama Na	li (da se sala p	a kin da dia ana	Freq Offset 0 Hz
-70.0									0 H2
Start 30.0 #Res BW		#VBW	1.0 MHz		\$	Sweep	Stop 1.0 90.0 ms (1	0000 GHz 0001 pts)	
MSG						STATU	JS		



gilent Spect	rum Analyzer - Sv RF 50			05	or with		101011		r
	RF 50 Freq 6.5000	00000 GH		Trig: Free	SE:INT	ALIGNAUTO : Log-Pwr	TRAC	PM Jul 22, 2013 E 1 2 3 4 5 6 PE M WWWWWW	Frequency
0 dB/div	Ref 20.00	IF	NO: Fast 🌩 Gain:Low	#Atten: 30		Mk	r1 2.40	er P NNNNN 2 5 GHz 16 dBm	Auto Tune
10.0	1								Center Fre 6.500000000 G⊦
0.0								-14.84 dBm	Start Fre 1.000000000 GH
0.0									Stop Fr 12.000000000 G
0.0									CF Ste 1.100000000 GI <u>Auto</u> M
D.O <mark>og skillend</mark>						pograpy) (ki to (12,50 pr , tra pograf dinensian an	a para ata dina data y Tang mponenanya kun		Freq Offs
'0.0									
tart 1.00 Res BW	00 GHz 100 kHz		#VBW	1.0 MHz		Sweep		.000 GHz 0001 pts)	
G						STATUS		• •	L

Agilent Spectrum Analyzer -					P
RE RF 50 Center Freq 18.50	PNO: Fast 😱	SENSE:INT Trig: Free Run #Atten: 30 dB	ALIGNAUTO Avg Type: Log-Pwr	10:14:20 PM Jul 22, 2013 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P N N N N N	Frequency
10 dB/div Ref 20.00	IFGain:Low	#Atten: 30 dB	Mkr	1 23.767 6 GHz -41.05 dBm	Auto Tun
10.0					Center Fre 18.500000000 GH
10.0				-14.84 dBm	Start Fre 12.000000000 G⊦
30.0					Stop Fre 25.000000000 G⊦
40.0		and the second			CF Ste 1.300000000 GH <u>Auto</u> Ma
60.0		and an all the second free spectra of the second			Freq Offs 0 H
-70.0				Stop 35 000 CH-	
Start 12.000 GHz #Res BW 100 kHz	#VBW	1.0 MHz	•	Stop 25.000 GHz 1.20 s (10001 pts)	
ISG			STATUS		

Product	:	Notebook
Test Item	:	RF Antenna Conducted Test
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK)

Figure Channel 39:

Agilent Spe											
IXI RL	RF	50 Ω			SEN	ISE:INT		LIGNAUTO		PM Jul 22, 2013	Frequency
Center	Freq	515.000		-1Z PNO: Fast 😱 IFGain:Low	Trig: Free #Atten: 30		Avg Type	: Log-Pwr	TYP	CE 123456 PE MWWWWW ET P NNNNN	
10 dB/div	Rei	⁻ 20.00 c						Mk	r1 965.5 -54.	65 MHz 12 dBm	Auto Tune
											Center Freq
10.0											515.000000 MHz
0.00											Start Free
-10.0										-13.65 dBm	30.000000 MH;
-20.0											Stop Free
-30.0											1.000000000 GH:
-40.0											CF Step 97.000000 MH
-50.0										1.	<u>Auto</u> Mai
60.0	manpha	al advertises	an a	ing a state of the second of t		a fairte talagar	p to the ball	an der Grent Genter	in harden	and station in pro-	Freq Offse
-70.0	free of a local de	en de la compañía de la	a ann ann an an								0 H
-10.0											
Start 30 #Res Bl			1	#VBW	1.0 MHz			Sweep	Stop 1.0 90.0 ms (1	0000 GHz	
MSG								STATU			L



