APPENDIX 2: Data of EMI test

Carrier Frequency Separation

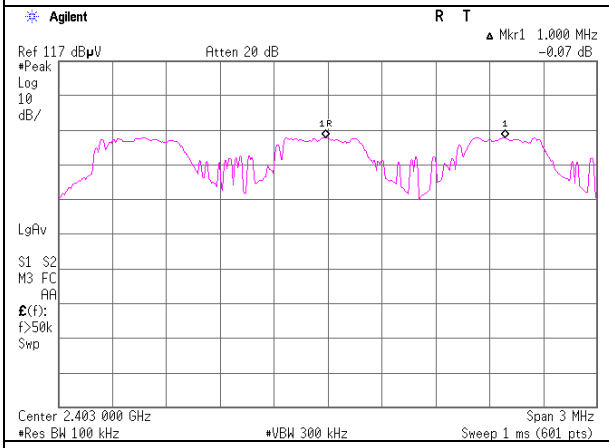
UL Japan, Inc.
Head Office EMC Lab. No.6 measurement Room

COMPANY	:	ALPINE ELECTRONICS, INC.	REGULATION	:	FCC15.247(a)(1)/RSS-210A8.1(b)
EQUIPMENT	:	Bluetooth Module Board	TEST DISTANCE	:	-
MODEL	:	96-09386Z98	DATE	:	06/04/2007
S/ N	:	1	TEMPERATURE	:	26deg.C
POWER	:	DC 12.0V	HUMIDITY	:	47%
MODE	:	Tx(Hopping on)/Inquiry	ENGINEER	:	Shinya Watanabe

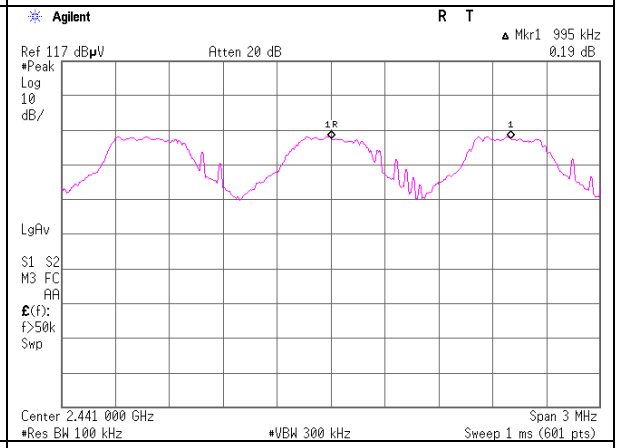
Ch	Freq. [MHz]	Channel separation [MHz]	Limit
Low	2402.0	1.000	>two-thirds of 1.088 [MHz] (20dB Bandwidth) or 25[kHz](whichever is greater)
Mid	2441.0	0.995	>two-thirds of 0.812 [MHz] (20dB Bandwidth) or 25[kHz](whichever is greater)
High	2480.0	1.000	>two-thirds of 0.810 [MHz] (20dB Bandwidth) or 25[kHz](whichever is greater)
Inquiry	2441.0	2.008	>two-thirds of 0.770 [MHz] (20dB Bandwidth) or 25[kHz](whichever is greater)

Carrier Frequency Separation

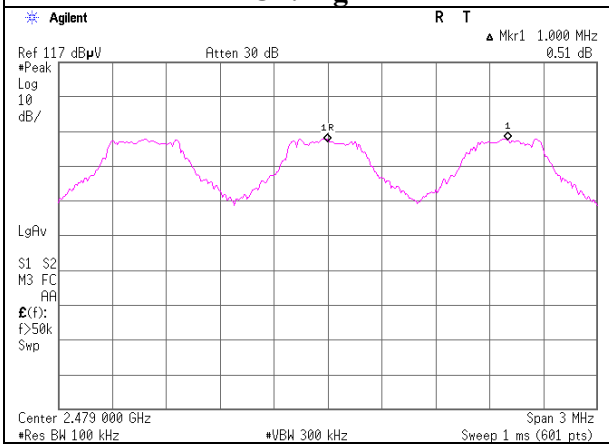
Ch:Low



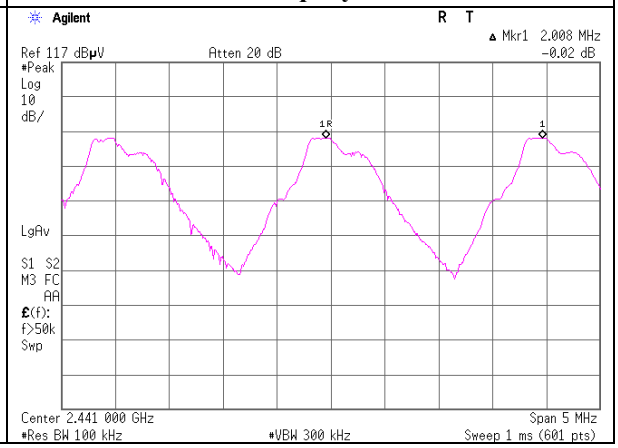
Ch:Mid



Ch:High



Inquiry



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20dB Bandwidth

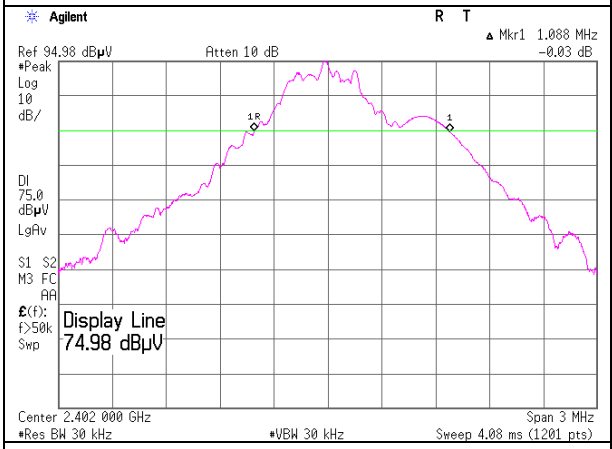
UL Japan, Inc.
Head Office EMC Lab. No.6 measurement Room

COMPANY	:	ALPINE ELECTRONICS, INC.	REGULATION	:	FCC15.247(a)(1)/RSS-210A8.1(a)
EQUIPMENT	:	Bluetooth Module Board	TEST DISTANCE	:	-
MODEL	:	96-09386Z98	DATE	:	06/04/2007
S/ N	:	1	TEMPERATURE	:	26deg.C
POWER	:	DC 12.0V	HUMIDITY	:	47%
MODE	:	Tx (Hopping off) /Inquiry	ENGINEER	:	Shinya Watanabe

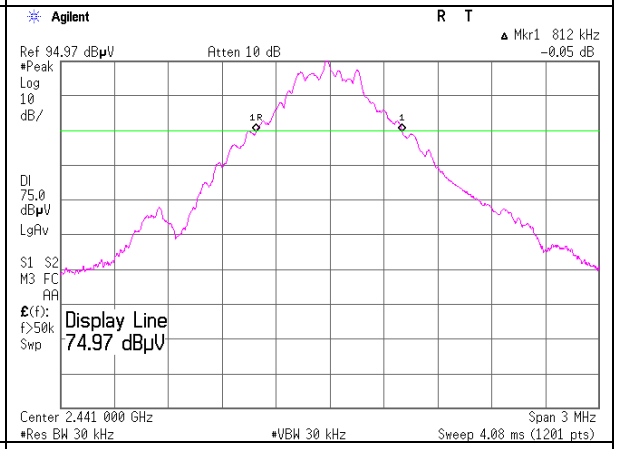
Ch	Freq. [MHz]	20dB Bandwidth [MHz]	Limit [MHz]
Low	2402.0	1.088	-
Mid	2441.0	0.812	-
High	2480.0	0.810	-
Inquiry	2441.0	0.770	-

20dB Bandwidth

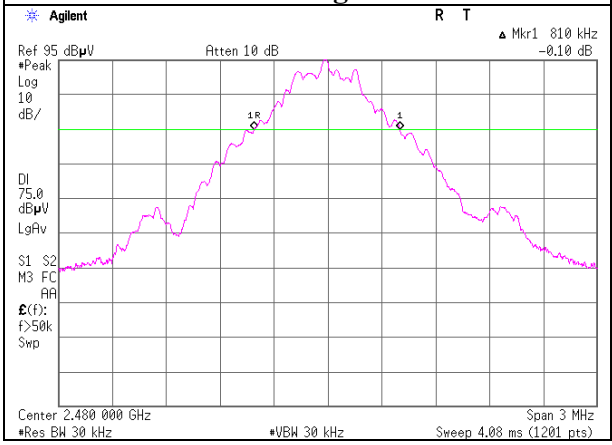
Ch:Low



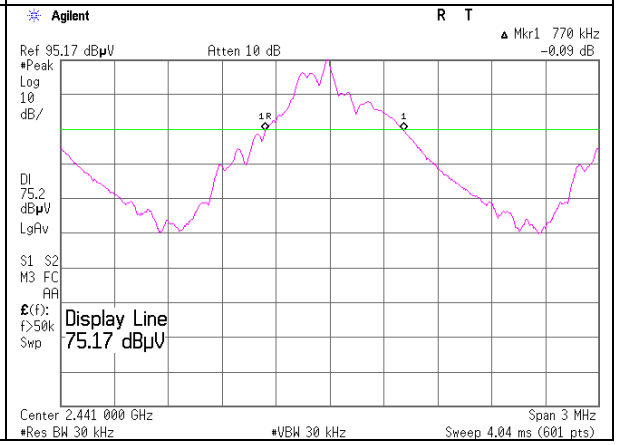
Ch:Mid



Ch:High



Inquiry



Number of Hopping Frequency

UL Japan, Inc.
Head Office EMC Lab. No.6 measurement Room

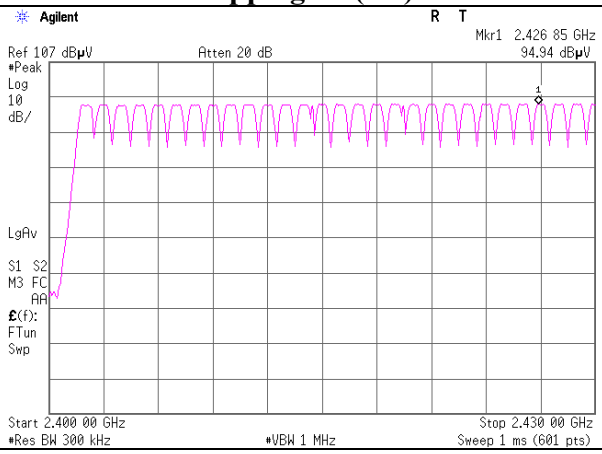
COMPANY	:	ALPINE ELECTRONICS, INC.	REGULATION	:	FCC15.247(a)(1)(iii)/RSS-210A8.1(d)
EQUIPMENT	:	Bluetooth Module Board	TEST DISTANCE	:	-
MODEL	:	96-09386Z98	DATE	:	06/04/2007
S/ N	:	1	TEMPERATURE	:	26deg.C
POWER	:	DC 12.0V	HUMIDITY	:	47%
MODE	:	Tx (Hopping on) /Inquiry	ENGINEER	:	Shinya Watanabe

