RADIO TEST REPORT

Test Report No.: 28GE0195-HO-01-A

Applicant	:	**Hitachi Maxell, Ltd.**
Type of Equipment	:	**Digital Pen**
Model No.	:	**DP-301**
FCC ID	:	**NEEDP03**
Test regulation	:	**FCC Part15 Subpart B: 2008** **FCC Part15 Subpart C: 2008**
Test result	:	**Complied**

1. This test report shall not be reproduced except in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.

Date of test: March 18 and 19, 2008

Tested by: T. Arai
Tatsuya Arai

Approved by: O. Watatani
Osamu Watatani
Manager of Yamakita EMC Lab.

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1 Applicant information

Company Name	:	Hitachi Maxell, Ltd.
Brand Name	:	maxell
Address	:	6-20-1 Kinunodai, Tsukubamirai-shi, Ibaraki-ken, 300-2496 Japan
Telephone Number	:	+81-297-20-5320
Facsimile Number	:	+81-297-20-5376
Contact Person	:	Masato Suzuki

2 Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	Digital Pen
Model No.	:	DP-301
Serial No.	:	Refer to 4.2 in this report.
Rating	:	DC1.5V
Country of Mass-production	:	China
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No modification by the test lab.
Receipt Date of Sample	:	March 18, 2008

2.2 Product description

Model: DP-301 (referred to as the EUT in this report) is a Digital Pen.
This pen-shape device is called a digital pen, which can convert analog information such as hand-written letters and drawings on a special sheet of paper, on which invisible dot patterns are printed. This digital pen can interface with PC and other computer devices, and transmit the digital information through Bluetooth.

Equipment type	:	Transceiver
Frequency of operation	:	2402-2480MHz
Clock frequency	:	26MHz
Bandwidth & channel spacing	:	79MHz & 1MHz
Type of modulation	:	FHSS
Antenna model & type	:	Inverted-F
Antenna gain with cable loss	:	0.69dBi
Antenna connector type	:	Soldering
ITU code	:	F1D
Operation temperature range	:	0 to +40 deg.C.

FCC Part15.31 (e)
The equipment provides the Bluetooth module with stable power supply (DC 3.3 V), therefore, the equipment complies power supply regulation.

FCC Part15.203 Antenna requirement
The equipment and its antenna comply with this requirement since this antenna is built in the equipment and it cannot be replaced by end users.

3 Test specification, procedures and results

3.1 Test specification

Test specification : FCC Part 15 Subpart B: 2008, final revised on March 24, 2008
Title : FCC 47CFR Part 15 Radio Frequency Device Subpart B Unintentional Radiators

Test specification : FCC Part 15 Subpart C: 2008, final revised on March 24, 2008
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.209 Radiated emission limits, general requirements
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz

*The revision on March 24, 2008 does not influence the test specification applied to the EUT.

3.2 Procedures & results

<Part 15 Subpart B, Radio requirement>

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4: 2003 7. AC powerline conducted emission measurements	FCC Section 15.107	N/A *1)	N/A	N/A
Radiated emission	ANSI C63.4: 2003 8. Radiated emission measurements	FCC Section 15.109	N/A	10.8dB (62.47MHz, Vertical, Rx 2441MHz, QP)	Complied

*1) The test is not applicable since the EUT has no AC mains.
Note: UL Japan's EMI Work Procedures No.QPM05.

<Part 15 Subpart C>

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	FCC Section 15.207	-	N/A *1)	N/A	N/A
Carrier Frequency Separation	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)	Conducted	N/A	*See data.	Complied
20dB Bandwidth	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)	Conducted	N/A		Complied
Number of Hopping Frequency	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)(iii)	Conducted	N/A		Complied
Dwell time	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)(iii)	Conducted	N/A		Complied
Maximum Peak Output Power	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (b)(1)	Conducted	N/A		Complied
Band Edge Compliance	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (d)	Radiated	N/A		Complied
Spurious Emission	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.209 & Section15.247 (d)	Conducted/ Radiated	N/A	0.7dB (4960.00MHz, Horizontal, Tx 2480MHz, AV)	Complied

*1) The test is not applicable since the EUT has no AC mains.
Note: UL Japan's EMI Work Procedures No.QPM05 and QPM15.