RL	rum Analyzer - S RF 50	Ω AC		SEN	ISE:INT		ALIGN AUTO		PM Jul 22, 2013	E
enter F	req 6.5000	Р	lz NO: Fast ♀ Gain:Low	Trig: Free #Atten: 30		Avg Type	e: Log-Pwr	TRAC TYF DI	ETPNNNNN	Frequency
0 dB/div	Ref 20.00		Jam.Low				Mk		1 0 GHz 35 dBm	Auto Tun
10.0	1									Center Fre 6.500000000 GH
0.00									-13.65 dBm	Start Fre 1.000000000 Gi
0.0										Stop Fr 12.000000000 G
0.0 ———				er fostalisen er et al an						CF Ste 1.100000000 G <u>Auto</u> M
0.0 <mark>datus bi</mark>				and the process			n a ta politici ti dan Mana Manana Ata In	e popular and the field of the po- e popular is a standard and a standard and a standard and a standard and a standard a standard a standard a stand 		Freq Offs
0.0										
tart 1.00 Res BW	0 GHz 100 kHz		#VBW	1.0 MHz			Sweep		.000 GHz 0001 pts)	
G							STATUS			<u> </u>

Res BW 1	UU KIIZ	#VDVV	1.0 191112			aucob		0001 pts)	
tart 12.00		#\/D\M	1.0 MHz			Sween		.000 GHz 0001 pts)	
70.0									
60.0 	disc of the								Freq Offse 0 H
50.0		a state s		anthogolahata Protografia		and the second secon			<u>rato</u> Ma
40.0					a chung	. Helefilden de se	a man de la sulla fra	1	CF Ste 1.30000000 GH Auto Ma
30.0									25.000000000 GH
20.0									Stop Fre
10.0								-13.65 dBm	Start Fre 12.000000000 G⊦
0.00									Nation of the Constraint Constrai
10.0									Center Fre 18.500000000 GH
0 dB/div	Ref 20.00 dBm					Mkr		7 0 GHz 48 dBm	Auto Tun
	a 18.5000000	PNO: Fast IFGain:Low	Trig: Free F #Atten: 30 c		CIA INC.	. Log-i wi	TYP		
RL	RF 50 Ω AC		SENSI	E:INT	Avg Type:			PM Jul 22, 2013	Frequency

Product	:	Notebook
Test Item	:	RF Antenna Conducted Test
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK)

Figure Channel 78:

	trum Analyzer - Sv									
X/RL	RF 50			SEN	ISE:INT		ALIGN AUTO		M Jul 22, 2013	Frequency
Center	Freq 515.00		Z PNO: Fast 😱 Gain:Low	Trig: Free #Atten: 30		Avg Type	: Log-Pwr	TYP	E 1 2 3 4 5 6 E M WWWW T P N N N N N	Troquency
10 dB/div	Ref 20.00						Mk	(r1 920.8 -54.1	48 MHz 35 dBm	Auto Tune
										Center Free
10.0						·				515.000000 MH
0.00										Start Fre
10.0						1			-13.86 dBm	30.000000 MH
20.0 ——										Stop Fre
30.0								-		1.000000000 GH
40.0										CF Ste 97.000000 MH
50.0								_	_ 1—	<u>Auto</u> Ma
60.0	and a state of the		al sector platers	dan di kari fu		and being polition	Lines History	del <mark>aller a de la constante</mark> La constante de la constante de		Freq Offs
70.0										0 H
. 5.5										
Start 30.	.0 MHz V 100 kHz	1	#VBW	1.0 MHz			Sweep	Stop 1.0 90.0 ms (1	000 GHz	
ISG							STATL	•		