Mode	Number of channel [time]	Limit [time]
Tx(Hopping on)	79	≧15

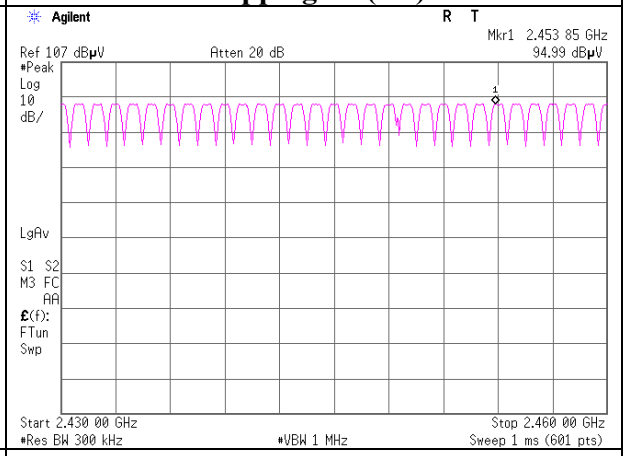
Mode	Number of channel [time]	Limit [time]
Inquiry	32	≧15

Number of Hopping Frequency

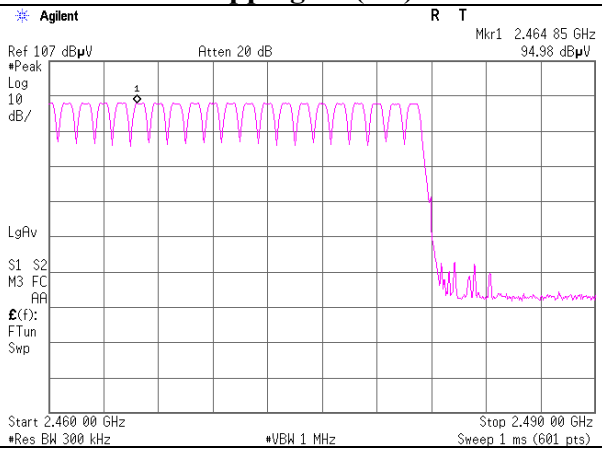
Hopping on (1/3)



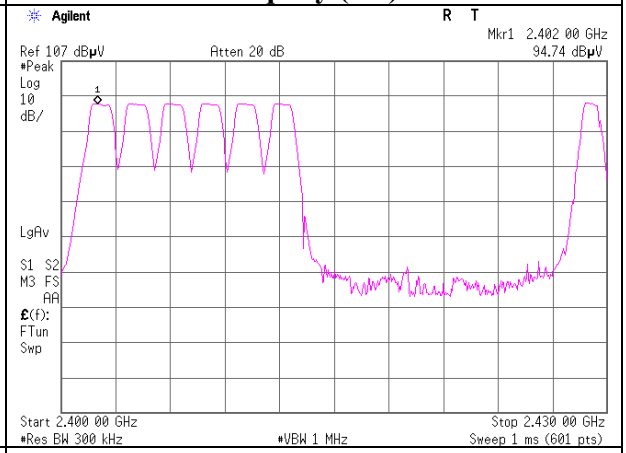
Hopping on (2/3)



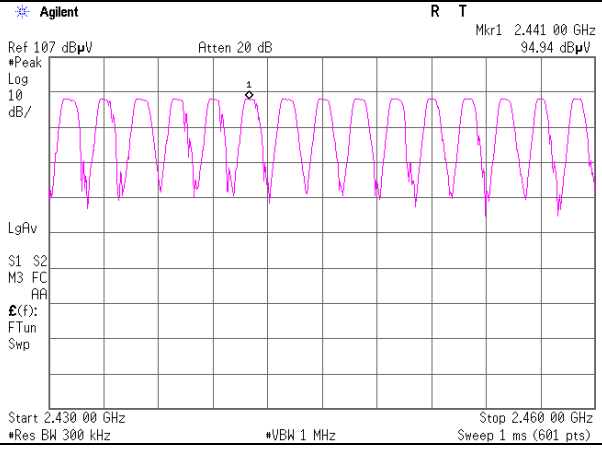
Hopping on (3/3)



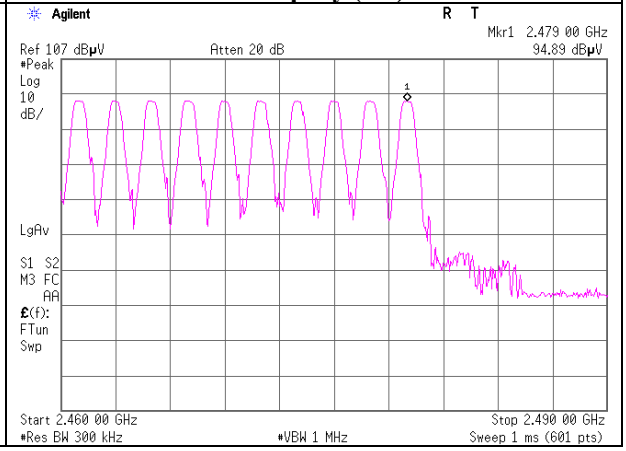
Inquiry (1/3)



Inquiry (2/3)



Inquiry (3/3)



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Dwell time

UL Japan, Inc.
Head Office EMC Lab. No.6 measurement Room

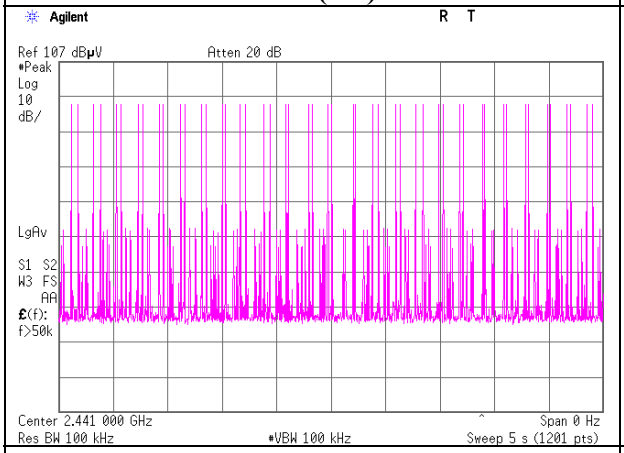
COMPANY	:	ALPINE ELECTRONICS, INC.	REGULATION	:	FCC15.247(a)(1)(iii)/RSS-210A8.1(d)
EQUIPMENT	:	Bluetooth Module Board	TEST DISTANCE	:	-
MODEL	:	96-09386Z98	DATE	:	06/04/2007
S/ N	:	1	TEMPERATURE	:	26deg.C
POWER	:	DC 12.0V	HUMIDITY	:	47%
MODE	:	Tx (Hopping on) /Inquiry	ENGINEER	:	Shinya Watanabe

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8(32 Hopping x 0.4)second period	Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	50 times / 5 sec. x 31.6 sec. = 316 times	0.490	155	400
DH3 *1	17 times / 5 sec. x 31.6 sec. = 108 times	1.751	189	400
DH5 *2	10 times / 5 sec. x 31.6 sec. = 64 times	3.008	193	400
Inquiry	100 times / 1 sec. x 12.8 sec. = 1280 times	0.191	244	400

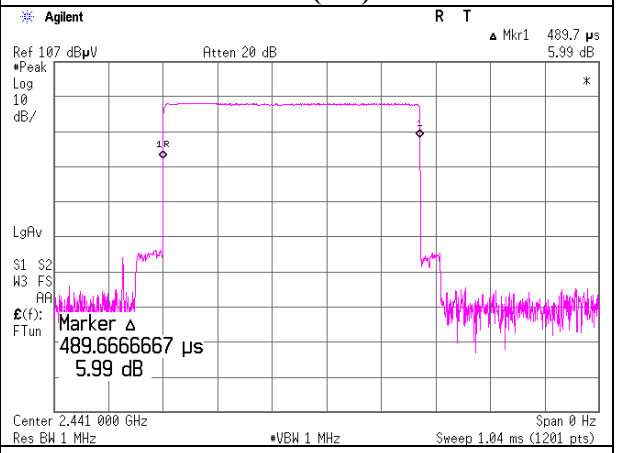
*1 (16+16+17+17+17) / 5 = 16.6 ≒ 17 times
*2 (10+11+10+9+10) / 5 = 10 times

Dwell time

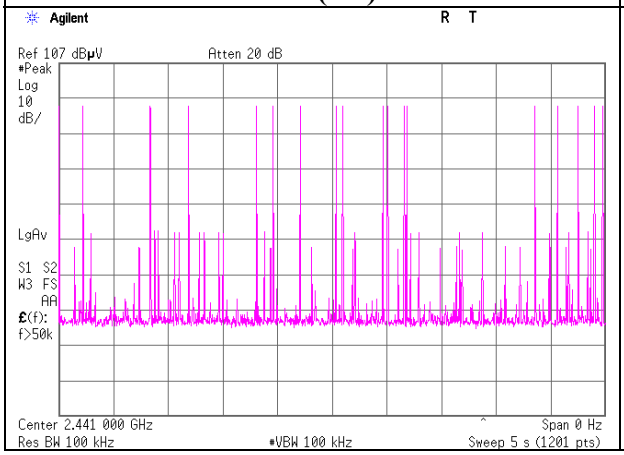
DH1 (1/2)



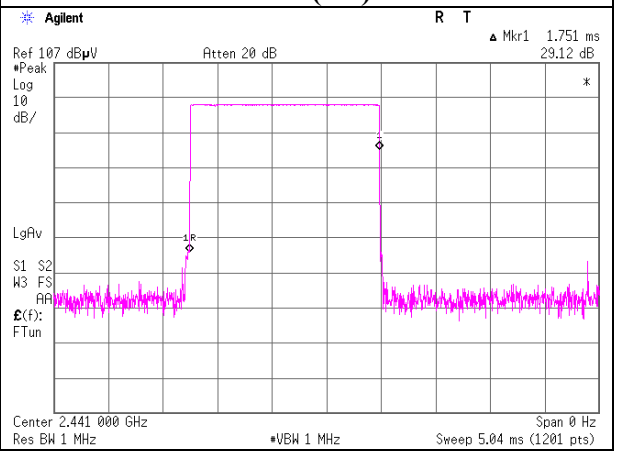
DH1 (2/2)



DH3 (1/2)



