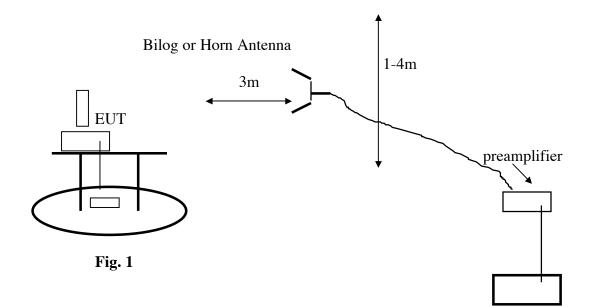
2.4 GHz HAN Radio Emissions Test Results

TEST RESULTS Radiated Test Set-up, 30-26 GHz



Test Procedures

Radiated emissions generated by the transmitter portion of the EUT were measured.

1. The EUT was placed on a wooden table resting on a turntable on the test site. The search antenna was placed 3m from the EUT. The EUT antenna was mounted in the with the EUT TX antenna pointed directly to the search antenna.

2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205.

3. Emissions were investigated to the 10^{th} harmonic of the fundamental.

5. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

Test Results: Worst-case results are presented. Refer to data sheets below. Restricted band emissions meet 54 dBuV/m. Other undesired emissions from the transmitter meet the -20 dBc requirement in 15.247(d).

15.205 Restricted Frequency Bands

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505 (1)	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	
13.36 - 13.41	322 - 335.4		

15.209 General Field Strength Limits

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

🔆 Agilent Freq/Channel R T Project: 08U11890 Mkr1 2.378 00 GHz Center Freq 2.3500000 GHz Ref 120 dBµ∨ #Atten 0 dB 59.42 dBµ∀ #Peak Log Start Freq 2.31000000 GHz 10 dB/ Offst 33.4 Stop Freq 2.3900000 GHz dB DI 74.0 CF Step 8.0000000 MHz dBµ∨ LgAv <u>Auto</u> Man • S1 V2 S3 FC sol. Freq Offset 0.00000000 Hz ≈(f): FTun Signal Track On <u>Off</u> Swp Start 2.310 00 GHz Stop 2.390 00 GHz #Res BW 1 MHz #VBW 1 MHz Sweep 1 ms (601 pts) Copyright 2000-2007 Agilent Technologies

LOW Channel, Peak, Vertical

LOW Channel, Peak, Horizontal

🔆 Agilent						R	? Т	Freq/Channel
Project: 08U′ Ref 120 dB µ′ #Peak		#Atten 0 dB			Mkr1	2.384 27 59.61		Center Freq 2.3500000 GHz
Log 10 dB/ Offst								Start Freq 2.31000000 GHz
33.4 dB DI								Stop Freq 2.3900000 GHz
74.0 dBµ∨ LgAv							1	CF Step 8.0000000 MHz <u>Auto Man</u>
S1 V2 //// S3 FC	nder Mandrad	ich physicanal and an	edgeneren en	whether was not	hty on the second	ann an Anna an Anna an Anna Anna Anna A	whethere	Freq Offset 0.00000000 Hz
×(f): FTun Swp ──								Signal Track ^{On <u>Off</u>}
Start 2.310 0 #Res BW 1 1			¥VBW 1 M⊦	lz	Stop 3 Sweep 1	2.390 00 ms (601		
Copyright 200	00-2007 A(gilent Technolo	gies					-

2.4 GHz HAN Radio Band Edge Emissions

🔆 Agilent		RT	Freq/Channel
Project: 08U11890 Ref 120 dB µ∨ #Peak	#Atten 0 dB	Mkr1 2.384 40 GHz 48.72 dBµ∀	Center Freq 2.35000000 GHz
Log 10 dB/ Offst			Start Freq 2.31000000 GHz
33.4 dB DI			Stop Freq 2.39000000 GHz
54.0 dBµ∨ LgAv			CF Step 8.00000000 MHz <u>Auto Ma</u>
S1 V2		÷	Freq Offset 0.00000000 Hz
×(f): FTun Swp			Signal Track On <u>Of</u>
Start 2.310 00 GH; #Res BW 1 MHz	z #VBW 10 Hz	Stop 2.390 00 GHz Sweep 6.238 s (601 pts)	

LOW Channel, Average, Vertical

LOW Channel, Average, Horizontal

🔆 Agilent		RT	Freq/Channel
Project: 08U11890 Ref 120 dB µ∨ #Peak	#Atten 0 dB	Mkr1 2.384 27 GHz 48.23 dBµ∀	Center Freq 2.35000000 GHz
Log 10 dB/ Offst			Start Freq 2.31000000 GHz
33.4 dB DI			Stop Freq 2.39000000 GHz
54.0 dBµ∀ LgAv			CF Step 8.00000000 MHz <u>Auto Man</u>
S1 V2 S3 FC			Freq Offset 0.00000000 Hz
»(f): FTun Swp			Signal Track On <u>Off</u>
Start 2.310 00 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 2.390 00 GHz Sweep 6.238 s (601 pts)	
Copyright 2000-2007 /	Agilent Technologies		

2.4 GHz Band Edge

2475.4 MHz, Peak, Vertical

🔆 Agilent 17:2	4:16 Oct 31, 2008			RΤ	Peak Search
Ref107dBµ∨ #Peak	#Atten 0 dB		Mkr1 2	.483 704 GHz 60.75 dBµ∨	Next Peak
Log 10 dB/ Offst					Next Pk Right
34.3 dB					Next Pk Left
74.0 dBµ∨ LgAv	en al fra al il dia ang dahaling ang dalam si kan al il Sur pingkangan generating ng tang ng tang ng tang si kang si ka		hall hereby a grad	in and the state of the state	Min Search
51 V2 53 FC					Pk-Pk Search
×(f): =Tun Swp					Mkr © Cl
Start 2.483 500 G #Res BW 1 MHz		BW 1 MHz	Stop 2 Sweep 1.02 n	.500 000 GHz 1s (1701 pts)	More 1 of 2
Copyright 2000-20	007 Agilent Technologi	es			

2475.4 MHz, Peak, Horizontal

🔆 Agilent 17	:26:58 Oct 31, 2008			RΤ	Peak Search
Ref107dBµ∨ #Peak	#Atten 0 dB		Mkr1 2	2.484 024 GHz 60.49 dBµ∀	Next Peak
Log 10 dB/ Offst					Next Pk Right
34.3 dB DI					Next Pk Left
74.0 dBµ∨ ♀ LgAv	white and approximate a state provide	an an a share an a s	making dinastrophysik	ntrital for a large part	Min Search
S1 M2 S3 FC AA					Pk-Pk Search
≈(f): FTun Swp					Mkr © CF
Start 2.483 500 #Res BW 1 MH		/BW 1 MHz	Stop 2 Sweep 1.02 n	500 000 GHz ns (1701 pts)	More 1 of 2
Copyright 2000	-2007 Agilent Technolog	ies			

2.4 GHz Band Edge

2475.4 MHz, Average, Vertical

🔆 Agilent 17	7:23:51 Oct 31,	2008				R	Т	Peak Search
Ref107 dBµ∨ #Peak	#Atter	n0 dB			Mkr1 2.	.483 529 48.45 d		Next Peak
Log 10 dB/ Offst								Next Pk Right
34.3 dB DI								Next Pk Left
54.0 dBµ∨ LgAv								Min Search
S1 V2 S3 FC AA								Pk-Pk Search
	33529000	GHz						Mkr © CF
.48 Start 2.483 500 #Res BW 1 Mi		#V	BW 10 Hz	Swee	Stop 2. ep 1.287 s	.500 000 s (1701 p		More 1 of 2
Copyright 2000	-2007 Agilent To	echnologie	es					

2475.4 MHz, Average, Horizontal

🔆 Agilent 17:27:	22 Oct 31, 2008			RΤ	Peak Search
Ref 107 dBµ∨ #Peak	#Atten 0 dB		Mkr1 2	.483 500 GHz 49.05 dBµ∨	Next Peak
Log 10 dB/ Offst					Next Pk Right
34.3 dB DI					Next Pk Left
54.0 dBµ∨ LgAv					Min Search
S1 V2 S3 FC AA					Pk-Pk Search
×(f): FTun Swp					Mkr © CF
Start 2.483 500 GH #Res BW 1 MHz		/BW 10 Hz	Stop 2 Sweep 1.287	.500 000 GHz [*] s (1701 pts)	More 1 of 2
Copyright 2000-200	7 Agilent Technologi	es			

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Silver Spring Networks FCC ID: OWS-NIC508 Model: 174-000084

2.4 GHz Band Edge

HIGH Channel, Peak, Vertical

🔆 Agilent 17:18:07	Oct 31, 2008			RT	Peak Search
Ref 107 dBµ∨ #Peak	#Atten 0 dB		Mkr1 2	.483 820 GHz 63.71 dBµ∨	Next Peak
Log 10 dB/ Offst					Next Pk Right
34.3 dB DI					Next Pk Left
74.0 dBµ∨ LgAv		Alexanorpation Medical Arrivat	yaraha layan kira tiraki sarigan	in the second	Min Search
S1 V2 S3 FC AA					Pk-Pk Search
×(f): FTun Swp					Mkr © CF
Start 2.483 500 GHz #Res BW 1 MHz	#VI	BW 1 MHz	Stop 2 Sweep 1.02 n	.500 000 GHz 1s (1701 pts)	More 1 of 2
Copyright 2000-2007	Agilent Technologie	es			

HIGH Channel, Peak, Horizontal

🔆 Agilent 17:0	08:28 Oct 31, 2008			RT	Peak Search
Ref 107 dBµ∨ #Peak	#Atten 0 dB		Mkr1 2.	483 578 GHz 66.84 dBµ∨	Next Peak
Log 10 dB/ Offst					Next Pk Right
34.3 dB DI					Next Pk Left
74.0 dBµ∨ LgAv	Monture planter and and provide	ushanduorina distri huko je fineri	uisina, jar <mark>antan ta</mark> in	and that we have descent where	Min Search
S1 V2 S3 FC AA					Pk-Pk Search
≈(f): FTun Swp					Mkr © CF
Start 2.483 500 (#Res BW 1 MHz		BW 1 MHz	Stop 2. Sweep 1.02 m	500 000 GHz is (1701 pts)	More 1 of 2
Copyright 2000-2	2007 Agilent Technologi	es			

Silver Spring Networks FCC ID: OWS-NIC508 Model: 174-000084 2.4 GHz Band Edge

🔆 Agilent 17:17:4	5 Oct 31, 2008	, 8		RΤ	Peak Search
Ref 107 dBµ∨ #Peak	#Atten 0 dB		Mkr1 2.483 52	500 GHz .77 dBµ∨	Next Peak
Log 10 dB/ Offst					Next Pk Right
34.3 dB DI					Next Pk Left
54.0 dBµ∨ LgAv					Min Search
51 V2 53 FC AA					Pk-Pk Search
«(f): =Tun Swp					Mkr © Cl
Start 2.483 500 GHz #Res BW 1 MHz		#VBW 10 Hz	Stop 2.500 Sweep 1.287 s (17		More 1 of 2
Copyright 2000-2007	Agilent Technolo	ogies			-