RL	RF 50 G			SEN	ISE:INT		ALIGN AUTO		M Jul 22, 2013	Frequency
enter F	req 6.5000	P	HZ NO: Fast 😱 Gain:Low	Trig: Free #Atten: 30		Avg Type	: Log-Pwr	TRAC TYF DE	E 1 2 3 4 5 6 E MWWWWW T P N N N N N	Frequency
0 dB/div	Ref 20.00	dBm					Mk		95 GHz 14 dBm	Auto Tun
08										Center Fre
10.0	∳ '									6.500000000 Gł
.00										Start Fro
0.0						1			-13.86 dBm	1.000000000 G
0.0										Stop Fr
0.0										12.000000000 G
0.0										CF St
										1.100000000 G <u>Auto</u> M
0.0	- La Alan	Destruction	A STREET OF STREET	a lan tinin tina ata ing Natari na ana ang kari	alateration de la de Compañía de la dela de la dela de la dela de la dela de		والمرابع والمعارك	- in bearing the	The design of the late	
0.0	and the second	a constraint and a second	Color IV			and the second second	ىد قائلىت ورىيىخى بى ا		and the second second second	Freq Offs 0
0.0										
tart 1.00	0.047							Stop 12	.000 GHz	
	100 kHz		#VBW	1.0 MHz			Sweep		000 GHZ	

SG						STATUS			
tart 12.000 G Res BW 100		#VBW	1.0 MHz			Sweep	Stop 25 1.20 s (1	.000 GHz 0001 pts)	
70.0									
50.0 manufactoria									Freq Offse 0 H
50.0	Friedrich and a statistic to		dispeters conth many transferre	ndin glippin la Spinning a bio	and a second	an Shinifati In an		and a second	Mato Ma
10.0						n datalista r con l	مراجع المرجع المثلول ورواني مرجع المراجع ال	Samelik ter ander	CF Ste 1.300000000 GF Auto Ma
30.0								1	25.00000000 GH
20.0									Stop Fre
10.0								-13.86 dBm	12.00000000 GH
0.00									Start Fre
10.0									18.50000000 GH
	20.00 0.011								Center Fre
0 dB/div Ref	20.00 dBm	-Gain:Low	#Atten: 50			Mkr		2 8 GHz 12 dBm	Auto Tur
enter Freq '		GHz PNO: Fast 😱 EGain:Low	Trig: Free #Atten: 30		Avg Type	: Log-Pwr	TYP	E 1 2 3 4 5 6 M WWWWW T P N N N N N	Frequency
RL RF	50 Ω AC		SEN	ISE:INT		ALIGN AUTO		PM Jul 22, 2013	Francisco

Product	:	Notebook
Test Item	:	RF Antenna Conducted Test
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK)

Figure Channel 00:

	rum Analyzer - Swept SA							
XIRL Center F	RF 50Ω AC req 515.000000 N	Hz		ISE:INT		LIGNAUTO	10:27:13 PM Jul 22, 2013 TRACE 1 2 3 4 5 6	Frequency
10 dB/div	Ref 20.00 dBm	PNO: Fast 😱 IFGain:Low	¹ Trig: Free #Atten: 30			Mk	түре Милини Deт Р NNNN -55.32 dBm	Auto Tun
10.0								Center Fre 515.000000 MH
10.00								Start Fre 30.000000 MH
20.0							-18.10 dBm	Stop Fre 1.000000000 GF
40.0								CF Ste 97.000000 Mi
50.0 <u> </u>	and part protocold to the standard and	ndan er fan sjit in sen win ek aladi	de mante proved la ba	and the later	ter la skil prositiviti	1	Later to the major of providing the second state	Auto Mi Freg Offs
70.0								01
tart 30.0 Res BW) MHz 100 kHz	#VBW	1.0 MHz			Sweep (Stop 1.0000 GHz 90.0 ms (10001 pts)	
MSG						STATU	s	