DH3 (2/2)



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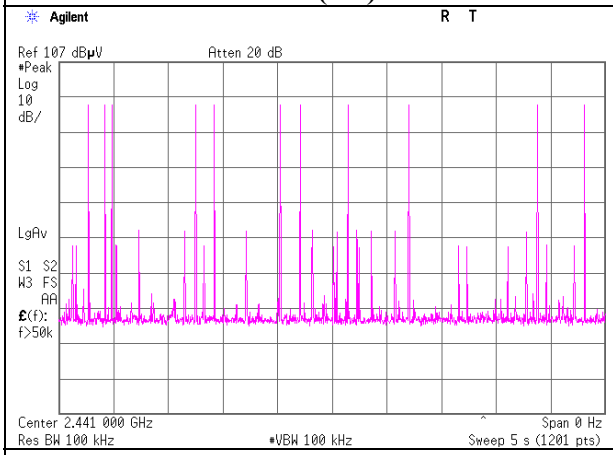
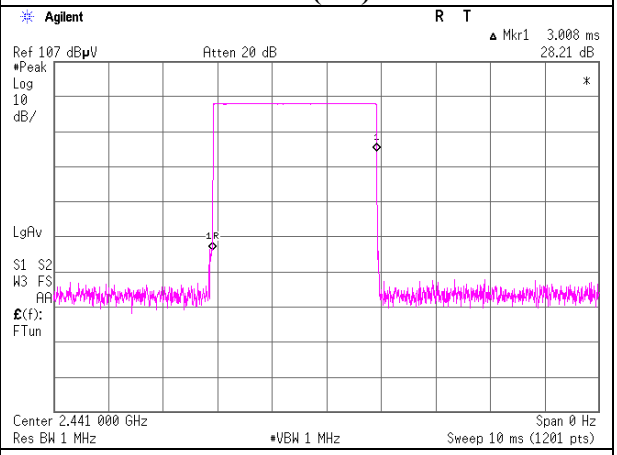
Dwell time

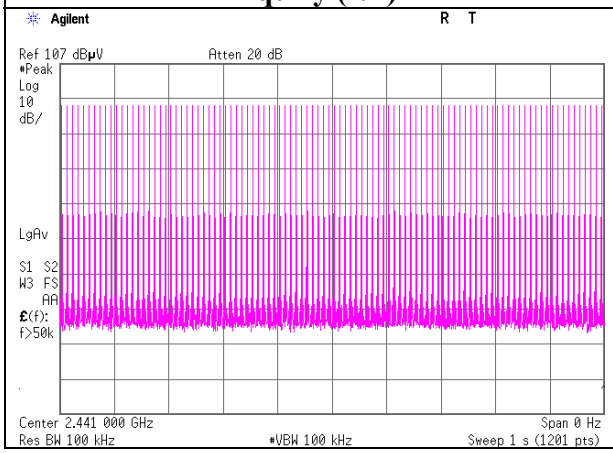
DH5 (1/2)



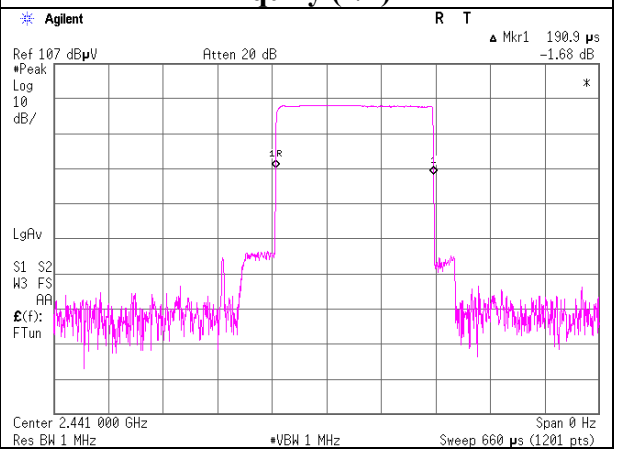
DH5 (2/2)



Inquiry (1/2)



Inquiry (2/2)



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Maximum Peak Output Power

UL Japan, Inc.
Head Office EMC Lab. No.6 measurement Room

COMPANY	:	ALPINE ELECTRONICS, INC.	REGULATION	:	FCC15.247(b)(1)/RSS-210A8.4(2)
EQUIPMENT	:	Bluetooth Module Board	TEST DISTANCE	:	-
MODEL	:	96-09386Z98	DATE	:	06/04/2007
S/ N	:	1	TEMPERATURE	:	26deg.C
POWER	:	DC 12.0V	HUMIDITY	:	47%
MODE	:	Tx (Hopping off) /Inquiry	ENGINEER	:	Shinya Watanabe

Ch	Freq.	P/M Reading	Cable Loss	Atten.	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
Low	2402.0	-10.60	0.57	10.04	0.02	1.00	20.97	125	20.95
Mid	2441.0	-10.53	0.58	10.11	0.16	1.04	20.97	125	20.81
High	2480.0	-10.65	0.58	10.03	-0.03	0.99	20.97	125	21.00
Inquiry	2441.0	-10.55	0.58	10.11	0.14	1.03	20.97	125	20.83

Sample Calculation:
Result = Reading + Cable Loss (supplied by the customer)+ Attenuator
* In the above table, factor 0.0dB represents no use of Atten. and/or Filter.

The Cable Loss from the customer

	1.0GHz		2.0GHz		2.5GHz		3.0GHz	
	S21	S12	S21	S12	S21	S12	S21	S12
1	0.35	0.35	0.51	0.51	0.58	0.59	0.65	0.64
2	0.35	0.35	0.51	0.51	0.58	0.59	0.66	0.66
3	0.35	0.35	0.51	0.52	0.58	0.59	0.65	0.65
4	0.35	0.35	0.51	0.51	0.58	0.59	0.66	0.66
5	0.35	0.34	0.52	0.51	0.58	0.58	0.65	0.65
AVE	0.350	0.348	0.512	0.512 *1)	0.580	0.588*1)	0.654	0.652
MAX.	0.35	0.35	0.52	0.52	0.58	0.59	0.66	0.66
MIN.	0.35	0.34	0.51	0.51	0.58	0.58	0.65	0.64

*1) The test result was calculated with the value.

Radiated Spurious Emission (below 1GHz)
Tx, Ch. Low

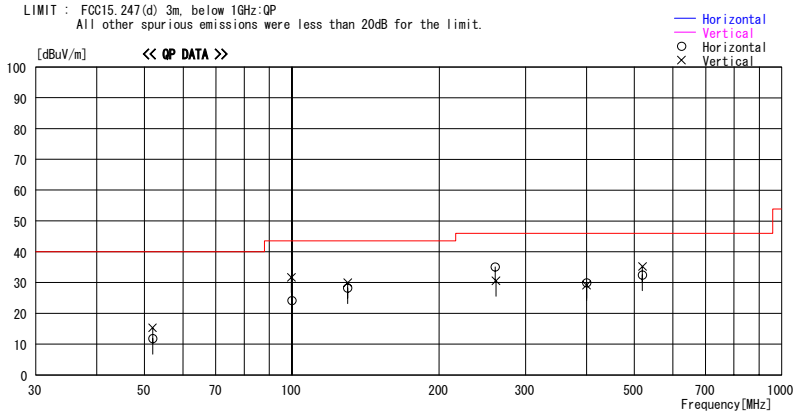
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2007/05/24

Company	: ALPINE ELECTRONICS, INC.	Report No.	: 27FE0134-HO
Kind of EUT	: Bluetooth Module Board	Power	: DC12.0V
Model No.	: 96-09386Z98	Temp./Humi.	: 24deg.C, / 55%
Serial No.	: 1	Operator	: Norihisa Hashimoto

Mode / Remarks : Transmitting 2402MHz / Bluetooth Module Board axis X-axis Worst Ant axis (Hor:X Ver:Y short_cable)

LIMIT : FCC15.247(d) 3m, below 1GHz:QP
All other spurious emissions were less than 20dB for the limit.



Frequency	Reading	DET	Antenna Factor	Loss & Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]
52.011	29.6	QP	10.3	-24.6	15.3	281	100	Vert.	40.0	24.7
52.032	26.1	QP	10.3	-24.6	11.8	193	318	Hori.	40.0	28.2
100.047	37.7	QP	10.5	-24.0	24.2	271	311	Hori.	43.5	19.3
99.843	45.3	QP	10.4	-24.0	31.7	172	129	Vert.	43.5	11.8
130.000	37.8	QP	13.9	-23.5	28.2	46	250	Hori.	43.5	15.3
130.000	39.6	QP	13.9	-23.5	30.0	358	100	Vert.	43.5	13.5
259.994	39.7	QP	17.8	-22.4	35.1	171	121	Hori.	46.0	10.9
261.121	35.1	QP	17.8	-22.3	30.6	22	100	Vert.	46.0	15.4
399.997	33.8	QP	17.5	-21.4	29.9	259	100	Hori.	46.0	16.1
400.001	33.0	QP	17.6	-21.4	29.2	323	100	Vert.	46.0	16.8
520.006	33.5	QP	19.6	-20.7	32.4	314	197	Hori.	46.0	13.6
520.005	36.3	QP	19.6	-20.7	35.2	312	130	Vert.	46.0	10.8

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - GAIN(AMP)

* The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.

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Radiated Spurious Emission (below 1GHz)

Tx, Ch. Mid

DATA OF RADIATED EMISSION TEST

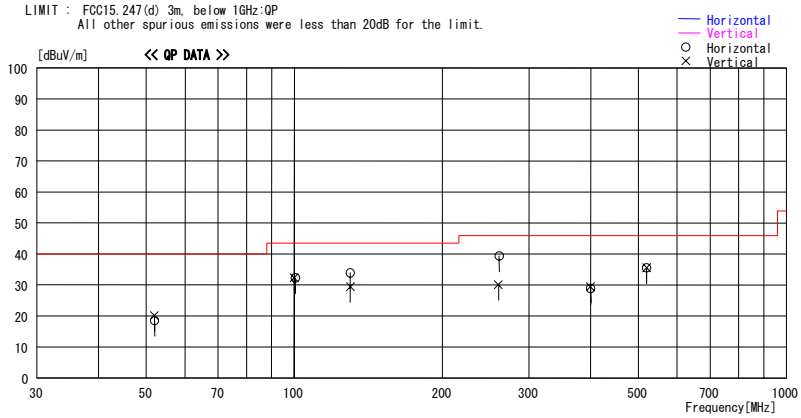
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2007/05/24

Company : ALPINE ELECTRONICS, INC.
Kind of EUT : Bluetooth Module Board
Model No. : 96-09386Z98
Serial No. : 1

Report No. : 27FE0134-HO
Power : DC12.0V
Temp./Humi. : 24deg.C. / 55%
Operator : Norihisa Hashimoto

Mode / Remarks : Transmitting 2441MHz / Bluetooth Module Board axis X-axis Worst Ant axis (Hor:X Ver:Y short_cable)

LIMIT : FCC15.247(d) 3m, below 1GHz:QP
All other spurious emissions were less than 20dB for the limit.