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.4:2003 13. Measurement of intentional radiators RSS-Gen 4.6.1	RSS-Gen 4.6.1	Conducted	-	Complied

* Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

	No.1 open site (±)	No.2 open site (±)	No.1 anechoic chamber (±)
Radiated emission (3m)			
30-300MHz	4.5 dB	4.4 dB	4.5 dB
300-1000MHz	4.3 dB	4.3 dB	4.3 dB
1GHz<	5.7 dB	5.7 dB	5.7 dB

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

Antenna port conducted test	(±)
Below 1GHz	0.4dB
1GHz and above	0.7dB

3.5 Test location

UL Japan, Inc. Yamakita EMC Lab.
907, Kawanishi, Yamakita-machi, Ashigarakami-gun, Kanagawa-ken 258-0124 JAPAN
Telephone number : +81 465 77 1011
Facsimile number : +81 465 77 2112
NVLAP Lab. code : 200441-0

No. 1 test site has been fully described in a report submitted to FCC office, and accepted on August 26, 2005 (Registration No.: 95486).
IC Registration No. : 2973B-1

No. 2 test site has been fully described in a report submitted to FCC office, and accepted on April 4, 2005 (Registration No.: 466226).
IC Registration No. : 2973B-3

No. 1 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on November 2, 2005 (Registration No.: 95967).
IC Registration No. : 2973B-2

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 shielded room	8.0 x 5.0 x 2.5	No.1 Semi-anechoic chamber	10.0 x 7.5 x 5.7
No.2 shielded room	5.0 x 4.0 x 2.5		
No.3 shielded room	4.0 x 5.0 x 2.7		

Open test site	Maximum measurement distance
No.1 open test site	30m
No.2 open test site	10m

4 System test configuration

4.1 Justification

The system was configured in typical fashion (as a customer would normally use it) for testing.

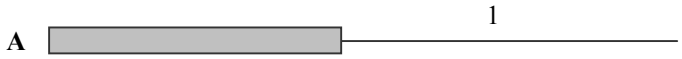
Test mode: Transmitting
- Low channel : 2402MHz
- Middle channel : 2441MHz
- High channel : 2480MHz
- Hopping mode

* No function of Inquiry mode and Page mode

Receiving
- Middle channel : 2441MHz

*Remarks: Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.
However, the limit level 125mWof AFH mode was used for the test.

4.2 Configuration of tested system



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Digital Pen	DP-301	*1)	Namtai	EUT

*1) Out of Band emission (Radiated): AJX-AAB-D53-AE, other test: AJX-AAB-D6R-A5

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Interface cable	0.45	Unshielded	Unshielded	Jig

* The cable was used to input test commands and didn't influence the test result.

5 Carrier frequency separation

Test Procedure
The carrier frequency separation was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass
Date : March 19, 2008 Test engineer : Tatsuya Arai

6 20dB bandwidth & Occupied bandwidth (99%)

Test Procedure
The bandwidth was measured with a spectrum analyzer connected to the antenna port.
The channel separation in Hopping mode and Inquiry mode was separated by 25kHz and 2/3 of the 20dB bandwidth.

Summary of the test results: Pass
Date : March 19, 2008 Test engineer : Tatsuya Arai

7 Number of hopping frequency

Test Procedure
The Number of Hopping Frequency was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass
Date : March 19, 2008 Test engineer : Tatsuya Arai

8 Dwell time

Test Procedure
The Dwell time was measured with a spectrum analyzer connected to the antenna port.
Measurement was performed with the packet type of DH1, DH3 and DH5.

Summary of the test results: Pass
Date : March 19, 2008 Test engineer : Tatsuya Arai

9 Maximum peak output power

Test Procedure
The Maximum Peak Output Power was measured with a power meter connected to the antenna port.

Summary of the test results: Pass
Date : March 19, 2008 Test engineer : Tatsuya Arai

10 Out of band emissions (Antenna port conducted)

Test Procedure
The Out of Band Emissions was measured with a spectrum analyzer connected to the antenna port.
In any 100kHz 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 confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a conducted measurement.

Summary of the test results: Pass
Date : March 19, 2008 Test engineer : Tatsuya Arai

11 Out of band emissions (Radiated)

11.1 Operating environment

The test was carried out in No.1 anechoic chamber.

11.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.5m by 0.5m, raised 80cm above the conducting ground plane. A drawing of the set up is shown in the photos of Appendix 1.