	um Analyzer - Swep								
Center F	RF 50 Ω req 6.500000	AC DOOD GHz PNO: Fast	 Trig: Free I	E:INT Run	Avg Type	ALIGNAUTO : Log-Pwr	TRAC	PM Jul 22, 2013 E 1 2 3 4 5 6 E MWWWWW	Frequency
10 dB/div	Ref 20.00 di	IFGain:Low	#Atten: 30	dB		Mk	r1 2.40 ⁻	1 4 GHz 90 dBm	Auto Tune
10.0	▲ ¹								Center Fre 6.500000000 GH
-10.0									Start Fre 1.000000000 G⊦
-20.0								-18.10 dBm	Stop Fre 12.000000000 GF
40.0									CF Ste 1.100000000 GF <u>Auto</u> M
60.0			engel feferform (started) og forskoller forsette forsette	¹⁹⁴ 0 (no by Chapter Cha Marine Manager Chapter Marine Manager Chapter		of the stand of the stand of the	en pala de la contra de la Callinga La manda de la contra de la contra de	ha fing ta ha sana a ta bata nan faktiya kan da sana ta	Freq Offs 0 H
-70.0									
Start 1.00 #Res BW		#VBW	1.0 MHz			Sweep		.000 GHz 0001 pts)	
MSG						STATUS			· · · · · · · · · · · · · · · · · · ·

Agilent Spectrum Analyzer - Swe					F
RL RF 50Ω Center Freq 18.5000	PNO: Fast 😱	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	10:27:47 PM Jul 22, 2013 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N N	Frequency
10 dB/div Ref 20.00 d	IFGain:Low	#Atten: 30 dB	Mkr	1 23.690 9 GHz -40.90 dBm	Auto Tun
10.0					Center Fre 18.500000000 GH
10.0					Start Fre 12.000000000 G⊦
20.0				-18.10 dBm	Stop Fre 25.000000000 G⊦
10.0				1	CF Ste 1.300000000 GF <u>Auto</u> Ma
					Freq Offs 0 ⊦
70.0					
Start 12.000 GHz #Res BW 100 kHz	#VBW	1.0 MHz	Sweep	Stop 25.000 GHz 1.20 s (10001 pts)	
ISG			STATUS	i i	

Product	:	Notebook
Test Item	:	RF Antenna Conducted Test
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK)

Figure Channel 39:

gilent Spect	rum Analyzer - Swept SA RF 50 Ω AC		SENSE			LIGN AUT C	10:36:43 PM	1400.0010	
	req 515.000000 M	PNO: Fast 😱	Trig: Free R #Atten: 30 d	lun	Avg Type:		TRACE TYPE	1 2 3 4 5 6 MWWWWW P NNNNN	Frequency
0 dB/div	Ref 20.00 dBm	IFGain:Low	#Atten: 30 d	в		М	kr1 902.90	Service Contractory	Auto Tun
.og 10.0									Center Fre 515.000000 M⊦
10.00									Start Fre 30.000000 MF
20.0								-19.04 dBm	Stop Fre 1.000000000 GH
0.0									CF Ste 97.000000 Mi <u>Auto</u> Mi
i0.0	entrelingelanderen i bereil fennen andere i de del	y kiy ka pangana sa		n estat pontel d	up ta di kyry i	a hasta keek	nee a fasti a para persa fin	y hand a state of a	Freq Offs
70.0									
tart 30.0 Res BW	0 MHz 100 kHz	#VBW	1.0 MHz		ş	Sweep	Stop 1.00 90.0 ms (100		
SG						STAT	US		



Agilent Spect	r um Analyzer - Sw RF 50 Ω			CEA	ISE:INT		ALIGNAUTO	10:20:001	PM JU 22, 2013	
	req 6.5000	00000 GH	Z 0: Fast 😱] Trig: Free	Run		: Log-Pwr	TRAC	E123456 EMW////////////////////////////////////	Frequency
10 dB/div	Ref 20.00	IFG	ain:Low	#Atten: 30	∣dB		Mk	r1 2.44	1 0 GHz 96 dBm	Auto Tun
10.0	▲1									Center Fre 6.500000000 G⊦
0.00										Start Fre 1.000000000 GI
30.0									-19.04 dBm	Stop Fr 12.000000000 GI
40.0										CF St 1.100000000 G <u>Auto</u> M
50.0 50.0				ergel INT - Biertieg Artist 1935 - Marine Brusie is anter		a da angenda da angenda Angenda da angenda da an		Philosofie and a fillen and a state of the s		Freq Offs 0
70.0										
Start 1.00 Res BW	0 GHz 100 kHz	1 I	#VBW	1.0 MHz		1	Sweep		.000 GHz 0001 pts)	
ISG							STATUS			D