Frequency	Reading	DET	Antenna Factor	Loss & Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]
51.987	34.5	QP	10.3	-24.6	20.2	249	100	Vert.	40.0	19.8
51.988	32.8	QP	10.3	-24.6	18.5	357	150	Hori.	40.0	21.5
100.470	45.8	QP	10.5	-24.0	32.3	223	150	Hori.	43.5	11.2
100.036	45.8	QP	10.5	-24.0	32.3	171	195	Vert.	43.5	11.2
129.996	43.6	QP	13.9	-23.5	34.0	250	150	Hori.	43.5	9.5
129.996	39.1	QP	13.9	-23.5	29.5	350	100	Vert.	43.5	14.0
260.851	43.9	QP	17.8	-22.3	39.4	180	134	Hori.	46.0	6.6
259.993	34.8	QP	17.8	-22.4	30.2	54	100	Vert.	46.0	15.8
400.000	32.8	QP	17.5	-21.4	28.9	255	100	Hori.	46.0	17.1
400.000	33.3	QP	17.6	-21.4	29.5	329	100	Vert.	46.0	16.5
519.998	36.7	QP	19.6	-20.7	35.6	304	193	Hori.	46.0	10.4
519.998	36.7	QP	19.6	-20.7	35.6	302	139	Vert.	46.0	10.4

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - GAIN(AMP)

* The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.

Radiated Spurious Emission (below 1GHz)
Tx, Ch. High

DATA OF RADIATED EMISSION TEST

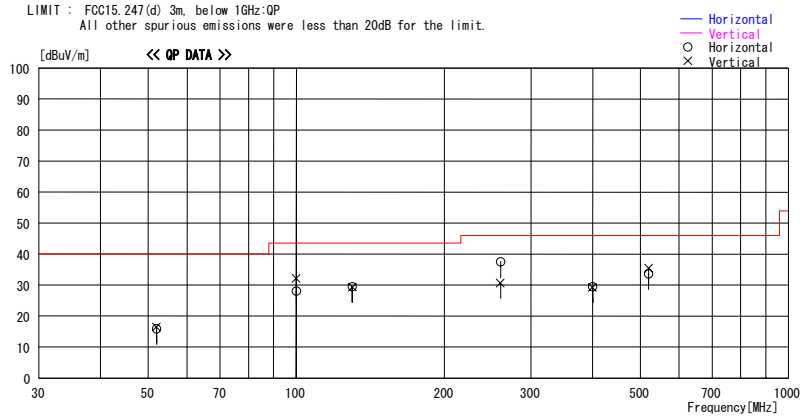
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2007/05/24

Company : ALPINE ELECTRONICS, INC.
Kind of EUT : Bluetooth Module Board
Model No. : 96-09386Z98
Serial No. : 1

Report No. : 27FE0134-HO
Power : DC12.0V
Temp./Humi. : 24deg.C. / 55%
Operator : Norihisa Hashimoto

Mode / Remarks : Transmitting 2480MHz / Bluetooth Module Board axis X-axis Worst Ant axis (Hor:X Ver:Y short_cable)

LIMIT : FCC15.247(d) 3m, below 1GHz:QP
All other spurious emissions were less than 20dB for the limit.



Frequency	Reading	DET	Antenna Factor	Loss & Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg.]	[cm]		[dBuV/m]	[dB]
51.998	30.8	QP	10.3	-24.6	16.5	270	100	Vert.	40.0	23.5
52.041	30.2	QP	10.3	-24.6	15.9	258	162	Hori.	40.0	24.1
100.025	41.6	QP	10.5	-24.0	28.1	322	171	Hori.	43.5	15.4
100.045	45.7	QP	10.5	-24.0	32.2	178	121	Vert.	43.5	11.3
129.990	39.1	QP	13.9	-23.5	29.5	59	223	Hori.	43.5	14.0
129.989	39.0	QP	13.9	-23.5	29.4	149	100	Vert.	43.5	14.1
260.069	42.0	QP	17.8	-22.3	37.5	182	130	Hori.	46.0	8.5
260.051	35.3	QP	17.8	-22.4	30.7	299	100	Vert.	46.0	15.3
400.002	33.3	QP	17.6	-21.4	29.5	259	100	Hori.	46.0	16.5
399.995	33.2	QP	17.5	-21.4	29.3	176	100	Vert.	46.0	16.7
520.001	36.5	QP	19.6	-20.7	35.4	287	132	Vert.	46.0	10.6
520.005	34.7	QP	19.6	-20.7	33.6	303	189	Hori.	46.0	12.4

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - GAIN(AMP)

* The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.

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Radiated Spurious Emission (below 1GHz)

Rx, Ch. Mid

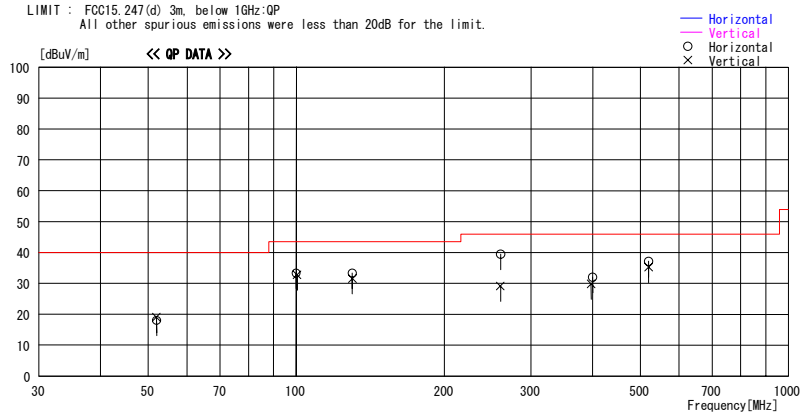
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2007/05/24

Company	: ALPINE ELECTRONICS, INC.	Report No.	: 27FE0134-HO
Kind of EUT	: Bluetooth Module Board	Power	: DC12.0V
Model No.	: 96-09386Z98	Temp./Humi.	: 24deg.C. / 55%
Serial No.	: 1	Operator	: Norihisa Hashimoto

Mode / Remarks : Receiving 2441MHz / Bluetooth Module Board axis X-axis Worst Ant axis (Hor:X Ver:Y short_cable)

LIMIT : FCC15.247(d) 3m, below 1GHz:QP
All other spurious emissions were less than 20dB for the limit.



Frequency	Reading	DET	Antenna Factor	Loss & Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]
52.016	32.4	QP	10.3	-24.6	18.1	173	299	Hori.	40.0	21.9
52.001	33.4	QP	10.3	-24.6	19.1	275	100	Vert.	40.0	20.9
99.990	46.8	QP	10.5	-24.0	33.3	239	316	Hori.	43.5	10.2
100.470	46.3	QP	10.5	-24.0	32.8	173	137	Vert.	43.5	10.7
130.000	42.9	QP	13.9	-23.5	33.3	48	152	Hori.	43.5	10.2
129.996	41.2	QP	13.9	-23.5	31.6	353	100	Vert.	43.5	11.9
259.993	44.1	QP	17.8	-22.4	39.5	177	124	Hori.	46.0	6.5
259.999	33.8	QP	17.8	-22.4	29.2	115	100	Vert.	46.0	16.8
400.000	35.8	QP	17.6	-21.4	32.0	310	100	Hori.	46.0	14.0
397.302	33.8	QP	17.5	-21.4	29.9	310	100	Vert.	46.0	16.1
519.804	38.3	QP	19.6	-20.7	37.2	312	197	Hori.	46.0	8.8
519.998	36.4	QP	19.6	-20.7	35.3	322	129	Vert.	46.0	10.7

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - GAIN(AMP)

* The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.

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Radiated Spurious Emission (above 1GHz)
Tx, Ch. Low

UL Japan, Inc.
Head Office EMC Lab. No.4Semi Anechoic Chamber

Company	: ALPINE ELECTRONICS, INC.	REPORT NO	: 27FE0134-HO
Equipment	: Bluetooth Module Board	REGULATION	: FCC15.247(d)/RSS-210A8.5
Model	: 96-09386Z98	TEST DISTANCE	: 3/1m
Sample No.	: 1	DATE	: 05/25/2007
Power	: DC 12V	TEMPERATURE	: 24deg.C
Mode	: Transmitting 2402MHz	HUMIDITY	: 64%
Remarks	: Hor: X-axis , Ver: X axis (for Bluetooth Module Board)	ENGINEER	: Norihisa Hashimoto
	: Hor: X-axis , Ver: Y-axis (for antenna)		

PK DETECT (RBW: 1MHz, VBW: 1MHz)

No.	FREQ	S/A READING		ANT	AMP	CABLE	Hi-Pass	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN	LOSS	Filter	HOR	VER	PK	HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss												
1	2390.0	42.3	43.8	26.6	32.1	2.5	0.0	39.3	40.8	73.9	34.6	33.1
2	*2400.0	68.8	75.9	26.6	32.1	2.5	0.0	65.8	72.9	73.9	-	-
3	4804.0	48.7	49.7	30.8	31.2	3.4	0.7	52.4	53.4	73.9	21.5	20.5
4	7206.0	42.5	41.0	35.2	32.5	4.2	0.4	49.8	48.3	73.9	24.1	25.6
5	9608.0	40.5	42.7	37.6	32.8	5.3	0.7	51.3	53.5	73.9	22.6	20.4
Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss - Dfac												
6	12010.0	NS	NS	-	-	-	-	-	-	73.9	-	-
7	14412.0	NS	NS	-	-	-	-	-	-	73.9	-	-
8	16814.0	NS	NS	-	-	-	-	-	-	73.9	-	-
9	19216.0	NS	NS	-	-	-	-	-	-	73.9	-	-
10	21618.0	NS	NS	-	-	-	-	-	-	73.9	-	-
11	24020.0	45.5	45.5	38.7	32.2	8.1	0.0	50.6	50.6	73.9	23.3	23.3

AV DETECT (RBW: 1MHz, VBW: 10Hz)