High Channel, Horizontal, Average

🔆 Agilent 17:13:5	0 Oct 31, 2008			RΤ	Peak Search
Ref 107 dBµ∨ #Peak	#Atten 0 dB		Mkr1 2.483 52.7	500 GHz 75 dBµ∀	Next Peak
Log 10 dB/ Offst					Next Pk Right
34.3 dB DI					Next Pk Left
54.0 IBµ∨ _gAv					Min Search
S1 V2 S3 FC AA					Pk-Pk Search
*(f): =Tun Swp					Mkr © C
Start 2.483 500 GH; #Res BW 1 MHz		W 10 Hz	Stop 2.500 (Sweep 1.287 s (17)		More 1 of 2
Copyright 2000-2007	7 Agilent Technologie:	S			

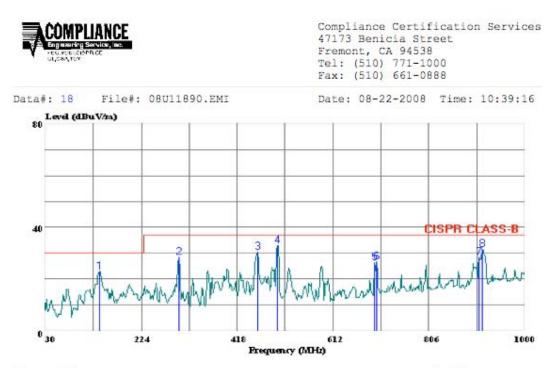
2.4 GHz HAN Radiated Spurious, LOW, MID, HIGH Channels

	High l	Frequency N	Vaciate Aeasurement vices, Morga					,	,						
Company: Project #: Date: Fest Engin Configura Mode:	neer:		Silver Spring 08U11890 8/15/08 Thanh Nguyen EUT at Y positi Transmit 2.4Gl	ion											
lest Equi	pment:														
Но	rn 1-18	GHz	Pre-an	nplifer	1-260	GHz	Pre-amp	lifer 26	6-40GHz		Н	orn > 18	GHz		
	N: 2238 @ ency Cables	3m 🚽	T144 N	liteq 30	08A009	31 🖵			•	_				-	
	2 foot	cable	3	foot c	able		12	foot c	able		HPF	R	eject Filte		eak Measurements BW=VBW=1MHz
Gord	don 187:	207002				-	Gordon	20313	4001 👻	HP	F_4.0GHz	-		Ave	rage Measurements =1MHz ; VBW=10Hz
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
-		TS107=11	ubu (ub/m	ub	ub	ub	up	ubu v/m	ubu v/m	ubu v/m	ubu v/m	u D	ub	(())
CH 2405.8	MHz	1010/-11	ATS112 =9												
.812	3.0	45.55	35.38	33.0	10.9	-36.5	0.0	0.6	53.6	43.4	74	54	-20.4	-10.6	v
2.026	3.0	42.53	29.04	37.5	16.1	-35.4	0.0	0.9	61.6	48.1	74	54	-12.4	-5.9	V
.812	3.0	45.6	35.5	33.0	10.9	-36.5	0.0	0.6	53.7	43.5	74	54	-20.3	-10.5	Н
2.027	3.0	41.9	29.0	37.5	16.1	-35.4	0.0	0.9	61.0	48.1	74	54	-13.0	-5.9	Н
		TS107=18	ATE 112 0												
Channel 1 .882	2440.8M	43.35	ATS 112=9 32.69	33.1	10.9	-36.5	0.0	0.6	51.5	40.8	74	54	-22.5	-13.2	v
.322	3.0	43.35	30.99	35.5	10.9	-36.2	0.0	0.6	55.4	40.8	74	54	-18.6	-13.2	v
2.204	3.0	41.28	28.63	37.4	16.2	-35.4	0.0	0.9	60.4	47.8	74	54	-13.6	-6.2	V
.882	3.0	43.26	33.21	33.1	10.9	-36.5	0.0	0.6	51.4	41.4	74	54	-22.6	-12.6	Н
2.204	3.0	41.67	29.67	37.4	16.2	-35.4	0.0	0.9	60.8	48.8	74	54	-13.2	-5.2	Н
hannel S hannel 24			ATS112=9												
.962	3.0	45.13	34.13	33.1	11.0	-36.5	0.0	0.6	53.4	42.4	74	54	-20.6	-11.6	v
.443	3.0	41.86	30.12	35.6	12.7	-36.2	0.0	0.6	54.6	42.9	74	54	-19.4	-11.1	V
2.405	3.0	41.85	29.12	37.4	16.3	-35.4	0.0	0.9	61.1	48.3	74	54	-12.9	-5.7	V
.962	3.0	45.92	36.38	33.1	11.0	-36.5	0.0	0.6	54.2	44.7	74	54	-19.8	-9.3	Н
.443	3.0	43.33	32.81	35.6	12.7	-36.2	0.0	0.6	56.1	45.6	74	54	-17.9	-8.4	Н
2.405	3.0	41.85	29.12	37.4	16.3	-35.4	0.0	0.9	61.1	48.3	74	54	-12.9	-5.7	Н
	Dist Read AF	Measuremer Distance to A Analyzer Re Antenna Fac Cable Loss	Antenna ading			Amp D Corr Avg Peak HPF	Average I	Correct Field St	to 3 meters rength @ 3 Field Streng			Avg Lim Pk Lim Avg Mar Pk Mar	Peak Field Margin vs.	eld Strength Strength Lin Average Li Peak Limit	nit

Radiated Emissions, 2475. 4 MHz

	nce Cert	ification Ser	Aeasurement vices, Fremo		hambe	r										
Company Project #: Date: 10/3 Test Engin Configura Mode: TX Model NI FCC ID: (<u>Test Equi</u>	0 31/2008 neer: Chi ation: X, Zibee C 508 OWS-NIC	-	rks													
	rn 1-18 N: 6717 @	-		nplifer Aiteq 30			Pre-amp	lifer 20	6-40GHz		_	H	orn > 18	GHz	-	
	2 foot	cable	3	foot c	able	-	Chan A-5m C		Cables		HP	HPF F_4.0GHz	-	eject Filte	R Ave	ak Measurements BW=VBW=1MHz rage Measurements =1MHz ; VBW=10Hz
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak		Avg	Pk Lim	Avg Lim		Avg Mar	Notes
GHz High Ch, 2	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dł	BuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
4.951	3.0	46.7	37.5	33.9	7.0	-36.5	0.0	0.6	51.8		42.6	74	54	-22.2	-11.4	Н
7.426	3.0	42.3	32.5	36.3	8.5	-36.2	0.0	0.6	51.5		41.7	74	54	-22.5	-12.3	Н
4.951 7.426	3.0	45.0 41.5	36.0	33.9 36.3	7.0	-36.5 -36.2	0.0	0.6	50.1 50.7		41.1 39.7	74 74	54 54	-23.9 -23.3	-12.9 -14.3	V V
Rev. 10.15.	08											1				
	Dist Read AF	Measuremen Distance to Analyzer Re Antenna Fac Cable Loss	ading			Amp D Corr Avg Peak HPF	Average I	Correct Field St d Peak	to 3 meters rength @ 3 Field Streng	m			Avg Lim Pk Lim Avg Mar Pk Mar	Peak Field Margin vs.	ield Strength Strength Lir Average Lir Peak Limit	nit

Radiated Emissions 30-1000 MHz



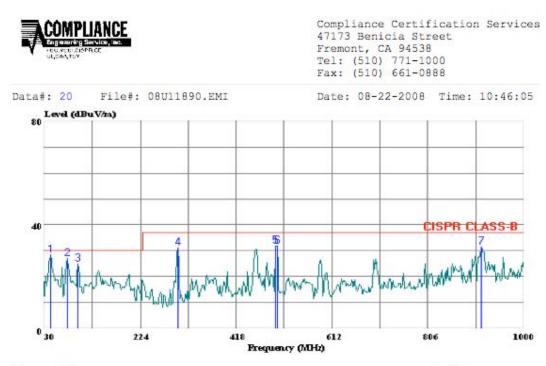
Trace: 17

Ref Trace:

Condition: CISP	R CLASS-B HORIZONTAL
Test Operator::	William Zhuang
Project #: :	
Company: :	Silver Spring
Configuration::	EUT with Laptop
Mode : :	Tx, 802.15.4 2.4GHz, Ch. 1 Max Power
Target: :	CISPR Class B

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	-
1	138.640	40.80	-17.92	22.88	30.00	-7.12	Peak
2	300.630	43.90	-15.47	28.43	37.00	-8.57	Peak
3	458.740	41.47	-11.00	30.47	37.00	-6.53	Peak
4	499.480	42.80	-9.87	32.93	37.00	-4.07	Peak
5	696.390	32.75	-6.42	26.33	37.00	-10.67	Peak
6	701.240	33.00	-6.29	26.71	37.00	-10.29	Peak
7	906.880	30.55	-2.22	28.33	37.00	-8.67	Peak
8	914.640	33.74	-2.06	31.68	37.00	-5.32	Peak

Page: 1



Trace: 19

Ref Trace:

Condition: CISPR CLASS-B VERTICAL Test Operator:: William Zhuang Project #: : 08U11890 Company: : Silver Spring Configuration:: EUT with Laptop Mode : : : Tx, 802.15.4_2.4GHz, Ch. 1 Max Power Target: : : CISPR Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	-
1	43.580	49.03	-20.69	28.34	30.00	-1.66	Peak
2	75.590	50.64	-23.54	27.10	30.00	-2.90	Peak
3	96.930	46.65	-21.85	24.80	30.00	-5.20	Peak
4	300.630	46.56	-15.47	31.09	37.00	-5.91	Peak
5	497.540	41.95	-9.94	32.01	37.00	-4.99	Peak
6	502.390	41.69	-9.83	31.86	37.00	-5.14	Peak
7	914.640	33.72	-2.06	31.66	37.00	-5.34	Peak

6dB Bandwidth for DTS Test Requirement: FCC: 15.247 (a)2 IC: RSS-210 Sec. 6.2.2(o)(iv)

Test Set-up



Test Procedures

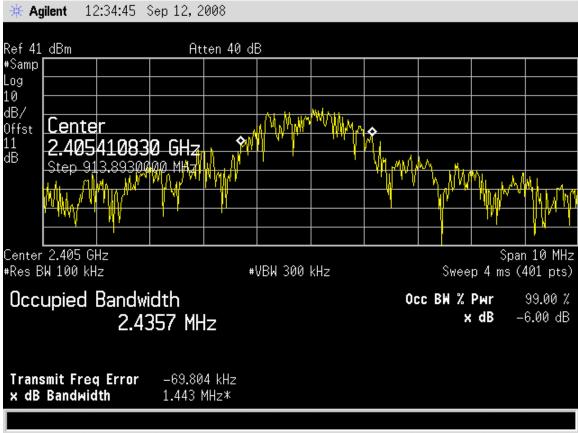
A modified EUT with a coaxial cable attached to the radio antenna port was configured on a test bench. The cable's SMA connector was connected to the spectrum analyzer. The EUT transmission was continuous at the LOW channel. While the transmitter broadcast a steady stream of digital data, the analyzer OCCUPIED BW function was activated to measure 6 dB BW and 99% BW.