gilent Spectrum Analyzer - Swep RL RF 50 Ω	AC AC	SENSE:INT	ALIGNAUTO	10:37:18 PM Jul 22, 2013	
Center Freq 18.50000		Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P N N N N N	Frequency
0 dB/div Ref 20.00 dE			Mkr	1 23.592 1 GHz -41.35 dBm	Auto Tun
10.0					Center Fre 18.50000000 GH
0.0					Start Fre 12.000000000 GF
0.0				-19.04 dBm	Stop Fre 25.00000000 GH
0.0	on also also a spinistica	Appleared Installation and added in a grade			CF Ste 1.300000000 GI <u>Auto</u> M
		n han an a			Freq Offs
70.0				Stop 25.000 GHz	
Res BW 100 kHz	#VBW	1.0 MHz	Sweep	1.20 s (10001 pts)	
SG			STATUS	6	

Product	:	Notebook
Test Item	:	RF Antenna Conducted Test
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK)

Figure Channel 78:

	100 kHz		#VBW	1.0 MHz			Sweep	90.0 ms (1		
tart 30.0) MHz							Stop 1.0	000 GHz	
0.0										
0.0	ll algesterreterreterrete	In the state of the state	nd geographic Papel Street Street Marine Street Street Street	phan Naglay applies have			and the part of the state	(all performance) en la trapération and a second performance a	initipipi opsigant. Normalista	Freq Offs 0
0.0								↓ 1		
0.0										97.000000 M Auto M
										CF St
0.0										1.000000000 G
0.0									-16.74 dBm	Stop Fr
0.0		-							40.74.40	30.000000 M
.00										Start Fr
0.0										Center Fr 515.000000 M
dB/div	Ref 20.00	dBm				Ι	1	-54.6	69 dBm	
		IF	Gain:Low	#Atten: 30	I dB		Mk	r1 802.5	08 MHz	Auto Tu
enter F	req 515.00		PNO: Fast 😱	Trig: Free		Avg Type	: Log-Pwr	TYP	E 1 2 3 4 5 6 E MWWWWW T P N N N N N	Frequency
RL	RF 50			SEN	ISE:INT		ALIGN AUTO		M Jul 22, 2013	Frequency



	rum Analyzer - Swept S								
Center F	RF 50Ω A req 6.5000000		SEN Trig: Free	Run	Avg Type	ALIGN AUTO : Log-Pwr	TRAC	PM Jul 22, 2013 E 1 2 3 4 5 6 E M WWWWW	Frequency
10 dB/div	Ref 20.00 dBr	IFGain:Low	#Atten: 30	dB		Mk	r1 2.479	9 5 GHz 26 dBm	Auto Tune
10.0	↓1				,				Center Fre 6.50000000 GH
-10.0									Start Fre 1.000000000 GH
-20.0								-16.74 dBm	Stop Fre 12.000000000 G⊦
40.0					5				CF Ste 1.100000000 GI <u>Auto</u> M
50.0 60.0			an a	Hanna ya Una basa ya ya ya ku Ya masa ya kuta ya kuta ya kuta		alagi segal fir		al din na alari manganan	Freq Offs
70.0									
Start 1.00 #Res BW		#VBW	1.0 MHz			Sweep		.000 GHz 0001 pts)	
MSG						STATUS			<u></u>