11.3 Test conditions

Frequency range : 30MHz - 26.5GHz
Test distance : 3m (30MHz-18GHz), 1m (18-26.5GHz)
EUT operation mode : Transmitting, Receiving

11.4 Test procedure

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m or 1m. The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization. Measurements were performed with QP, PK, and AV detector.
The radiated emission measurements were made with the following detector function of the test receiver.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
Detector IF Bandwidth	QP: BW 120kHz	PK: RBW: 1MHz/VBW: 1MHz, AV RBW: 1MHz/VBW: 300Hz
Measuring antenna	Biconical (30-300MHz) Logperiodic (300MHz-1GHz)	Horn

The equipment was previously checked at each position of three axes X, Y and Z. The position in which the maximum noise occurred was chosen to put into measurement. See the table below and photographs in page 12. With the position, the noise levels of all the frequencies were measured.

Frequency	Worst position	
	Horizontal	Vertical
Below 1GHz	Y	Z
Above 1GHz	Y	Z

11.5 Band edge

Band edge level at 2390MHz and 2483.5MHz is below the limits of FCC 15.209 and band edge level at 2400MHz is below the 20dBc. Refer to the data.

11.6 Results

Summary of the test results : Pass *No noise was detected above the 5th order harmonics.

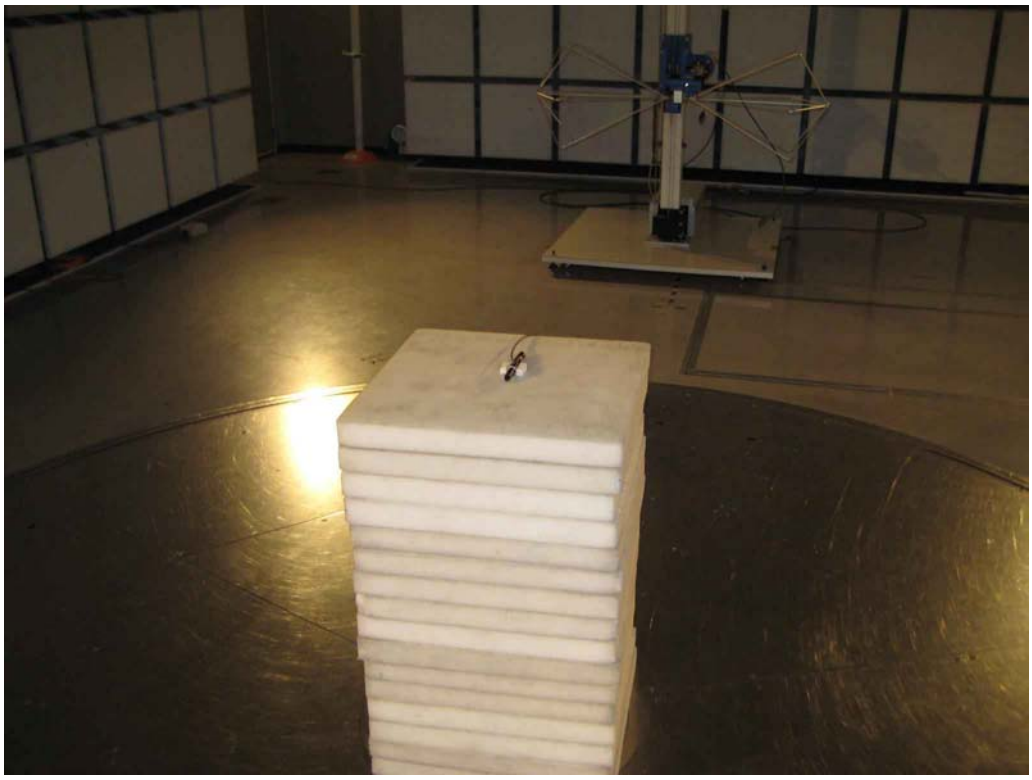
Date : March 18, 2008 Test engineer : Tatsuya Arai