Test was repeated for MID and HIGH channels.

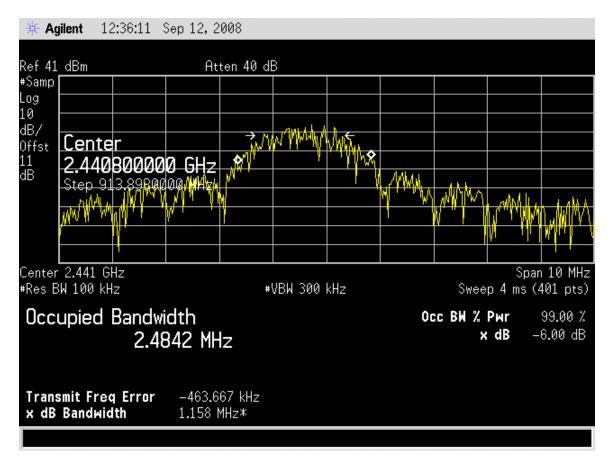
Test Results. No non-compliance noted. Refer to data sheets below.

Minimum 6 dB BW: 1.158 MHz Minimum Required: 500 kHz

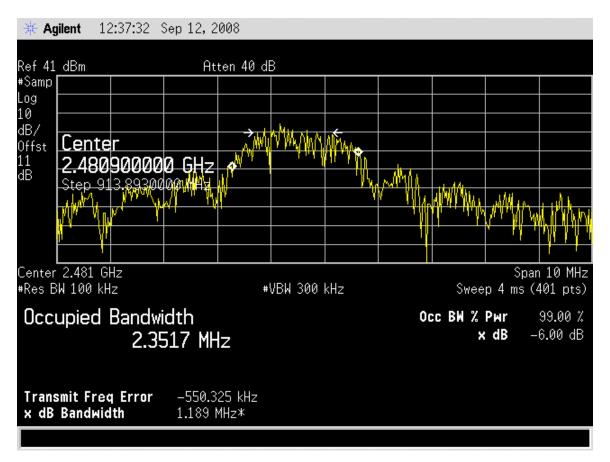
6dB Bandwidth LOW Channel



6 dB BW, MID Channel



6 dB BW, HIGH Channel



99% Bandwidth

Test Setup



Limit

None: for reporting purposes only.

Test Procedure

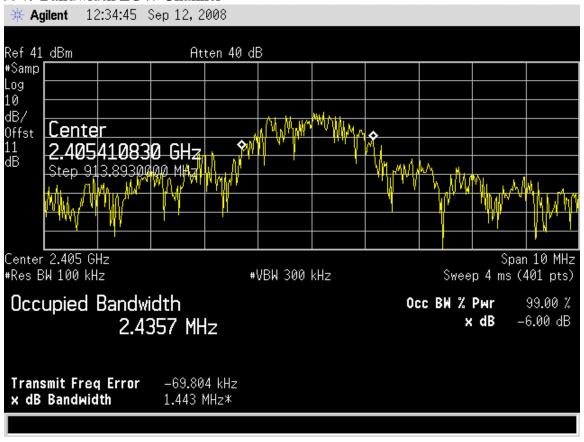
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal OCCUPIED BW function was utilized.

Test Results

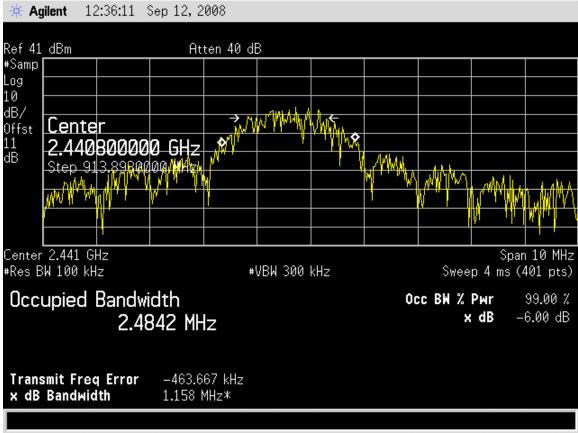
Refer to spectrum analyzer charts below. 99% bandwidth approximately 2.4 MHz.

Emission Designator: 2M40G1D

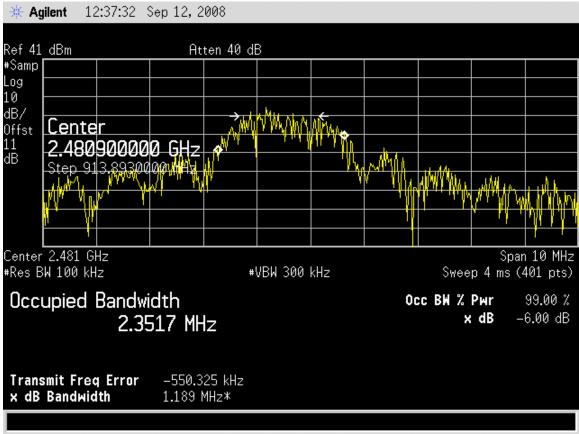
99% Bandwidth LOW Channel



99% Bandwidth MID Channel



99% Bandwidth HIGH Channel



RF Power Output Test Requirement: FCC: 15.247(b)

IC: RSS-210 Sec. 6.2.2(o)(iv)

Test Setup



Test Procedures

1. The EUT was configured on a test bench. RBW was set to a value higher than the 2.5 MHz 99% band width: RBW=3 MHz, VBW=8 MHz

2. The spectrum analyzer detector was set to PEAK and the highest value was recorded using the analyzer PEAK SEARCH function.

Test Results

Refer to spectrum analyzer graphs. Reference level offset corrects for external attenuation and cable loss.

Channel	Frequency, MHz	Output Power, dBm
Low	2405.8	23.49
Mid	2440.8	23.01
High-1	2475.4	22.67
High	2480.9	15.86

Note: Highest channel output power limited by band edge considerations. Output power setting for all other channels is ATS112=9, approximately 23 dBm.

🔆 Agilent 12	2:20:41 Sep	27,2008				RТ		
Ref 30 dBm		Att	en 20 dB			М	kr1 2.404 23	97 GHz 49 dBm
#Peak Log					L			
10 dB/								
Offst 20.9 dB								
4D		M						
LgAv								
M1 S2								
S3 FC AA								
¤(f): FTun								
Swp								
Center 2.405 80	GHz						Spa	n 20 MHz
#Res BW 3 MH;	2		i	#VBW 5 N	Hz	Swe	ep 1 ms (6	01 pts)

Peak Output Power LOW Channel

Peak Output Power MID Channel

🔆 Agilent 11:	55:22 Sep	27,2008		RT					
Ref 30 dBm		Att	ten 20 dB				М	kr1 2.439 23.	83 GHz .01 dBm
#Peak Log									
10 dB/									
Offst 20.9 dB									
LgAv									
V1 S2									
S3 FC AA									
¤(f): FTun									
Swp									
Center 2.440 80 #Res BW 3 MHz	GHz			#VBW 5 M	IHz		Swe	Span Span Sp1ms(6	n 20 MHz 01 pts)

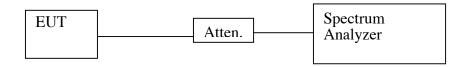
Peak Output Power 2475.4 MHz

🔆 Agilent 18:30	0:42 Oct 31, 2008			RΤ	Peak Search
Ref 30 dBm #Peak	Atten 30 dB		Mkr1	2.474 83 GHz 22.67 dBm	Next Peak
Log 10 dB/ Offst					Next Pk Right
11				~	Next Pk Left
#PAvg					Min Search
V1 S2 S3 FC AA					Pk-Pk Search
¤(f): FTun Swp					Mkr © CF
Center 2.475 40 (#Res BW 3 MHz		V 5 MHz	Sweep 1	Span 20 MHz ms (601 pts)	More 1 of 2
Copyright 2000-20	007 Agilent Technologies		-		

Peak Output Power HIGH Channel

🔆 Agilent 18:4	5:17 Oct 31, 2008			RΤ	Peak Search
Ref 30 dBm #Peak	Atten 30 dB		Mkr1	2.479 78 GHz 15.86 dBm	Next Peak
Log 10 dB/ Offst		•			Next Pk Right
dB					Next Pk Left
#PAvg					Min Search
V1 S2 S3 FC AA					Pk-Pk Search
¤(f): FTun Swp					Mkr © CF
Center 2.479 88 #Res BW 3 MHz		BW 5 MHz	Sweep 1	Span 20 MHz ms (601 pts)	More 1 of 2
Copyright 2000-20	007 Agilent Technologi	es			

Test Setup



Test Procedure

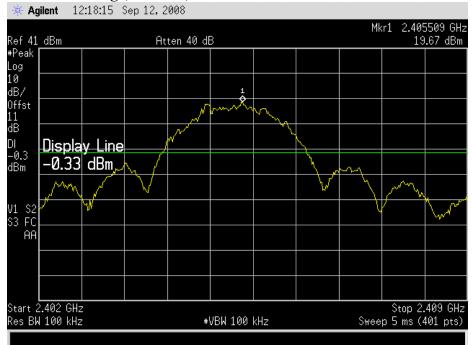
1. The EUT was configured on a test bench. The cable was connected between the EUT antenna port and the spectrum analyzer input port.

Spectrum analyzer RES BW was set to 100 kHz. While the transmitter broadcast a steady stream of digital data, the analyzer MAX HOLD function was used to capture the envelope of the transmission.

Readings were taken out to 10fo.

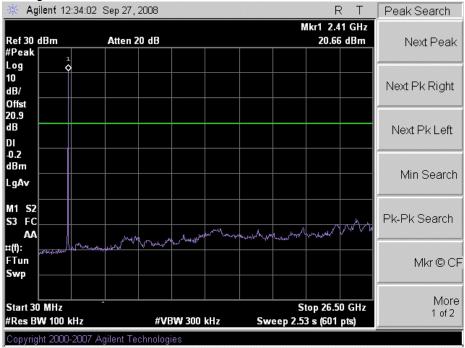
Test Results

Refer to spectrum analyzer plots. Data shows out of band emissions are suppressed well below the -20 dBc minimum required by the Rules.