No.	FREQ	S/A READING		ANT	AMP	CABLE	Hi-Pass	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN	LOSS	Filter	HOR	VER	AV	HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss												
1	2390.0	30.3	30.5	26.6	32.1	2.5	0.0	27.3	27.5	53.9	26.6	26.4
2	*2400.0	46.5	50.7	26.6	32.1	2.5	0.0	43.5	47.7	53.9	-	-
3	4804.0	36.5	38.2	30.8	31.2	3.4	0.7	40.2	41.9	53.9	13.7	12.0
4	7206.0	30.1	30.0	35.2	32.5	4.2	0.4	37.4	37.3	53.9	16.5	16.6
5	9608.0	30.2	30.4	37.6	32.8	5.3	0.7	41.0	41.2	53.9	12.9	12.7
Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss - Dfac												
6	12010.0	NS	NS	-	-	-	-	-	-	53.9	-	-
7	14412.0	NS	NS	-	-	-	-	-	-	53.9	-	-
8	16814.0	NS	NS	-	-	-	-	-	-	53.9	-	-
9	19216.0	NS	NS	-	-	-	-	-	-	53.9	-	-
10	21618.0	NS	NS	-	-	-	-	-	-	53.9	-	-
11	24020.0	32.8	32.8	38.7	32.2	8.1	0.0	37.9	37.9	53.9	16.0	16.0

* Reference data
NS: Non Signal

20dBc(Fundamental 2402MHz) (RBW: 100kHz, VBW: 300kHz)

No.	FREQ	S/A READING		ANT	AMP	CABLE	Hi-Pass	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN	LOSS	Filter	HOR	VER	20dBc	HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	[dB]
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss												
1	2402.0	91.6	97.8	26.6	32.1	2.5	0.0	88.6	94.8	-	-	-
2	2400.0	36.8	41.5	26.6	32.1	2.5	0.0	33.8	38.5	Funda-20dB	34.8	36.3

Test Distance 1.0m : Distance Factor(Dfac) = 20log(3/1.0) = 9.5dB
*Except for the above table : All other spurious emissions were less than 20dB for the limit.
*In the frequency over the fifth harmonic, the noise from the EUT was not seen.The data above is its base noise.
*The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.
*Hi-Pass Fiter was not used for factor 0.0dB of the above table.

Radiated Spurious Emission (above 1GHz)
Tx, Ch. Mid

UL Japan, Inc.
Head Office EMC Lab. No.4Semi Anechoic Chamber

Company	: ALPINE ELECTRONICS, INC.	REPORT NO	: 27FE0134-HO
Equipment	: Bluetooth Module Board	REGULATION	: FCC15.247(d)/RSS-210A8.5
Model	: 96-09386Z98	TEST DISTANCE	: 3/1m
Sample No.	: 1	DATE	: 05/25/2007
Power	: DC 12V	TEMPERATURE	: 24deg.C
Mode	: Transmitting 2441MHz	HUMIDITY	: 64%
Remarks	: Hor: X-axis , Ver: X axis (for Bluetooth Module Board)	ENGINEER	: Norihisa Hashimoto
	: Hor: X-axis , Ver: Y-axis (for antenna)		

PK DETECT (RBW: 1MHz, VBW: 1MHz)

No.	FREQ	S/A READING		ANT	AMP	CABLE	Hi-Pass	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN	LOSS	Filter	HOR	VER	PK	HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss												
1	4882.0	48.0	49.1	31.0	31.2	3.4	0.7	51.9	53.0	73.9	22.0	20.9
2	7323.0	42.6	42.5	35.4	32.5	4.3	0.4	50.2	50.1	73.9	23.7	23.8
3	9764.0	42.7	42.7	37.6	32.9	5.4	0.6	53.4	53.4	73.9	20.5	20.5
Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss - Dfac												
4	12205.0	NS	NS	-	-	-	-	-	-	73.9	-	-
5	14646.0	NS	NS	-	-	-	-	-	-	73.9	-	-
6	17087.0	NS	NS	-	-	-	-	-	-	73.9	-	-
7	19528.0	NS	NS	-	-	-	-	-	-	73.9	-	-
8	21969.0	NS	NS	-	-	-	-	-	-	73.9	-	-
9	24410.0	45.7	45.7	38.8	32.2	8.2	0.0	51.0	51.0	73.9	22.9	22.9

AV DETECT (RBW: 1MHz, VBW: 10Hz)

No.	FREQ	S/A READING		ANT	AMP	CABLE	Hi-Pass	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN	LOSS	Filter	HOR	VER	AV	HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss												
1	4882.0	36.5	37.6	31.0	31.2	3.4	0.7	40.4	41.5	53.9	13.5	12.4
2	7323.0	30.6	30.6	35.4	32.5	4.3	0.4	38.2	38.2	53.9	15.7	15.7
3	9764.0	30.2	30.2	37.6	32.9	5.4	0.6	40.9	40.9	53.9	13.0	13.0
Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss - Dfac												
4	12205.0	NS	NS	-	-	-	-	-	-	53.9	-	-
5	14646.0	NS	NS	-	-	-	-	-	-	53.9	-	-
6	17087.0	NS	NS	-	-	-	-	-	-	53.9	-	-
7	19528.0	NS	NS	-	-	-	-	-	-	53.9	-	-
8	21969.0	NS	NS	-	-	-	-	-	-	53.9	-	-
9	24410.0	32.8	32.8	38.8	32.2	8.2	0.0	38.1	38.1	53.9	15.8	15.8

Test Distance 1.0m : Distance Factor(Dfac) = 20log(3/1.0) = 9.5dB
*Except for the above table : All other spurious emissions were less than 20dB for the limit.
*In the frequency over the fifth harmonic, the noise from the EUT was not seen.The data above is its base noise.
*The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.
*Hi-Pass Fiter was not used for factor 0.0dB of the above table.
NS: Non Signal

Radiated Spurious Emission (above 1GHz)

Tx, Ch. High

UL Japan, Inc.
Head Office EMC Lab. No.4Semi Anechoic Chamber

Company	: ALPINE ELECTRONICS, INC.	REPORT NO	: 27FE0134-HO
Equipment	: Bluetooth Module Board	REGULATION	: FCC15.247(d)/RSS-210A8.5
Model	: 96-09386Z98	TEST DISTANCE	: 3/1m
Sample No.	: 1	DATE	: 05/25/2007
Power	: DC 12V	TEMPERATURE	: 24deg.C
Mode	: Transmitting 2480MHz	HUMIDITY	: 64%
Remarks	: Hor: X-axis , Ver: X axis (Bluetooth Module Board)	ENGINEER	: Norihisa Hashimoto
	: Hor: X-axis , Ver: Y-axis (for antenna)		

PK DETECT (RBW: 1MHz, VBW: 1MHz)

No.	FREQ	S/A READING		ANT	AMP	CABLE	Hi-Pass	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN	LOSS	Filter	HOR	VER	PK	HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss												
1	2483.5	54.0	55.0	26.8	32.1	2.6	0.0	51.3	52.3	73.9	22.6	21.6
2	4808.0	48.3	50.4	30.8	31.2	3.4	0.7	52.0	54.1	73.9	21.9	19.8
3	4960.0	45.8	47.0	31.1	31.2	3.4	0.7	49.8	51.0	73.9	24.1	22.9
4	7440.0	42.9	42.4	35.6	32.6	4.3	0.5	50.7	50.2	73.9	23.2	23.7
5	9920.0	43.0	43.1	37.7	32.9	5.4	0.6	53.8	53.9	73.9	20.1	20.0
Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss - Dfac												
6	12400.0	NS	NS	-	-	-	-	-	-	73.9	-	-
7	14880.0	NS	NS	-	-	-	-	-	-	73.9	-	-
8	17360.0	NS	NS	-	-	-	-	-	-	73.9	-	-
9	19840.0	NS	NS	-	-	-	-	-	-	73.9	-	-
10	22320.0	NS	NS	-	-	-	-	-	-	73.9	-	-
11	24800.0	46.0	46.1	38.9	32.2	8.3	0.0	51.5	51.6	73.9	22.4	22.3

AV DETECT (RBW: 1MHz, VBW: 10Hz)

No.	FREQ	S/A READING		ANT	AMP	CABLE	Hi-Pass	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN	LOSS	Filter	HOR	VER	AV	HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss												
1	2483.5	40.3	41.1	26.8	32.1	2.6	0.0	37.6	38.4	53.9	16.3	15.5
2	4808.0	33.5	34.2	30.8	31.2	3.4	0.7	37.2	37.9	53.9	16.7	16.0
3	4960.0	34.6	35.8	31.1	31.2	3.4	0.7	38.6	39.8	53.9	15.3	14.1
4	7440.0	30.2	30.2	35.6	32.6	4.3	0.5	38.0	38.0	53.9	15.9	15.9
5	9920.0	30.4	30.4	37.7	32.9	5.4	0.6	41.2	41.2	53.9	12.7	12.7
Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss - Dfac												
6	12400.0	NS	NS	-	-	-	-	-	-	53.9	-	-
7	14880.0	NS	NS	-	-	-	-	-	-	53.9	-	-
8	17360.0	NS	NS	-	-	-	-	-	-	53.9	-	-
9	19840.0	NS	NS	-	-	-	-	-	-	53.9	-	-
10	22320.0	NS	NS	-	-	-	-	-	-	53.9	-	-
11	24800.0	33.1	33.2	38.9	32.2	8.3	0.0	38.6	38.7	53.9	15.3	15.2

Test Distance 1.0m : Distance Factor(Dfac) = 20log(3/1.0) = 9.5dB
*Except for the above table : All other spurious emissions were less than 20dB for the limit.
*In the frequency over the fifth harmonic, the noise from the EUT was not seen.The data above is its base noise.
*The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.
*Hi-Pass Fiter was not used for factor 0.0dB of the above table.
NS: Non Signal

Radiated Spurious Emission (above 1GHz)
Rx, Ch. Mid

UL Japan, Inc.
Head Office EMC Lab. No.4Semi Anechoic Chamber

Company	: ALPINE ELECTRONICS, INC.	REPORT NO	: 27FE0134-HO
Equipment	: Bluetooth Module Board	REGULATION	: FCC15.247(d)/RSS-210A8.5
Model	: 96-09386Z98	TEST DISTANCE	: 3m
Sample No.	: 1	DATE	: 05/25/2007
Power	: DC 12V	TEMPERATURE	: 24deg.C
Mode	: Receiving 2441MHz	HUMIDITY	: 64%
Remarks	: Hor: X-axis , Ver: X axis (for Bluetooth Module Board)	ENGINEER	: Norihisa Hashimoto
	: Hor: X-axis , Ver: Y-axis (for antenna)		

PK DETECT (RBW: 1MHz, VBW: 1MHz)

No.	FREQ	S/A READING		ANT	AMP	CABLE	Hi-Pass	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN	LOSS	Filter	HOR	VER	PK	HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss												
1	2441.0	42.5	41.7	26.7	32.1	2.5	0.0	39.6	38.8	73.9	34.3	35.1
2	2443.0	49.8	52.6	26.7	32.1	2.5	0.0	46.9	49.7	73.9	27.0	24.2
3	4882.0	41.1	41.5	31.0	31.2	3.4	0.0	44.3	44.7	73.9	29.6	29.2
4	4886.0	47.4	49.5	31.0	31.2	3.4	0.0	50.6	52.7	73.9	23.3	21.2
5	7323.0	43.5	42.5	35.4	32.5	4.3	0.0	50.7	49.7	73.9	23.2	24.2
6	9764.0	42.2	42.6	37.6	32.9	5.4	0.0	52.3	52.7	73.9	21.6	21.2
7	12205.0	41.3	41.4	38.5	32.9	5.5	0.0	52.4	52.5	73.9	21.5	21.4