Agilent Spectrum Analyzer - Swej XI RL RF 50Ω					ſ
Center Freq 18.5000	PNO: Fast 😱	SENSE:INT Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr	10:40:54 PM Jul 22, 2013 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P N N N N N	Frequency
0 dB/div Ref 20.00 d	IFGain:Low	#Atten: 50 dB	Mkr	1 23.623 3 GHz -41.10 dBm	Auto Tun
10.0					Center Fre 18.500000000 GH
0.00					Start Fre 12.000000000 GF
30.0				-26.74 dBm	Stop Fre 25.000000000 GH
0.0	anten selete litte an er er filligete	and a start of the			CF Ste 1.300000000 Gi <u>Auto</u> Mi
	and a set for a set of a set o	_{The second se}			Freq Offs
70.0 Start 12.000 GHz Res BW 100 kHz	#\/P\//	1.0 MHz	Swaan	Stop 25.000 GHz 1.20 s (10001 pts)	
	#VDVV		Sweep	· · · · · · · · · · · · · · · · · · ·	

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, 2013
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2013
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

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., 2012
	Х	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2013
	Х	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2012
	Х	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2013
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	Х	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2013
	Х	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	Х	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

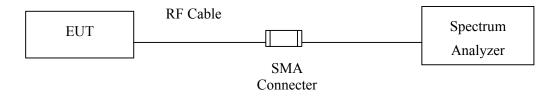
Note:

1. All equipments are calibrated every one year.

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

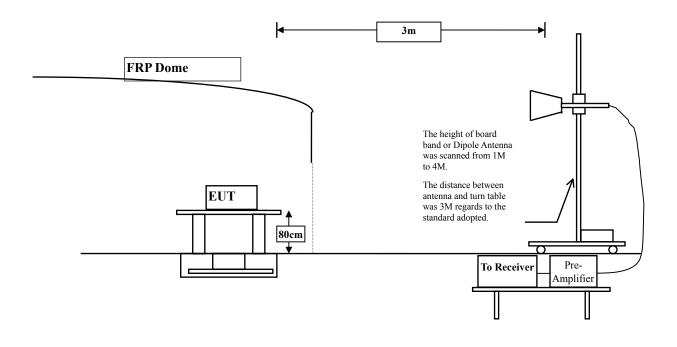
6.2. Test Setup

RF Conducted Measurement



RF Radiated Measurement:

Above 1GHz



6.3. Limit

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)).

6.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 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 can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2009 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz. The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

6.5. Uncertainty

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

6.6. Test Result of Band Edge

Product	:	Notebook
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2402	70.64	102.214	102.214	Peak
Horizontal	2402	57.21	88.784	88.784	Average
Vertical	2402	69.55	100.467	100.467	Peak
Vertical	2402	56.41	87.327	87.327	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	(dB) Band Edge Field Strength (dBuV/m)		Detector
Horizontal	2341.6	102.214	48.46	53.754	74.000	Peak
Horizontal	2342.1	88.784	46.5	42.284	54.000	Average
Vertical	2341.6	100.467	48.46	52.007	74.000	Peak
Vertical	2342.1	87.327	46.5	40.827	54.000	Average

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements

per the Marker-Delta Method with the following formula:

Band Edge field Strength = $F - \Delta$

F = Fundamental field Strength (Peak or Average)

 Δ = Conducted Band Edge Delta (Peak or Average)

ilent Spe R L	ectrum A	nalyzer - Sv F 50 :	vept SA		SEN	E:INT			ALIGN AUTO	03:19:3	3 PM Jul 22, 2013	[
			000000	GHz IFGain:Low	Trig: Free #Atten: 30	Run	Avg		Log-Pwr	TRA	CE 1 2 3 4 5 6 (PE MWWWWW) DET P N N N N N	Frequency
dB/div	v Re	ef 20.00	dBm						Mk		1 6 GHz 67 dBm	Auto Tu
												Center Fr
.0							Λ					2.390000000 G
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		and the second second		at the provide frankling	()	2		al man	water and the state of the state	- white and the state	- rener of the market	2.340000000 G
.0												Stop Fr
1.0												2.440000000 G
	2.3900 W 1.0	00 GHz MHz		#VB\	N 1.0 MHz			3	#Sweep		100.0 MHz (1001 pts)	CF St 10.000000 M
N	TRC SC 1 f			2 2 GHz	¥ 5.79 dB	m	INCTION	FUN	ICTION WIDTH	FUNCT	ION VALUE	<u>Auto</u> N
N N	1 f 1 f		2.39	0 0 GHz 1 6 GHz	-43.11 dB -42.67 dB	m m						Freq Offs
												0
, })												
) 1 2						_		-				
									STATUS			