Lower band edge, -20 dBc, LOW Channel

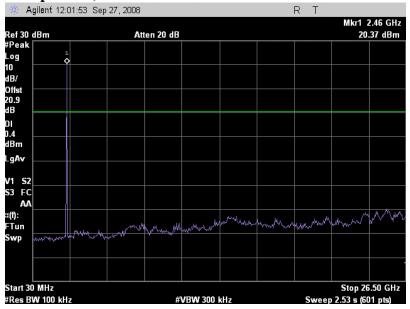
TX Spurious Emissions LOW Channel



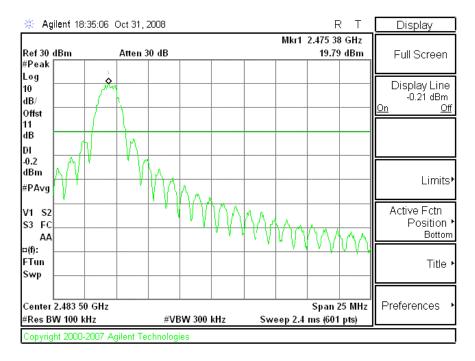
-20 dBc MID Channel Reference



TX Spurious, MID Channel

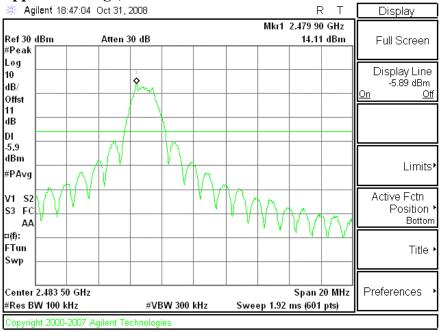


2475.4 MHz -20 dBc



TX Spurious, 2475.4 MHz

🔆 Agilent 18	:35:43 Oct 31, 2008			RΤ	Marker
Ref 30 dBm #Peak □	Atten 30 dB		Mk	ar1 11.15 GHz -45.05 dBm	Select Marker <u>1 2 3 4</u>
Log 10 dB/ Offst					Normal
11 dB DI					Delta
-0.2 dBm #PAvg					Delta Pair (Tracking Ref) Ref <u>∆</u>
V1 S2 S3 FC AA		1. • 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	when he was a short when	and the second s	Span Pair ^{Span <u>Center</u>}
¤(f): FTun Swp	And the second s		a monthe antipation		Off
Start 30 MHz #Res BW 100 k	Hz #\	/BW 300 kHz	Steep 2.482	top 26.00 GHz ^ 2 s (601 pts)	More 1 of 2
Copyright 2000-	2007 Agilent Technolo	gies			



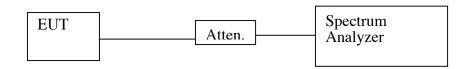
Upper band edge, -20 dBc HIGH Channel

TX Spurious, HIGH Channel

🔆 Agil	ent 18:4	7:44 C	oct 31, 2	2008					F	R T	M	arker	
Ref30d #Peak ∏	Bm		Atten 3	0 dB		1	1	N	45.73		Selec 1 2	t Marko <u>3</u>	er 4
Heak Log 10 dB/ Offst												Nori	ma
11 dB DI												De	əlta
-5.9 dBm #PA∨g												Delta P cking Re	
V1 S2 S3 FC AA			2			weather ward	hanne Mar	of share stronge	Now-yedre Marily	~~~~	: Span	Span F <u>Cer</u>	
¤(f): FTun Swp –	Landrahand	م م	****	₩°₩ <u>₩</u>									Off
_ Start 30 #Res BW		z		#VI	BW 300	kHz	Swe		top 26.0 2 s (601			M 1 o	ore if 2
Copyrigh	t 2000-2	007 Ag	ilent Te	chnolog	ies								

Power Spectral Density Test Requirement: 15.247(e) RSS-210 Sec. 6.2.2(o)(iv)

Test Setup



Test Procedure

1. Determine frequency at which maximum emission occurs during pre-scan.

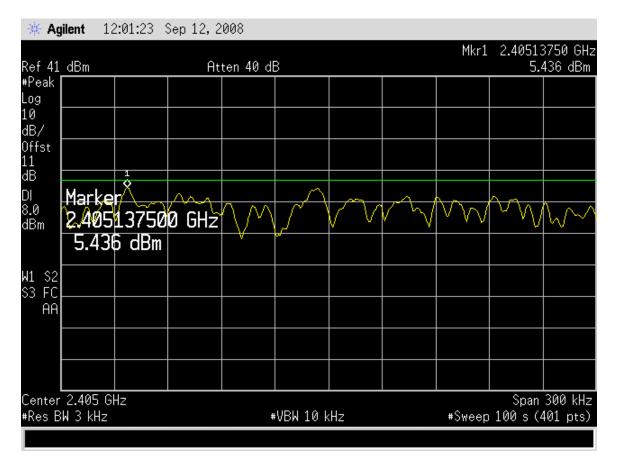
2. Reduce SPAN to 300 kHz, while adjusting tuning frequency so that peak remains at center of screen.

3. Set RES BW = 3 kHz, VID BW = 10 kHz, SWEEP = 100 sec.

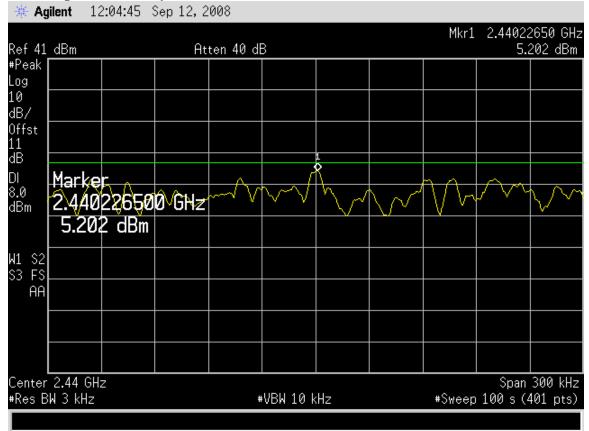
4. Record highest reading and compare to 8 dBm limit.

Test Results

Maximum PSD was 5.4 dBm. Refer to attached spectrum analyzer chart.



Power Spectral Density LOW Channel



Power Spectral Density MID Channel

🔆 Agilent 18:33:34 Oct 31, 2008 Peak Search R Т Mkr1 2.475 533 8 GHz Ref 20 dBm Atten 20 dB 4.44 dBm Next Peak #Peak Log 10 Next Pk Right dB/ Offst 11 dB Next Pk Left DL 8.0 dBm Min Search #PAvg M1 S2 Pk-Pk Search \$3 FC AA ¤(f): f>50k Mkr © CF Swp More Center 2.475 533 3 GHz Span 300 kHz 1 of 2 #Res BW/3 kHz #Sweep 100 s (601 pts) #VBW 10 kHz Copyright 2000-2007 Agilent Technologies

Power Spectral Density 2475.4 MHz

🔆 Ag	ilent 18	:44:23 (Oct 31, 2	2008					F	хт	Peak Search
#Peak				Mk ten 20 dB					79 910 9 -2.43	GHz dBm	Next Peak
Log 10 dB/ Offst						1					Next Pk Right
dB DI	\sim	\sim	~v~	\sim	V~{V	W	Vvv	M		A	Next Pk Left
8.1 dBm #PA∨g											Min Search
M1 S2 S3 FC AA											Pk-Pk Search
⊏(f): f>50k Swp											Mkr © CF
	Center 2.479 883 3 GHz Res BW 3 kHz #VBW				BW 10 k	Hz	#Sw		Span 3(0 s (601		More 1 of 2
<u> </u>	Copyright 2000-2007 Agilent Technologies										

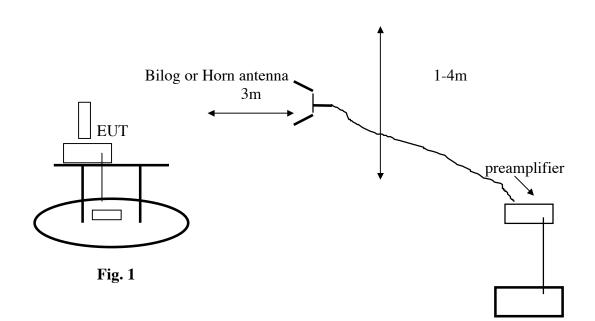
Power Spectral Density HIGH Channel

RF Exposure (MPE) Calculations

Silver Spring I	Networks									
FCC ID: OWS-	-NIC507									
IC: 5975A- N	IC507									
Utility Meter \	WLAN Transcei	ver	2.4 GHz			Calculate mW/cm	2 here. Enter fr	equency in MHz		
RF Hazard Dis	tance Calculati	ion				Calculation of Limi	ts from 1.1310 T	able 1		
									Controlled	Uncontrolled
									Ave 6 min	Ave 30 min
mW/cm2 from	n Table1:	1.00	(E: 61 V/m)			F(MHz)	Actual F, MHz			Gen, mW/cm2
						0.3-3	0.5		100.0	100.0
		MPE distance		Comment		3.0 - 30.0	5		180.0	36.0
P, dBm	G, dBi	cm	at 20 cm			30.0-300	55		1.0	0.2
						300-1500	902		3.0	0.60
24.3	1.0	5.2	0.07			1500-100000	5555		5.0	1.0
							E an de la rete al Dara	Fatas dDas	E an in a la set M/a t	
						Enter P(mW)	Equivalent dBm	Enter dBm	Equivalent Wat	ts
Basis of Calcu						64	18.1	18.1	64.6	
Basis of Calcu	lations:					04	10.1	10.1	64.6	
E^2/3770 = S	mW/cm2									
	itts*Ggain*30)	\ 5/d meters								
	G*30)/3770*S)		Pwatts*Ggain = 1	$ $ 0 \wedge (PdBm-30 $+$ C	dBi)/10)					
	log (MPE dist/		rwatts Gyain –							
NOTE: For m	bile or fixed l	cation transmi	ttere minimum e	naration distan	ce is for ECC	compliance is 20 cr				
			distance is less				·,		+	
		1	1	1						
			1	1			1			
			1	1			1		1	
				1					1	
1			1	1			1			
		1	1	1		1	1		1	
	1	1		1	I	1	1		1	

FREQUENCY HOPPING SPREAD SPECTRUM RADIO EMISSIONS

Silver Spring Networks FCC ID: OWS-NIC508 Model: 174-000084 TEST RESULTS Radiated Test Set-up, 30 MHz-26 GHz



Test Procedures

Radiated emissions generated by the transmitter portion of the EUT were measured.

1. The EUT was placed on a wooden table resting on a turntable on the test site. The search antenna was placed 3m from the EUT. The EUT antenna was mounted in the with the EUT TX antenna pointed directly to the search antenna.

2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205.

3. Emissions were investigated to the 10^{th} harmonic of the fundamental.

6. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

Test Results: Worst-case results are presented. Refer to data sheets below. Restricted band emissions meet 54 dBuV/m. Other undesired emissions from the transmitter meet the -20 dBc requirement in 15.247(d).