AV DETECT (RBW: 1MHz, VBW: 10Hz)

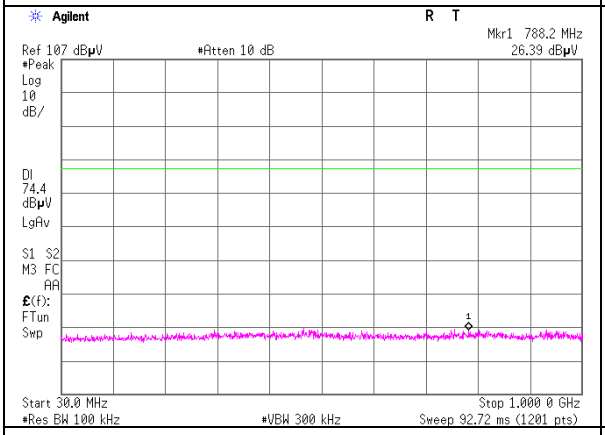
No.	FREQ	S/A READING		ANT	AMP	CABLE	Hi-Pass	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN	LOSS	Filter	HOR	VER	AV	HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss												
1	2441.0	29.1	29.0	26.7	32.1	2.5	0.0	26.2	26.1	53.9	27.7	27.8
2	2443.0	45.9	50.4	26.7	32.1	2.5	0.0	43.0	47.5	53.9	10.9	6.4
3	4882.0	28.4	28.6	31.0	31.2	3.4	0.0	31.6	31.8	53.9	22.3	22.1
4	4886.0	42.7	45.5	31.0	31.2	3.4	0.0	45.9	48.7	53.9	8.0	5.2
5	7323.0	29.6	29.6	35.4	32.5	4.3	0.0	36.8	36.8	53.9	17.1	17.1
6	9764.0	29.3	29.5	37.6	32.9	5.4	0.0	39.4	39.6	53.9	14.5	14.3
7	12205.0	28.4	28.5	38.5	32.9	5.5	0.0	39.5	39.6	53.9	14.4	14.3

Test Distance 1.0m : Distance Factor(Dfac) = 20log(3/1.0) = 9.5dB
*Except for the above table : All other spurious emissions were less than 20dB for the limit.
*In the frequency over the fifth harmonic, the noise from the EUT was not seen.The data above is its base noise.
*The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.
*Hi-Pass Fiter was not used for factor 0.0dB of the above table.

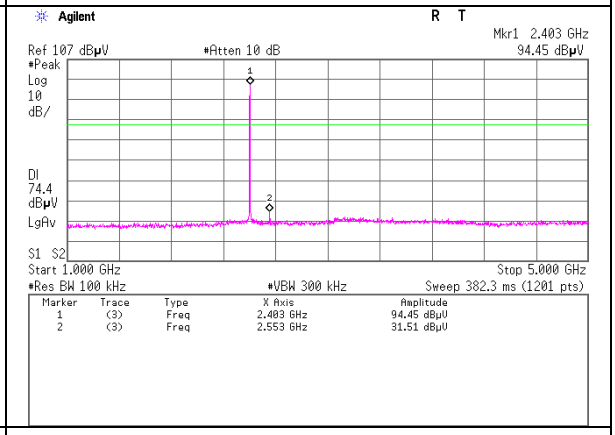
Conducted Spurious Emission

Tx, Ch:Low

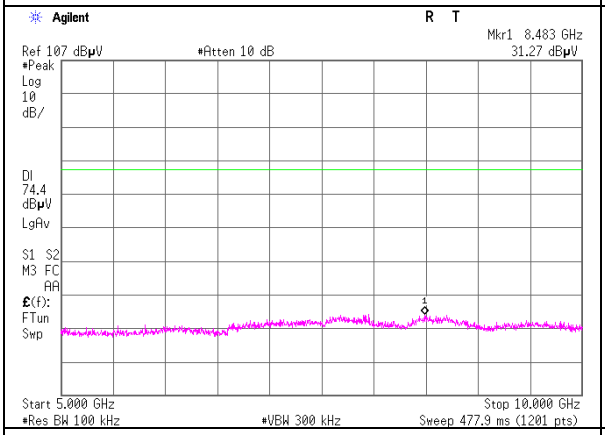
30MHz-1GHz



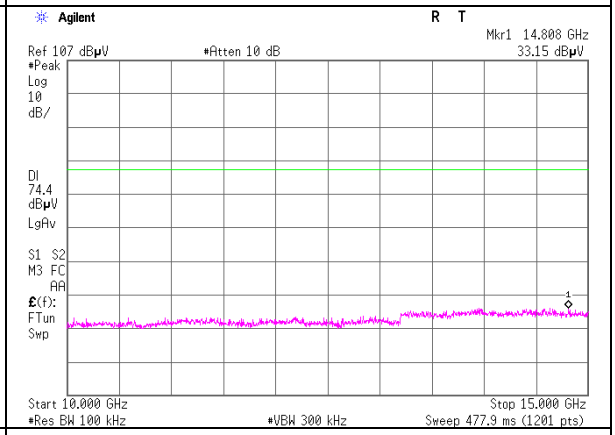
1GHz-5GHz



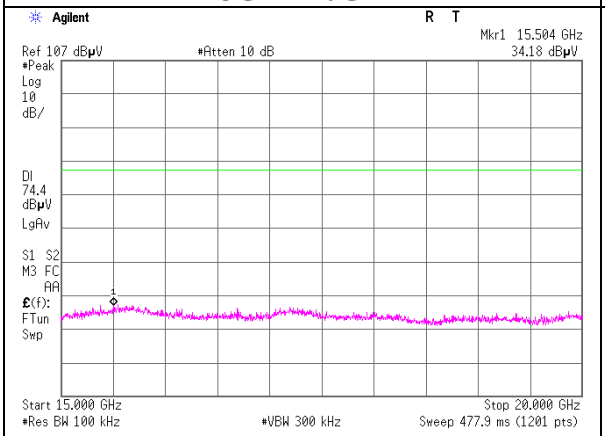
5GHz-10GHz



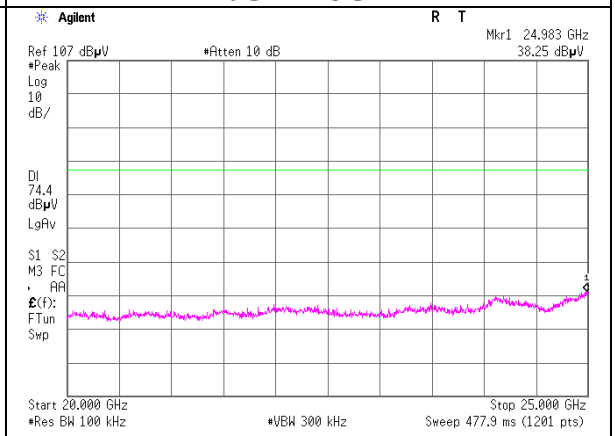
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz



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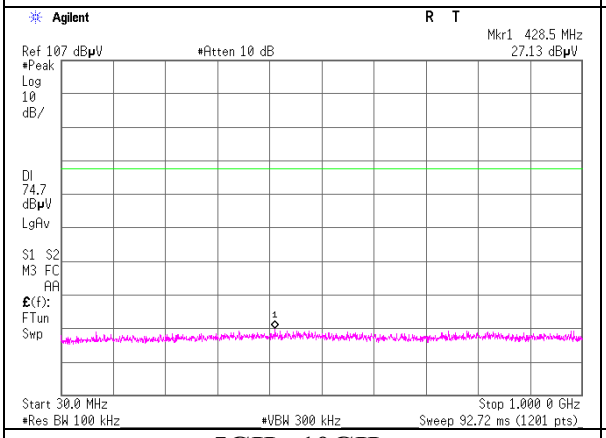
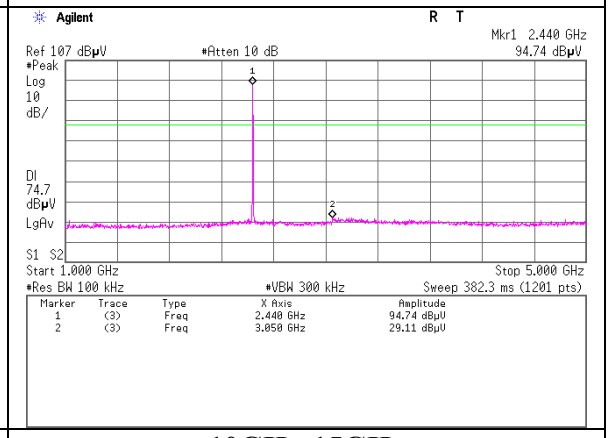
Conducted Spurious Emission