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

Agilent Spectrum Analyzer - Swe					
Center Freq 2.3900	AC 00000 GHz	SENSE:INT	ALIGNAUTO Avg Type: Log-Pwr	03:18:58 PM Jul 22, 2013 TRACE 1 2 3 4 5 6 TYPE MWWWWW	Frequency
10 dB/div Ref 20.00 d	IFGain:Low	#Atten: 30 dB	MI	(r3 2.342 1 GHz -53.72 dBm	Auto Tune
Log 10.0 0.00 -10.0			1		Center Freq 2.390000000 GHz
-20.0 -30.0 -40.0 - 3		2			Start Fred 2.340000000 GHz
-50.0 +60.0 -70.0 -70.0	~				Stop Fred 2.440000000 GHz
Center 2.39000 GHz #Res BW 1.0 MHz	#VBV	V 10 Hz	Swee	Span 100.0 MHz 7.80 s (1001 pts)	CF Step 10.000000 MH: Auto Mar
1 N 1 f 2 N 1 f 3 N 1 f 4 5 6 8	2.402 0 GHz 2.390 0 GHz 2.342 1 GHz	-7.22 dBm -56.16 dBm -53.72 dBm			Freq Offset
7 8 9 10 11 12					
MSG			STATU	s	

Product	:	Notebook
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK)

Fundamental Filed Strength

Antenna	Frequency	Correction Factor	Reading Level	Emission Level	Detector
Pole	[MHz]	[dB/m]	[dBuV]	[dB(uV/m)]	
Horizontal	2480	71.48	103.636	103.636	Peak
Horizontal	2480	57.69	89.846	89.846	Average
Vertical	2480	71.12	102.532	102.532	Peak
Vertical	2480	57.68	89.092	89.092	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Δ (dB) Band Edge Field Strength (dBuV/m)		Detector
Horizontal	2484.9	103.636	46.04	57.596	74.000	Peak
Horizontal	2483.5	89.846	49.23	40.616	54.000	Average
Vertical	2484.9	102.532	46.04	56.492	74.000	Peak
Vertical	2483.5	89.092	49.23	39.862	54.000	Average

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

F = Fundamental field Strength (Peak or Average)

 Δ = Conducted Band Edge Delta (Peak or Average)

Agilent Spectrum Analyzer - Sw					
Center Freq 2.4835	2 AC 000000 GHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	03:35:13 PM Jul 22, 2013 TRACE 1 2 3 4 5 6 TYPE MWWWWW	Frequency
10 dB/div Ref 20.00	IFGain:Low ∽	#Atten: 30 dB	Mk	r3 2.484 9 GHz -38.31 dBm	Auto Tune
10.0 0.00					Center Free 2.483500000 GH
-20.0 -30.0 -40.0		3-		were all the set of th	Start Fre 2.433500000 GH
-50.0 -60.0 -70.0					Stop Fre 2.533500000 GH
Center 2.48350 GHz #Res BW 1.0 MHz		/ 1.0 MHz		Span 100.0 MHz 500 ms (1001 pts)	CF Ste 10.000000 MH
MKE MODE TEC SCL 1 N 1 f 2 N 1 f 3 N 1 f 4 - - - 5 - - - 6 - - -	× 2.480 2 GHz 2.483 5 GHz 2.484 9 GHz	7.74 dBm 42.27 dBm -38.31 dBm	INCTION FUNCTION WIDTH	FUNCTION VALUE	Auto Ma Freq Offse 0 H
7 8 9 10 11 12					
MSG			STATUS		