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505 (1)	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	
13.36 - 13.41	322 - 335.4		

15.205 Restricted Frequency Bands

15.209 General Field Strength Limits

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

Radiated Emissions Above 1 GHz, Low Channel

Complia			Aeasurement vices, Morga		pen Fi	eld Site										
Company Project #: Date: Test Engi Configura Mode:	neer:		Silver Spring 08U11890 8/15/08 Thanh Nguyen EUT at Y posit Transmit													
Test Equi	pment:															
Но	rn 1-18	GHz	Pre-ar	nplifer	1-260	GHz	Pre-amp	lifer 2	6-40GHz			н	orn > 18	GHz		
	N: 6717 @		T144 N	liteq 30	08A009	931 🖕			-						-	
_	ency Cables		3	foot c	able	-	12 f Gordon	i <mark>oot c</mark> 20313			HPI	HPF F_1.5GHz	₹	eject Filte	R Ave	eak Measurements BW=VBW=1MHz rage Measurements =1MHz ; VBW=10Hz
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m		vg iV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Setting A	TTS112	=20														()
		Iz ATS 107= 0														
2.707 3.609	3.0	50.72 42.15	46.90 30.69	29.2 31.6	8.6 9.6	-37.4 -36.9	0.0	0.6 0.6	51.6 47.0		7.8 5.5	74	54 54	-22.4	-6.2 -18.5	V V
.512	3.0	42.15	33.48	33.0	9.0	-36.5	0.0	0.6	50.0		5.5 1.2	74	54	-27.0	-18.5	V
.414	3.0	42.43	33.55	33.8	11.2	-36.3	0.0	0.5	51.6		2.7	74	54	-22.4	-11.3	v
.121	3.0	40.70	29.31	35.5	13.1	-36.2	0.0	0.7	53.7		2.3	74	54	-20.3	-11.7	v
.023	3.0	40.31	28.15	36.5	13.5	-36.7	0.0	0.7	54.4	4	2.2	74	54	-19.6	-11.8	Noise floor
.707	3.0	53.06	51.24	29.2	8.6	-37.4	0.0	0.6	54.0	5	2.2	74	54	-20.0	-1.8	Н
.609	3.0	42.18	33.75	31.6	9.6	-36.9	0.0	0.6	47.0		8.6	74	54	-27.0	-15.4	Н
.512	3.0	43.67	36.12	33.0	10.6	-36.5	0.0	0.6	51.3		3.8	74	54	-22.7	-10.2	Н
.414	3.0	43.65	36.85	33.8	11.2	-36.3	0.0	0.5	52.8		6.0	74	54	-21.2	-8.0	Н
.121	3.0	43.89 41.43	34.97 28.02	35.5 36.5	13.1 13.5	-36.2 -36.7	0.0	0.7 0.7	56.9 55.5		8.0 2.1	74 74	54 54	-17.1	-6.0 -11.9	H Noise floor
.025	5.0	41.45	28.02	30.5	13.5	-30.7	0.0	0.7	55.5	4	2.1	/4	54	-16.5	-11.9	Noise noor
	f Dist Read AF CL	Measuremen Distance to Analyzer Re Antenna Fao Cable Loss	eading			Amp D Corr Avg Peak HPF	Average F	Correct Field St I Peak	to 3 meters rength @ 3 Field Streng	m			Avg Lim Pk Lim Avg Mar Pk Mar	Peak Field Margin vs.	eld Strength Strength Lin Average Lin Peak Limit	nit

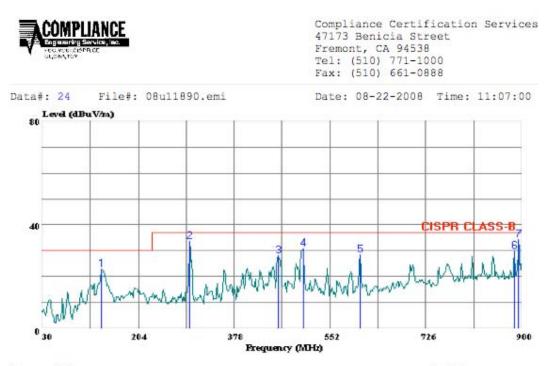
Compliar			Aeasurement vices, Morga	n Hill ()	nen Fi	eld Site										
•			, 0		•	ciu site										
Company:			Silver Spring	Network	1											
Project #:			08U11890													
Date: Test Engir			8/15/08													
Configura			Thanh Nguyen													
Mode:	tion:		EUT at Y posit Transmit MID		914.95N	IHZ										
Test Equip	oment:															
Ho	rn 1-18	GHz	Pre-an	nplifer	1-260	GHz	Pre-amp	lifer 26	6-40GHz			Н	orn > 18	GHz		
	N: 6717 @	•	T144 N	liteq 30	08A009	931 🖕			-						•	
' Hi Freque	ency Cables		,				,								_	
:	2 foot	cable	3	footc	able		12	footc	able			HPF	Re	eject Filte		e <u>ak Measurements</u> BW=VBW=1MHz
		•				-	Gordon	20313	4001		HPI	F_1.5GHz	-			rage Measurements =1MHz ; VBW=10Hz
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak		Avg	Pk Lim	Avg Lim		Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	d	BuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
Mid CH 91																
Power Se																
	setting A	ATS107=42														
2.744	3.0	54.03	52.29	29.3	8.7	-37.4	0.0	0.6	55.1		53.4	74	54	-18.9	-0.6	v
3.660	3.0	48.72	44.62	31.7	9.7	-36.9	0.0	0.6	53.8		49.7	74	54	-20.2	-4.3	V
4.575 7.319	3.0	41.50 44.99	29.09 37.88	33.1 35.0	10.7 12.7	-36.5 -36.2	0.0	0.6	49.3 57.1		36.9 49.9	74	54 54	-24.7 -16.9	-17.1 -4.1	V V
8.234	3.0	44.99	30.32	35.0	12.7	-36.2	0.0	0.6	57.1		49.9	74	54	-16.9	-4.1	v
9.149	3.0	39.90	28.09	36.5	13.6	-36.7	0.0	0.7	54.1		43.5	74 74	54	-20.5	-10.5	v Noise floor
2.744	3.0	47.37	43.10	29.3	8.7	-37.4	0.0	0.6	48.4		44.2	74	54	-25.6	-9.8	Н
3.660	3.0	50.90	44.53	31.7	9.7	-36.9	0.0	0.6	56.0	<u> </u>	49.6	74	54	-18.0	-4.4	Н
4.575	3.0	42.73	33.78	33.1	10.7	-36.5	0.0	0.6	50.5		41.6	74	54	-23.5	-12.4	Н
7.319 8.234	3.0	47.15 43.94	41.87 35.94	35.0 35.6	12.7	-36.2 -36.3	0.0	0.6	59.2 57.1	-	53.9 49.1	74	54 54	-14.8 -16.9	-0.1 -4.9	H
8.234 9.149	3.0	43.94 40.89	35.94 28.54	35.6	13.1	-36.3	0.0	0.7	57.1	\vdash	49.1	74	54	-16.9	-4.9	H Noise floor
	0.0	10102	2010-1	UUL	1010	2017	010	011			-207	/•		1015	110	10000 1000
	f	Measuremer	nt Frequency			Amp	Preamp G	ain					Avg Lim	Average F	ield Strength	Limit
	Dist	Distance to				D Corr			to 3 meters				Pk Lim		Strength Lir	
	Read	Analyzer Re				Avg			rength @ 3				Avg Mar		Average Li	
	AF	Antenna Fac							Field Streng				U			int
	AF CL	Antenna Fac Cable Loss	ctor			Peak HPF	High Pass		Field Streng	gth			Pk Mar	wargin vs.	Peak Limit	
1							-									

Radiated Emissions Above 1 GHz, Mid Channel

omplia			Aeasurement vices, Morga		pen Fi	eld Site										
T73; S/	neer: ation:	IGHz ≌3m →		sition	926.866 1-26 0	GHz	Pre-amp	lifer 20	6-40GHz ▼			Н	orn > 18	GHz	•	
	2 foot	cable		s foot c	able	•	12 f Gordon	foot c 20313			HPI	HPF F_1.5GHz	₹ ₹	eject Filte	RB Aver	ak <u>Measurements</u> W=VBW=1MHz age <u>Measurements</u> 1MHz ; VBW=10Hz
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	A	vg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBı	ıV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
		FS112=20														
		ATS107=82														
.781	3.0	47.5	43.7	29.4	8.7	-37.4	0.0	0.6	48.7		4.9	74	54	-25.3	-9.1	V
.707	3.0	42.1 43.8	32.1 37.3	31.8	9.7 10.7	-36.8 -36.5	0.0	0.6	47.4		7.4 5.2	74 74	54 54	-26.6	-16.6 -8.8	V V
.415	3.0	42.6	30.7	35.0	10.7	-36.2	0.0	0.6	54.8		2.9	74	54	-19.2	-11.1	v
3.342	3.0	41.1	28.7	35.7	13.2	-36.3	0.0	0.7	54.4		2.0	74	54	-19.6	-12.0	v
-	2.0	51.05	40.04	20.4	0.5	27.6		0.6	53.1	-		= 1		-		
2.781 3.707	3.0	51.85 46.10	49.04 39.90	29.4 31.8	8.7 9.7	-37.4	0.0	0.6	53.1 51.4		0.3 5.2	74	54 54	-20.9 -22.6	-3.7	<u>н</u> н
.634	3.0	47.20	42.86	33.1	10.7	-36.5	0.0	0.6	55.1		0.8	74	54	-18.9	-3.2	Н
.415	3.0	42.27	29.33	35.0	12.7	-36.2	0.0	0.6	54.4		1.5	74	54	-19.6	-12.5	Н
3.342	3.0	40.75	28.92	35.7	13.2	-36.3	0.0	0.7	54.0	4	2.2	74	54	-20.0	-11.8	Н
	f Dist Read AF CL	Measuremer Distance to A Analyzer Re Antenna Fac Cable Loss	Antenna ading			Amp D Corr Avg Peak HPF	Average F	Correct Field St d Peak	to 3 meters rength @ 3 Field Streng	m			Avg Lim Pk Lim Avg Mar Pk Mar	Peak Field	eld Strength I Strength Lim Average Lim Peak Limit	iit

Radiated Emissions Above 1 GHz, High Channel

Radiated Emissions Below 1 GHZ

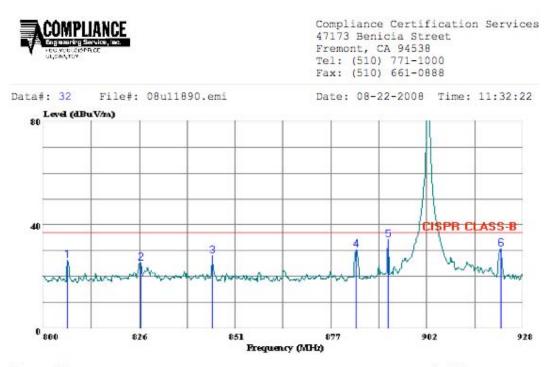


Trace: 23

Ref Trace:

Condition: CISPR CLASS-B HORIZONTAL Test Operator:: William Zhuang Project #: : 08U11890 Company: : Silver Spring Configuration:: EUT with Laptop Mode : : : Tx, 900MHz, Hopping Max Power Target: : CISPR Class B

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	137.880	40.83	-17.92	22.91	30.00	-7.09	Peak
2	297.090	49.38	-15.65	33.73	37.00	-3.27	Peak
3	458.040	39.10	-11.01	28.09	37.00	-8.91	Peak
4	503.280	40.50	-9.82	30.68	37.00	-6.32	Peak
5	605.940	36.93	-8.39	28.54	37.00	-8.46	Peak
6	886.080	32.61	-2.65	29.96	37.00	-7.04	Peak
7	894.780	36.66	-2.40	34.26	37.00	-2.74	Peak

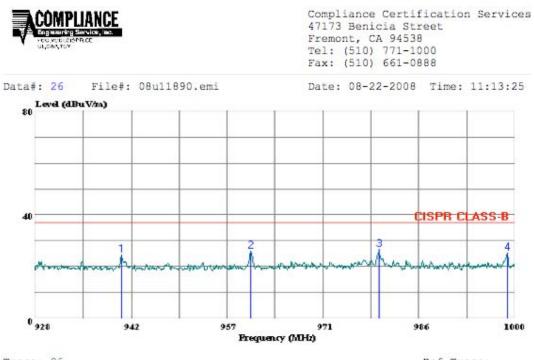


Trace: 31

Ref Trace:

Condition: CISPR CLASS-B HORIZONTAL Test Operator:: William Zhuang Project #: : 08U11890 Company: : Silver Spring Configuration:: EUT with Laptop Mode : : : Tx, 900MHz, Hopping Max Power Target: : CISPR Class B

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
13	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	806.272	30.81	-4.35	26.46	37.00	-10.54	Peak
2	825.856	29.17	-3.96	25.21	37.00	-11.79	Peak
3	845.056	31.69	-3.59	28.10	37.00	-8.90	Peak
4	883.584	33.13	-2.72	30.40	37.00	-6.60	Peak
5	892.032	36.84	-2.49	34.36	37.00	-2.64	Peak
6	922.112	32.54	-1.83	30.71	37.00	-6.29	Peak

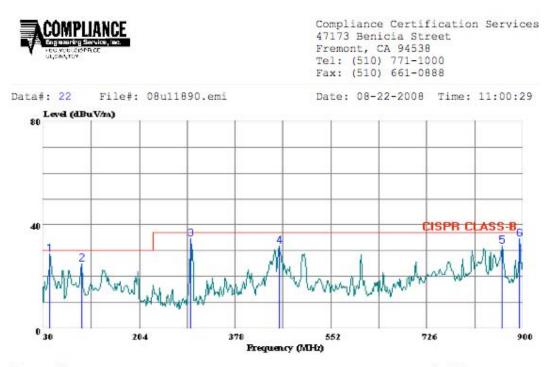


Trace: 25

Ref Trace:

Condition: CISPR CLASS-B HORIZONTAL Test Operator:: William Zhuang Project #: : 08U11890 Company: : Silver Spring Configuration:: EUT with Laptop Mode : : : Tx, 900MHz, Hopping Max Power Target: : CISPR Class B

	Freq	Read Level	Factor	Level	Limit Line		Remark
	MHz	dBuV	dB	dBuV/m	$\overline{dBuV/m}$	dB	-
1	940.888	25.96	-1.53	24.43	37.00	-12.57	Peak
23	960.328	27.13	-1.01	26.12	37.00	-10.88	Peak
3	979.624	27.31	-0.70	26.61	37.00	-10.39	Peak
4	998.848	25.71	-0.30	25.41	37.00	-11.59	Peak

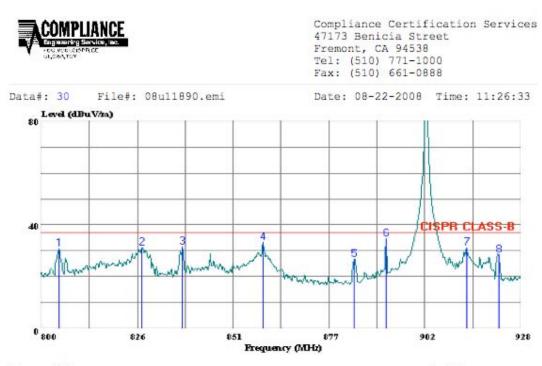


Trace: 21

Ref Trace:

Condition: CISPR CLASS-B VERTICAL Test Operator:: William Zhuang Project #: : 08U11890 Company: : Silver Spring Configuration:: EUT with Laptop Mode : : : Tx, 900MHz, Hopping Max Power Target: : CISPR Class B

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
13	MHz	dBuV	dB	dBuV/m	$\overline{dBuV/m}$	dB	-
1	42.180	48.70	-19.82	28.89	30.00	-1.11	Peak
2	98.730	46.34	-21.40	24.94	30.00	-5.06	Peak
3	297.090	50.18	-15.65	34.53	37.00	-2.47	Peak
4	458.040	42.79	-11.01	31.78	37.00	-5.22	Peak
5	862.590	34.91	-3.16	31.75	37.00	-5.25	Peak
6	894.780	37.05	-2.40	34.65	37.00	-2.35	Peak

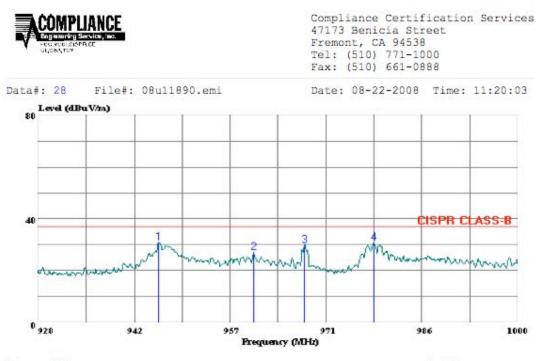


Trace: 29

Ref Trace:

Condition: CISPR CLASS-B VERTICAL Test Operator:: William Zhuang Project #: : 08U11890 Company: : Silver Spring Configuration:: EUT with Laptop Mode : : : Tx, 900MHz, Hopping Max Power Target: : CISPR Class B

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
18	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	-
1	804.736	35.12	-4.40	30.72	37.00	-6.28	Peak
2	826.880	35.19	-3.94	31.25	37.00	-5.75	Peak
3	837.632	35.11	-3.73	31.38	37.00	-5.62	Peak
4	859.136	36.57	-3.22	33.35	37.00	-3.65	Peak
5	883.584	29.47	-2.72	26.75	37.00	-10.25	Peak
6	892.032	37.07	-2.49	34.59	37.00	-2.41	Peak
7	913.536	33.20	-2.07	31.13	37.00	-5.87	Peak
8	922.112	30.29	-1.83	28.46	37.00	-8.54	Peak



Trace: 27

Ref Trace:

Condition: CISPR CLASS-B VERTICAL Test Operator:: William Zhuang Project #: : 08U11890 Company: : Silver Spring Configuration:: EUT with Laptop Mode : : : Tx, 900MHz, Hopping Max Power Target: : CISPR Class B

	Freq	Read Level	Factor	Level	Limit Line		Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	946.072	32.15	-1.41	30.73	37.00	-6.27	Peak
2	960.328	27.90	-1.01	26.89	37.00	-10.11	Peak
3	968.032	30.85	-0.93	29.92	37.00	-7.08	Peak
4	978.328	31.51	-0.75	30.76	37.00	-6.24	Peak

20 dB Bandwidth

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to approximately 5% of the 20 dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

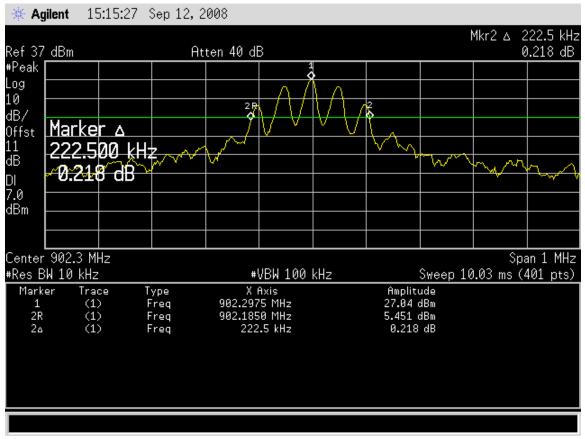
RESULTS

No non-compliance noted:

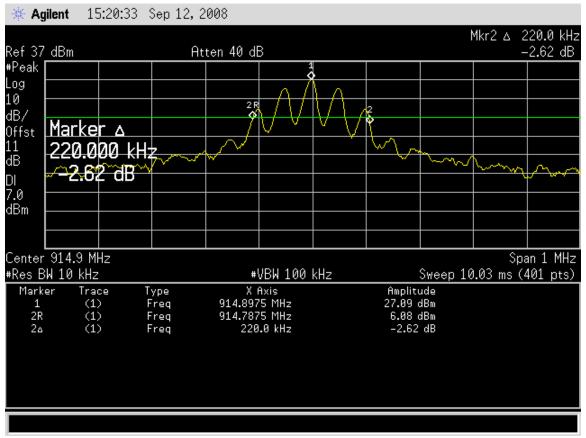
Channel	Frequency	20 dB Bandwidth
	(MHz)	(kHz)
Low	902.3	222.5
Middle	914.9	220
High	926.9	215

Emission Designator: 223KF1D

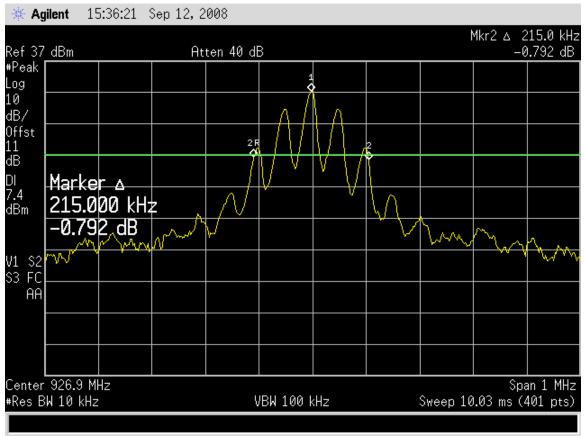
20 dB BANDWIDTH LOW CHANNEL



20 dB BANDWIDTH MID CHANNEL



20 dB BANDWIDTH HIGH CHANNEL



HOPPING FREQUENCY SEPARATION

<u>LIMIT</u>

§15.247 (a) (1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

TEST PROCEDURE

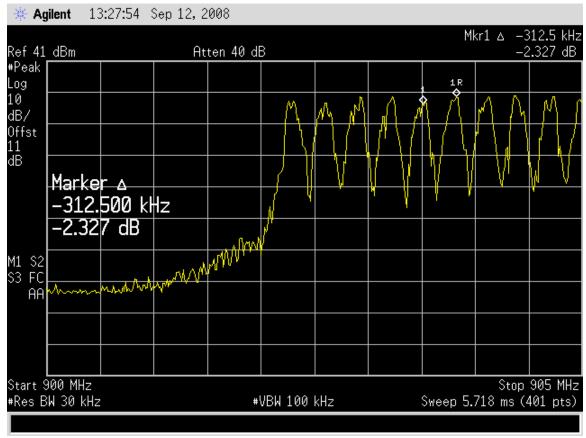
The transmitter output is connected to a spectrum analyzer. The RBW is set to 10 kHz and the VBW is set to 30 kHz. The sweep time is coupled.