Tx, Ch:Mid

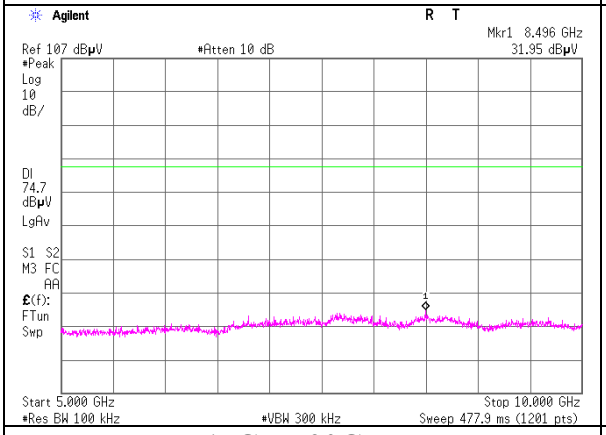
30MHz-1GHz



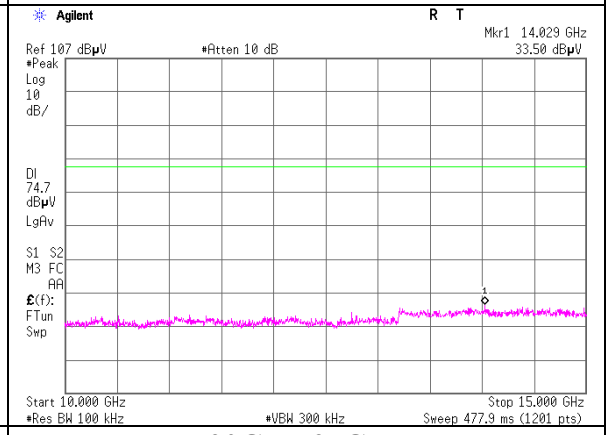
1GHz-5GHz



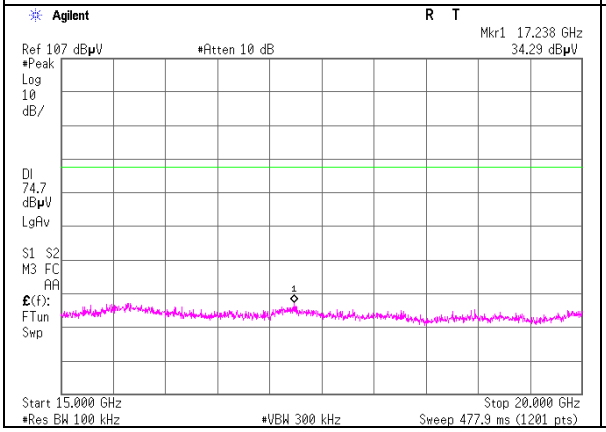
5GHz-10GHz



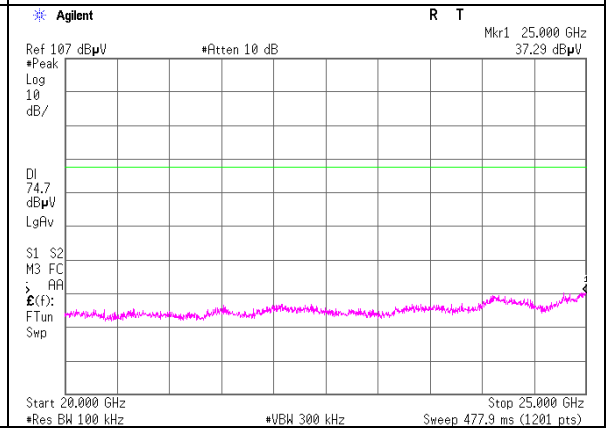
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz



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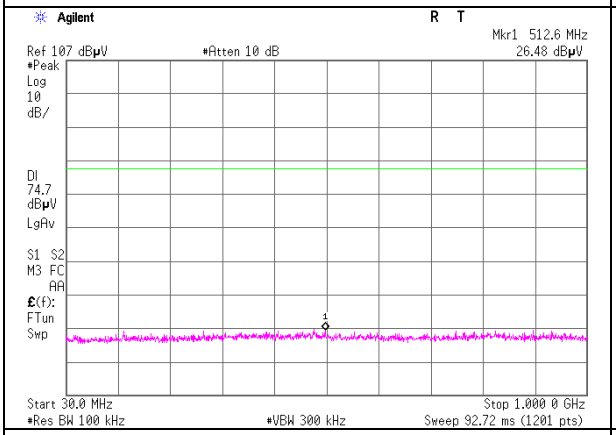
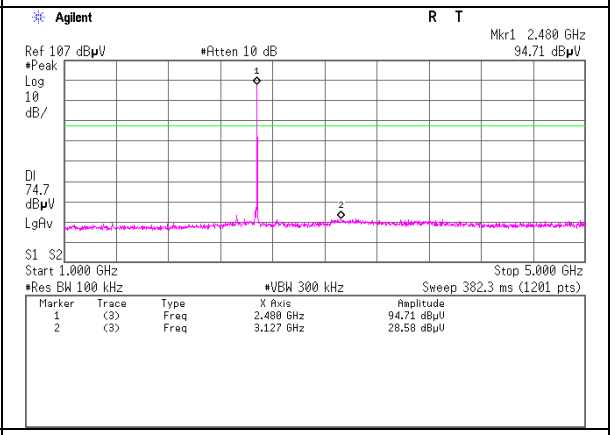
Conducted Spurious Emission
Tx, Ch:High

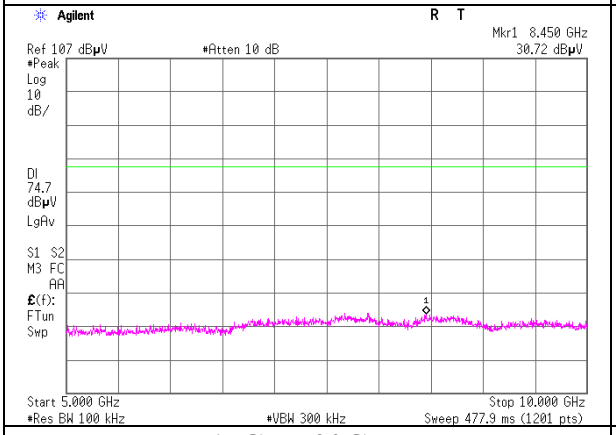
30MHz-1GHz



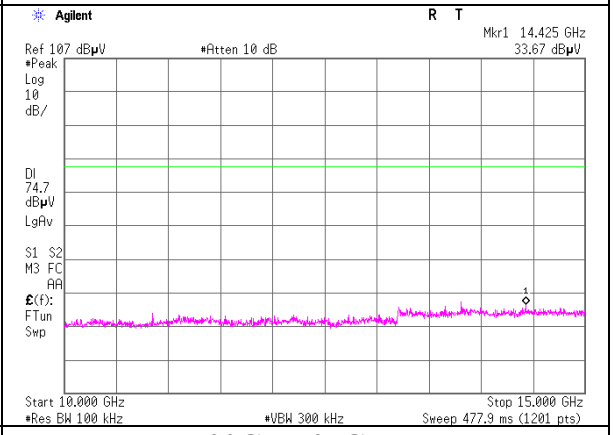
1GHz-5GHz



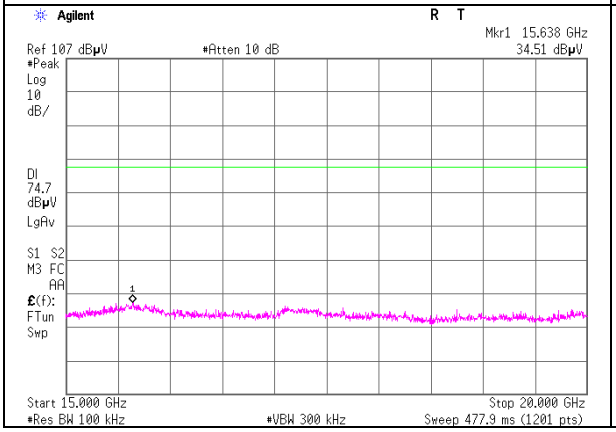
5GHz-10GHz



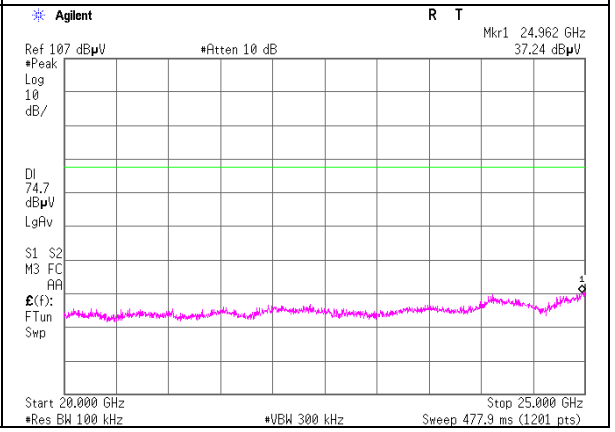
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz



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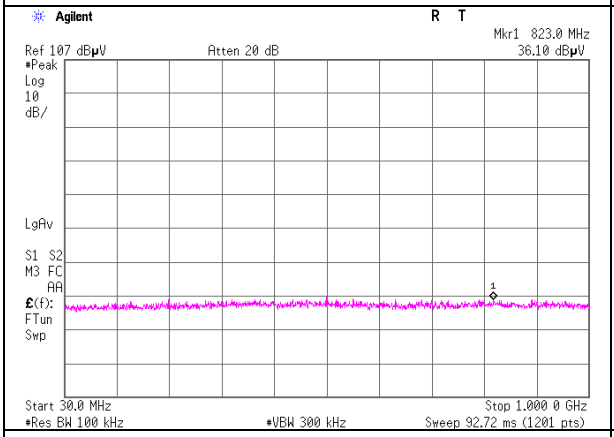
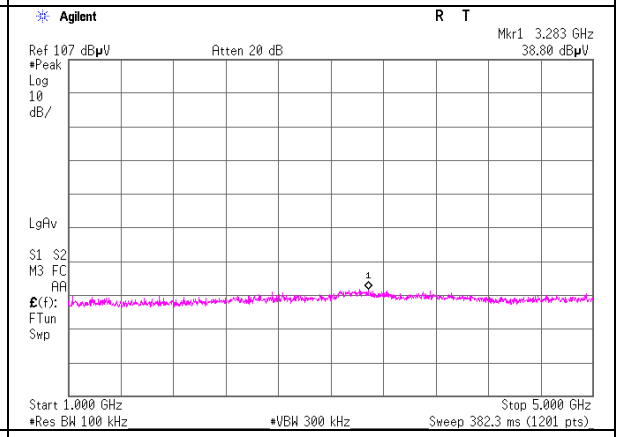
Conducted Spurious Emission