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

-	P111 100 0010		ALIGNAUTO				<u></u>		a <mark>lyzer - S</mark> w	i <mark>m Ana</mark> RE	Spectru	ilent R L
Frequency	PM Jul 22, 2013 CE 1 2 3 4 5 6 PE MWWWWW	TRAC	e: Log-Pwr	Avg T	ENSE:INT	Trig: Fre	Hz	00000 G			er Fre	
Auto Tun	3 5 GHz 82 dBm	r2 2.48	Mk			#Atten: 3	Gain:Low	201702	20.00	Ref	/div) dB
Center Fre 2.483500000 GH												0.0 - 0.00 - 0.00 -
Start Fr 2.433500000 G					A2							0.0 0.0 - 0.0 -
Stop Fr 2.533500000 G					-							0.0 0.0 0.0
CF St 10.000000 M	100.0 MHz (1001 pts)	7.80 s (10 Hz	#VBW		0 GHz /IHz	1.0 N	BW 1	Res
Auto M	ON VALUE	FUNCTIL	NCTION WIDTH	FUNCTION	dBm dBm	-5.59 d -54.82 d	0 GHz 5 GHz			f	ide tro N 1 N 1	1 2
Freq Offs 0												3 4 5 6 7
												8 9 0 1
1			STATUS									2 G

Product	:	Notebook
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2402	68.25	99.824	99.824	Peak
Horizontal	2402	53.34	84.914	84.914	Average
Vertical	2402	67.46	98.377	98.377	Peak
Vertical	2402	52.9	83.817	83.817	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)Δ (dB)Band EdgeΔ (dB)Field Strength (dBuV/m)		Limit (dBuV/m)	Detector	
Horizontal	2341.8	99.824	47.09	52.734	74.000	Peak
Horizontal	2342	84.914	44.7	40.214	54.000	Average
Vertical	2341.8	98.377	47.09	51.287	74.000	Peak
Vertical	2342	83.817	44.7	39.117	54.000	Average

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = $F - \Delta$

F = Fundamental field Strength (Peak or Average)

 Δ = Conducted Band Edge Delta (Peak or Average)

rilent Spe R L		RF		AC				9	ENSE:INT			ALIGN AUTO	03:46:50	PM Jul 22, 2013	-
enter	Frec	2.	3900	0000		lz ain:Low	Ģ	Trig: Fr #Atten:	ee Run 30 dB	Av	у Тур	e: Log-Pwr	TY	ET P NNNN	Frequency
) dB/div	R	ef 2	0.00 d	:IBm								Mk		1 8 GHz 25 dBm	Auto Tur
										1					Center Fr
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.0															Stop Fr
0.0		-								-					2.440000000 G
enter : tes Bi						#VI	BW	1.0 MH	z			#Sweep		00.0 MHz 1001 pts)	CF St 10.000000 M
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5															0
7 3															
1															
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Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

RL RF 50	IQ AC	SENSE:INT	ALIGN AUTO	03:46:16 PM Jul 22, 2013	
enter Freq 2.390			Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N N	Frequency
Mkr3 2.342 0 GHz موط8/div Ref 20.00 dBm -54.42 dBm					Auto Tur
29 0.0 00			1		Center Fre 2.390000000 GF
0.0 0.0 0.0					Start Fro 2.340000000 Gi
0.0 0.0 0.0		2			Stop Fr 2.44000000 G
enter 2.39000 GHz Res BW 1.0 MHz		V 10 Hz	Sweep	Span 100.0 MHz 7.80 s (1001 pts)	CF Sto 10.000000 M
R MODE TRC SCL 1 N 1 f 2 N 1 f	× 2.402 0 GHz 2.390 0 GHz	-9.72 dBm -55.99 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> M
3 N 1 f 4 5 6 8	2.342 0 GHz	-54.42 dBm			Freq Offs 0
7					
2					