RESULTS

No non-compliance noted:

The separation is 312.5KHz.

HOPPING FREQUENCY SEPARATION



NUMBER OF HOPPING CHANNELS

LIMIT

§15.247 (a) (1) (i) For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

TEST PROCEDURE

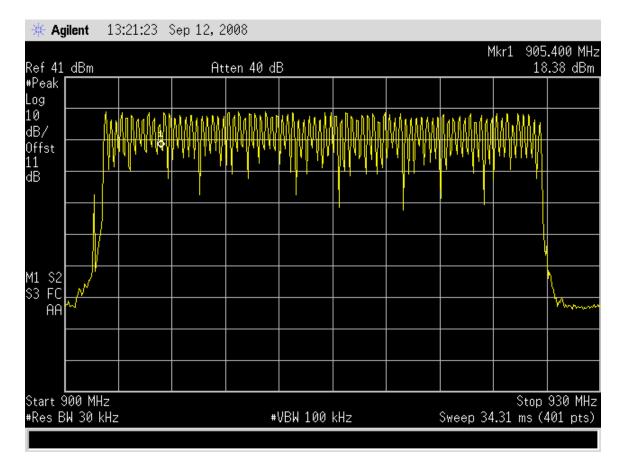
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to 3 % of the span. The analyzer is set to Max Hold.

RESULTS

No non-compliance noted:

83 Channels observed.

NUMBER OF HOPPING CHANNELS



AVERAGE TIME OF OCCUPANCY

LIMIT

§15.247 (a) (1) (i) For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 20 second scan, to enable resolution of each occurrence.

RESULTS

No non-compliance noted:

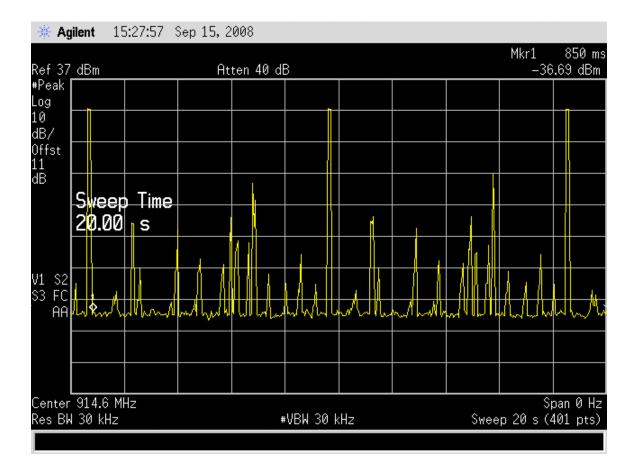
There are 3 pulses within the 20-second period. The on time for each pulse is 90 msec.

Therefore, the average time of occupancy in the specified 20-second period is 270 sec.

PULSE WIDTH

🔆 🔆 Ag	jilent 15	5:04:29	Sep 12, 2	008					
Ref 41	dBm		At	ten 40 df	3			Mkr1 ∆	90 ms 0.36 dB
#Peak Log									
10 dB/									
Offst 11 dB									
dВ	Marke	r 🛆 📉							
	90.00	00000	0 ms						
	0.38	5 dB							
V1 S2 S3 FC	mhun	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		han	~~~~~	1R	 		
AA									
	902.6 M I 300 kHz			#	VBW 100	kHz	Swe	Si ep1s(4	pan 0 Hz 401 pts)

NUMBER OF PULSES IN 20 SECOND OBSERVATION PERIOD



PEAK OUTPUT POWER

PEAK POWER LIMIT

\$15.247 (b) The maximum peak output power of the intentional radiator shall not exceed the following:

§15.247 (b) (2) For frequency hopping systems operating in the 902-928 MHz band, employing at least 50 hopping channels: 1 watt; and employing less than 50 hopping channels, but at least 25 hopping channels: 0.25 watt.

§15.247 (b) (4) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is 2.4 dBi, therefore the power limit is 30 dBm.

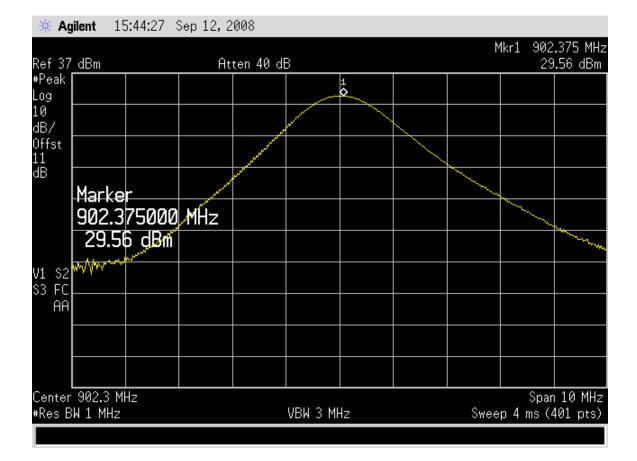
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer and the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

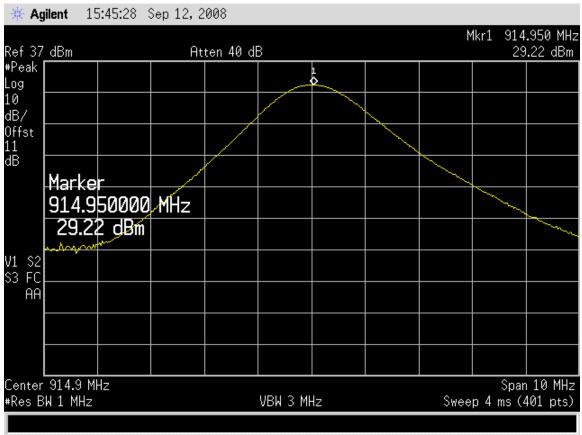
RESULTS

No non-compliance noted:

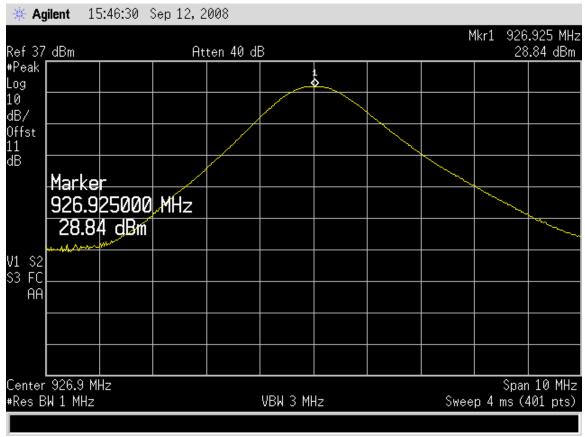
Channel	Frequency	P out
Low	902.3	29.56
Mid	914.9	29.22
High	926.9	28.84



OUTPUT POWER MID CHANNEL



OUTPUT POWER HIGH CHANNEL



MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

\$1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
(A) Lim	its for Occupational	/Controlled Exposu	res	
0.3–3.0 3.0–30 30–300	614 1842/f 61.4	1.63 4.89/f 0.163	*(100) *(900/f²) 1.0	6 6 6
300–1500 1500–100,000			f/300 5	6 6
(B) Limits	for General Populati	on/Uncontrolled Exp	posure	
0.3–1.34 1.34–30	614 824 <i>/</i> f	1.63 2.19/f	*(100) *(180/f²)	30 30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

TABLE 1-LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)-Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
30–300 300–1500	27.5	0.073	0.2 f/1500	30 30
1500-100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density
NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their
employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure.
Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for
exposure or can not exercise control over their exposure.

exposure or can not exercise control over their exposure.

CALCULATIONS

E

Given

$$= \sqrt{(30 * P * G)} / d$$

and

 $S = E^{2}/3770$

where

E = Field Strength in Volts/meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

 $d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and d (cm) =100 * d (m) yields $d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$ $d = 0.282 * \sqrt{(P * G / S)}$ where d = distance in cm P = Power in mW G = Numeric antenna gain $S = \text{Power Density in mW/cm^2}$

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and G (numeric) = 10 ^ (G (dBi) / 10) yields $d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$ where d = MPE distance in cm P = Power in dBm

G = Antenna Gain in dBi

 $S = Power Density Limit in mW/cm^2$

Equation (1) and the measured peak power is used to calculate the MPE distance.