Rx, Ch:Mid

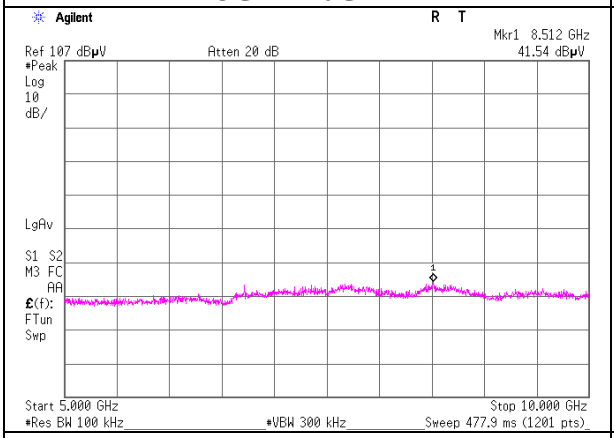
30MHz-1GHz



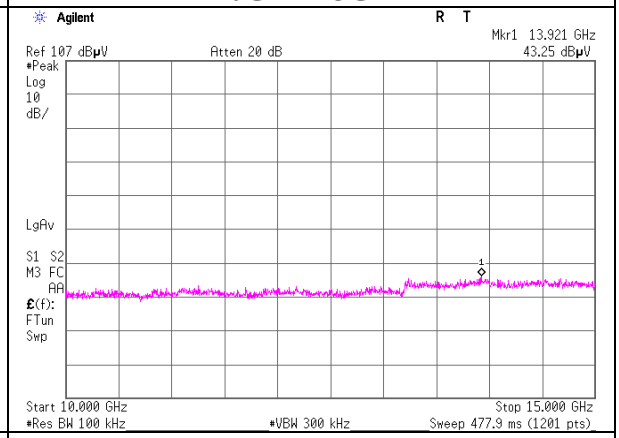
1GHz-5GHz



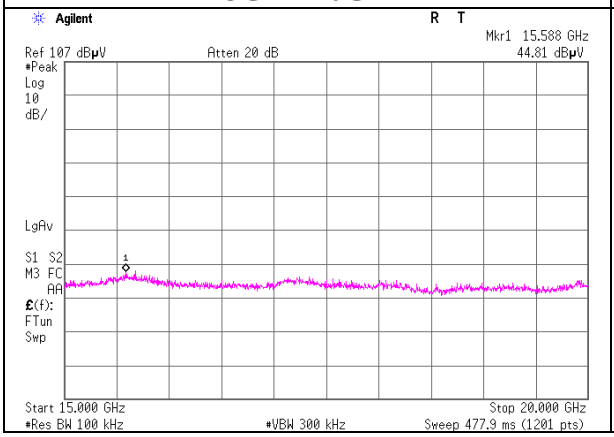
5GHz-10GHz



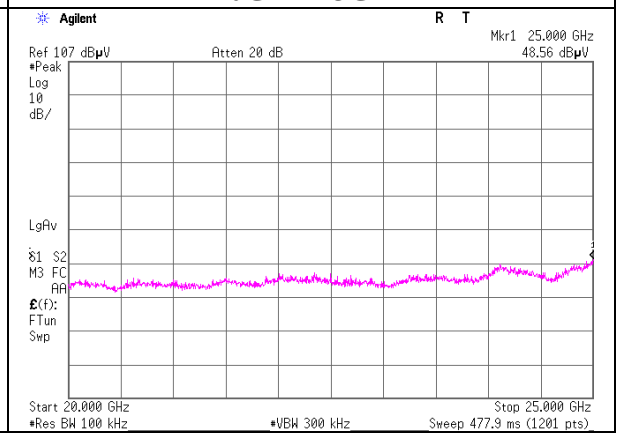
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz



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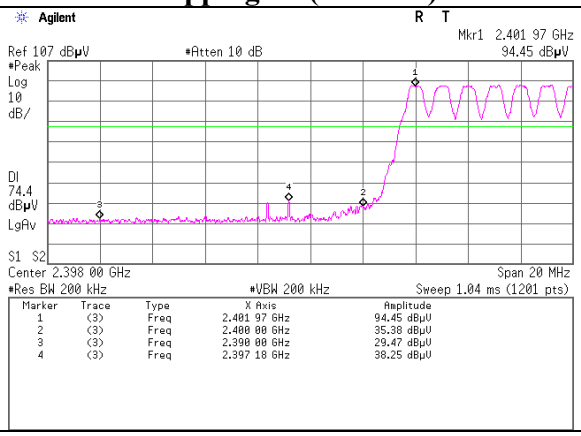
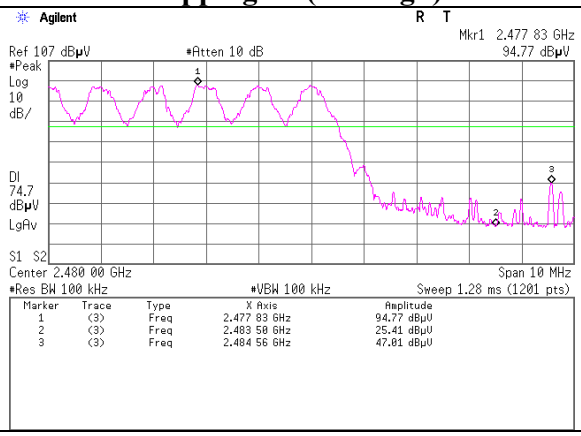
Conducted Spurious Emission
Band Edge compliance

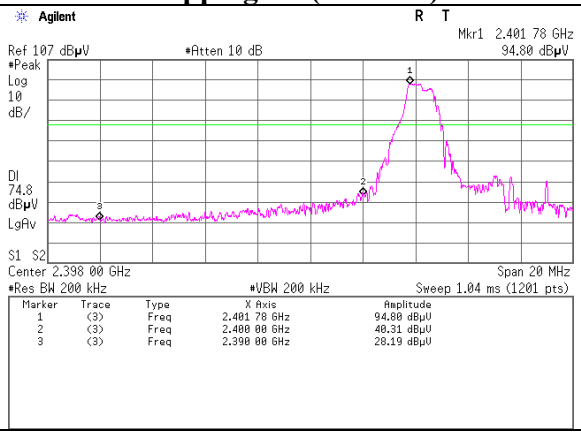
Hopping on (Ch:Low)



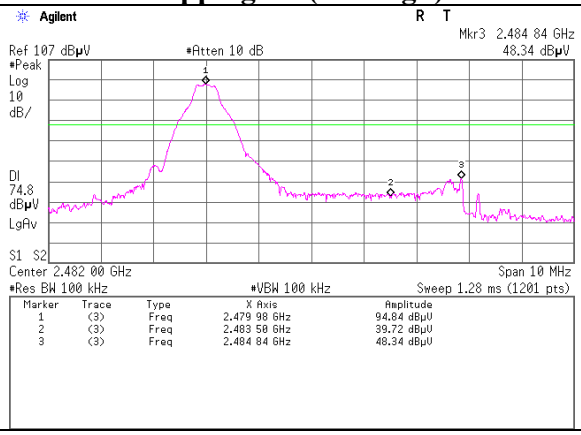
Hopping on (Ch:High)



Hopping off (Ch:Low)



Hopping off (Ch:High)



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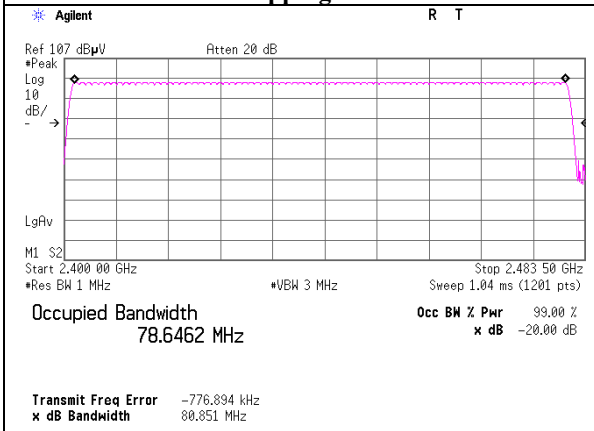
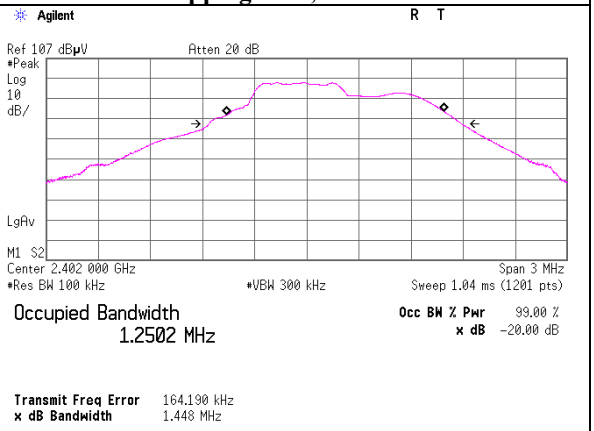
99% Occupied Bandwidth

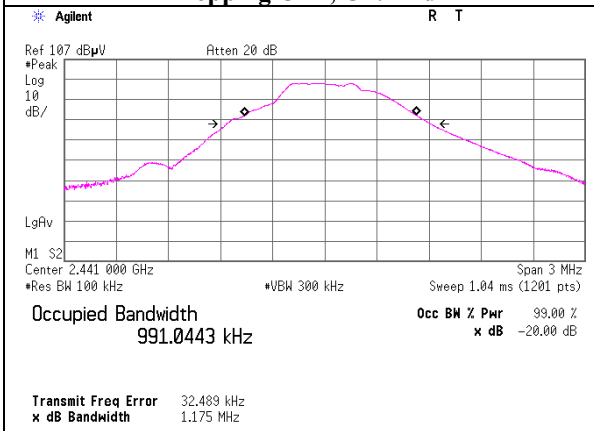
Hopping ON



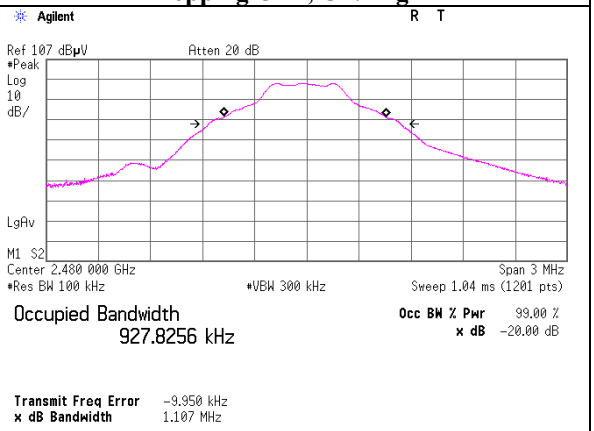
Hopping OFF, Ch: Low



Hopping OFF, Ch: Mid



Hopping OFF, Ch: High



APPENDIX 3:Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-04	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE	2007/03/03 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	RE	2007/01/19 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	RE	2007/01/19 * 12
MCC-50	Coaxial cable	UL Apex	-	RE	2007/03/06 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	RE	2007/03/12 * 12
MAT-31	Attenuator(6dB)	TME	UFA-01	RE	2007/03/05 * 12
MSA-05	Spectrum Analyzer	Advantest	R3273	RE	2007/06/01 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	RE	2006/01/19 * 24
MBM-03	Barometer	Sunoh	SBR121	RE	2006/02/13 * 36
MJM-07	Measure	PROMART	SEN1955	RE	-
MSTW-14	EMI measurement program	TSJ	TEPTO-DV	RE	
MCC-57	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	RE	2007/03/30 * 12
MHF-14	High Pass Filter 3.5-18GHz	TOKIMEC	TF323DCC	RE	2006/12/18 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	RE	2007/03/12 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	RE	2006/08/17 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	RE	2007/04/06 * 12
MAT-23	Attenuator(10dB) DC-18GHz	Orient Microwave	BX10-0476-00	AT	2007/03/07 * 12
MCC-67	Microwave Cable 1G-40GHz	Schner	SUCOFLEX102	AT	2007/04/03 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	AT	2006/06/02 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-180	AT	2006/01/19 * 24
MPM-09	Power Meter	Anritsu	ML2495A	AT	2006/09/20 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	AT	2006/09/20 * 12

The expiration date of the calibration is the end of the expired month.
All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item: CE: Conducted Emission
RE: Radiated Emission
AT: Antenna Terminal Conducted test