Equation (1)

LIMITS

From §1.1310 Table 1 (B), S = 0.6 mW/cm^2

RESULTS

No non-compliance noted:

Power Density	Output	Antenna	S, mW/cm2
Limit	Power	Gain	at 20cm
(mW/cm^2)	(dBm)	(dBi)	
0.6	29.56	2.40	0.31

MPE Distance: 14.4 cm

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.247 (c) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in§15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

TEST PROCEDURE

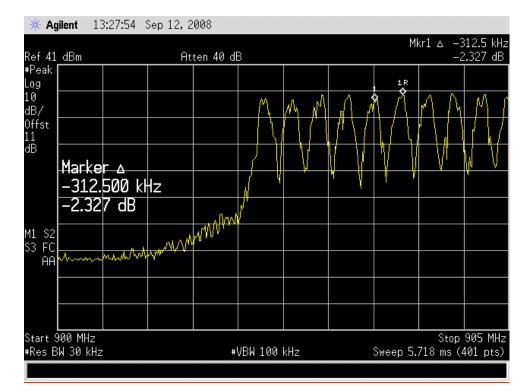
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

The spectrum from 30 MHz to 10 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

No non-compliance noted:

SPURIOUS EMISSIONS, LOW CHANNEL, HOPPING



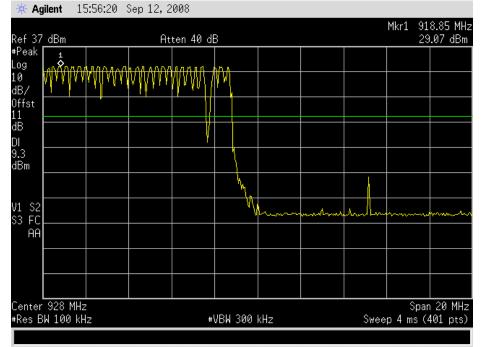
SPURIOUS EMISSIONS, LOW CHANNEL

əf 37	dBm		At	ten 40 di	3				Mkr1 29	909 MH .32 dBr
^{>} eak										
og Ø										
3/ ifst										
1 3										
	Marke	-								
∣ .3 ∃m		50000	MHz							
		2 dBm								
1 S2 3 FC	m	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	a har was a start of the start	-	mm	·····	m	mano	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	ym
ÂÂ										
	30 MHz W 100 kH	Iz		#	VBW 300	kHz		Sween 95	: Stop /4.3 ms	0.28 GH 401 nts

SPURIOUS EMISSIONS, MID CHANNEL

🔆 Ag	jilent 1	5:50:49	Sep 12, 2	008						
Ref 37	dBm		At	ten 40 di	3					909 MHz .26 dBm
#Peak Log	Ś	>								
10 dB/										
Offst 11 dB										
DI 9.3 dBm	Displa 9.26	y Line								
dBm	J.20									
V1 S2 S3 FC	m	·····	******	1	,	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~	~~~~~	www.	Mann
AA										
Start 3	30 MHz								Stop_9	9.28 GHz
	₩ 100 kH	lz		#	VBW 300 I	kHz		Sweep 95	i8.3 ms (4	101 pts)

SPURIOUS EMISSIONS, HIGH CHANNEL, HOPPING



SPURIOUS EMISSIONS, HIGH CHANNEL, HOPPING

🔆 Agi	ilent 1	5:49:22		•	1 01111		,			
Ref 37_	dBm		At	ten 40 di	3					932 MH: .07 dBm
#Peak Log	1 <	>								
10 dB/										
Offst 11 dB										
DI		y Line dBm								
M1 S2		a second		h				Mar and a constraint		hun
S3 FC. AA										
Start 3 #Res Bl	0 MHz W 100 kH	Iz		#	VBW 300	kHz		Sweep 95	? Stop / 68.3 ms	9.28 GHz 401 pts)

4.4 POWERLINE CONDUCTED EMISSIONS

LIMIT

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

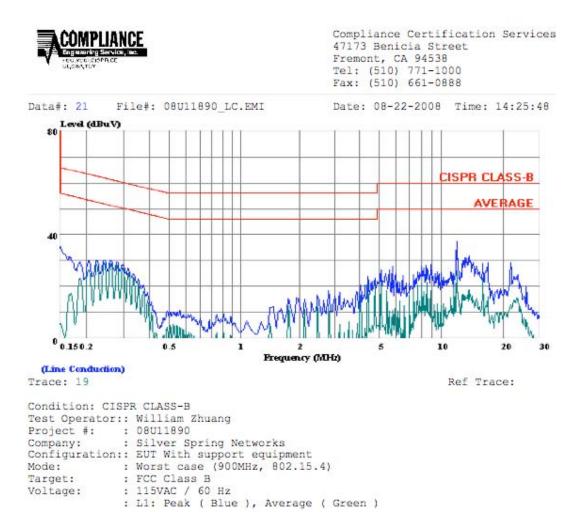
The resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

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

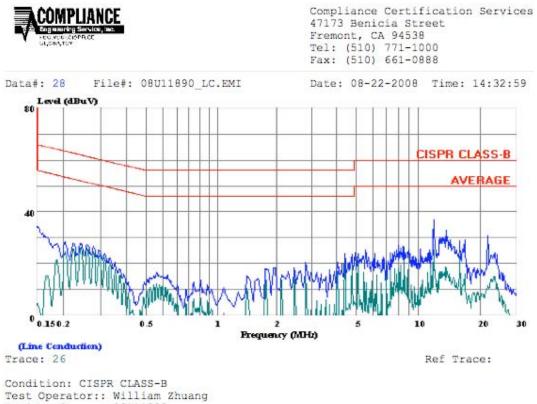
RESULTS

No non-compliance noted:

900 HAN, LINE 1 RESULTS

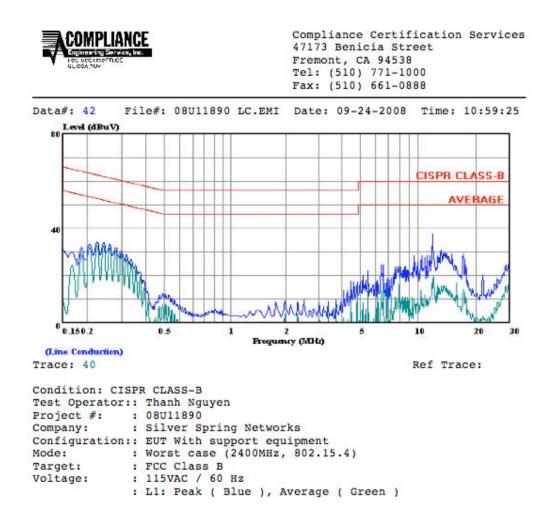


900 HAN, LINE 2 RESULTS

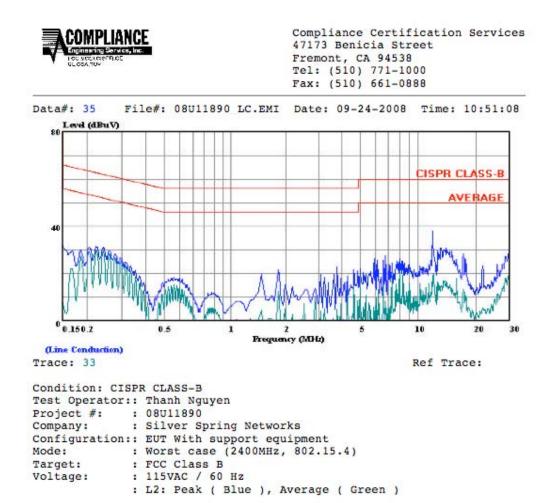


Test Operator:: William Zhuang Project #: : 08U11890 Company: : Silver Spring Networks Configuration:: EUT With support equipment Mode: : : Worst case (900MHz, 802.15.4) Target: : : FCC Class B Voltage: : 115VAC / 60 Hz : L2: Peak (Blue), Average (Green)

2.4 GHz HAN, LINE 1 RESULTS

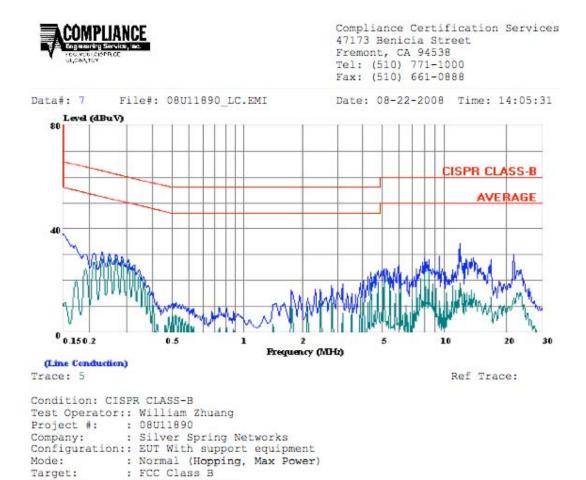


2.4 GHz HAN, LINE 2 RESULTS

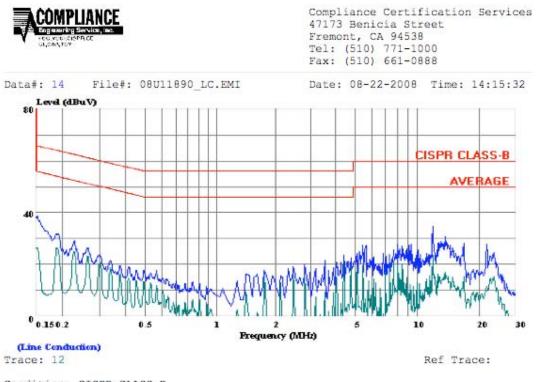


900 MHz FHSS, LINE 1 RESULTS

Voltage:



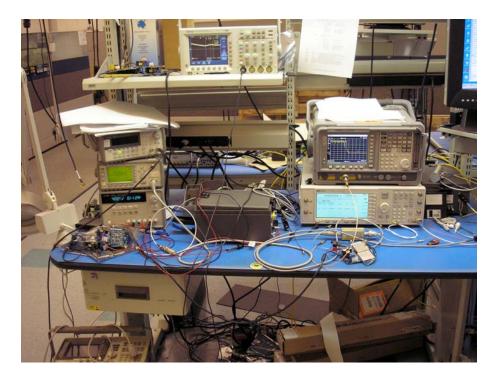
: 115VAC / 60 Hz : L1: Peak (Blue), Average (Green)



Condition: CISH	PR CLASS-B
Test Operator::	William Zhuang
Project #: :	08U11890
Company: :	Silver Spring Networks
Configuration::	EUT With support equipment
Mode: :	Normal (Hopping, Max Power)
Target: :	FCC Class B
Voltage: :	115VAC / 60 Hz
10-0.0000000000000000000000000000000000	L2: Peak (Blue), Average (Green)

SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP, SILVER SPRING NETWORKS



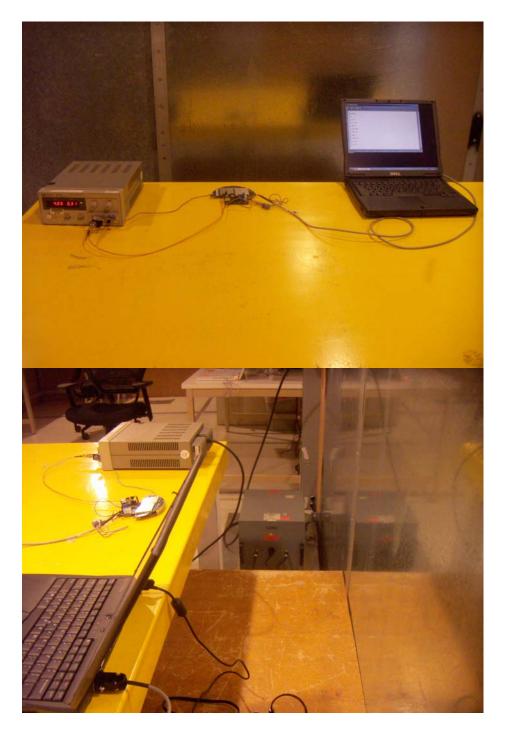
ANTENNA PORT CONDUCTED TESTS, CCS



RADIATED RF MEASUREMENT SETUP



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP



END OF REPORT

Report Revision History

Revision	Revision Description	Pages Revised	Revised by	Date
No.				
-	Original Issue		T. Cokenias	10/12/08
1	Add 2.4 GHz band edge emissions test		T. Cokenias	11/20/08
	and high channel conducted data			