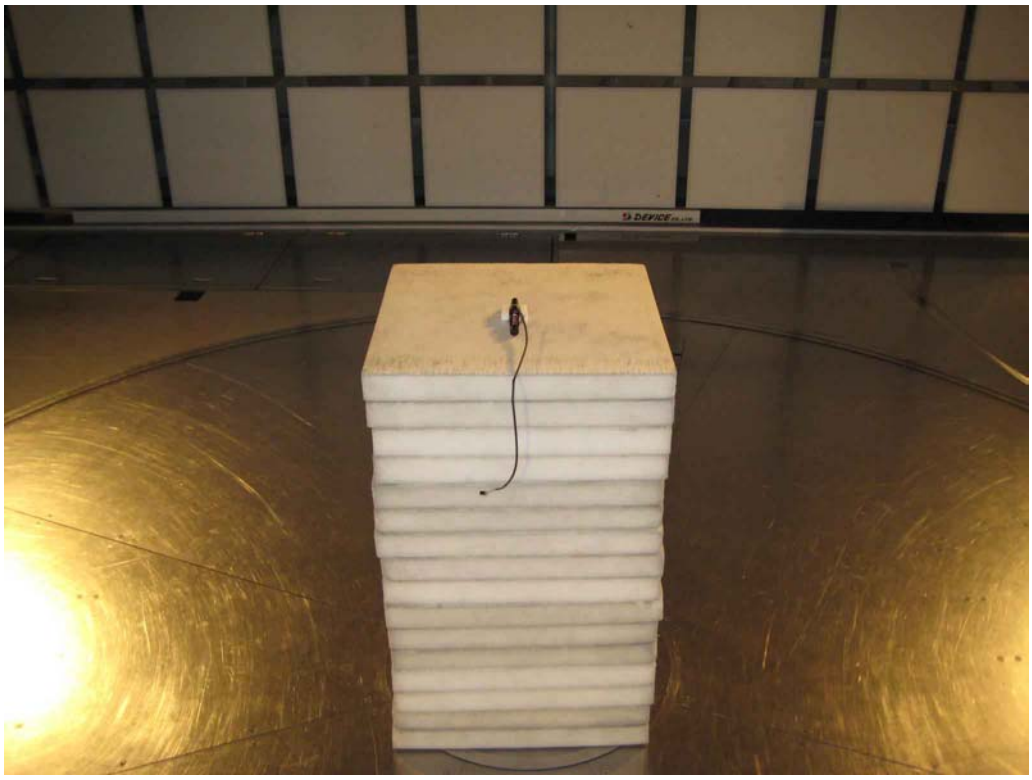
APPENDIX 1: Photographs of test setup

APPENDIX 2: Test Data

APPENDIX 3: Test instruments

Radiated emission





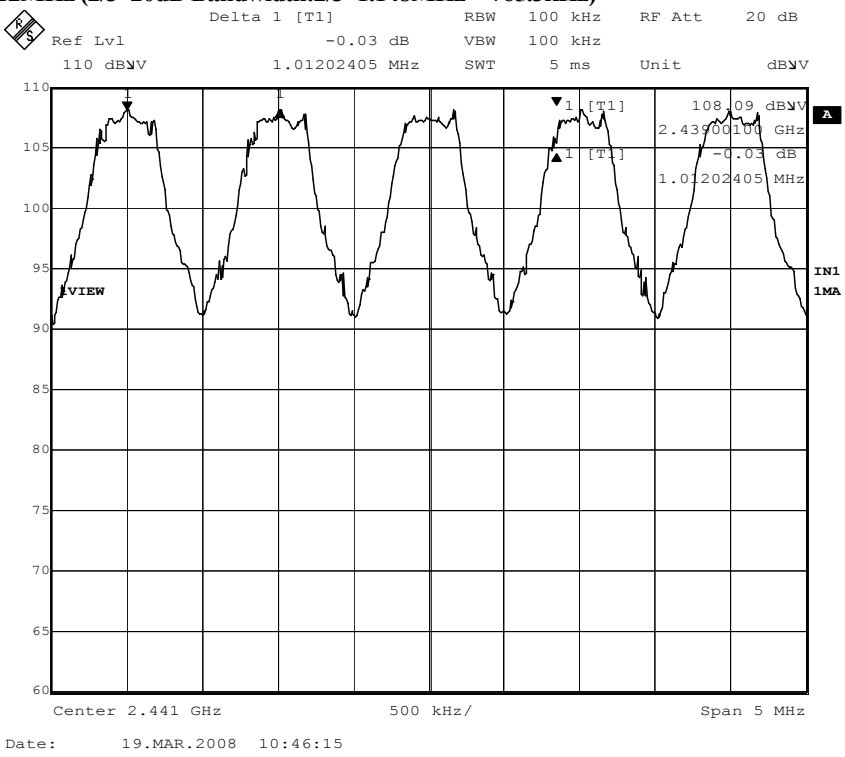
Pre-check of the worst position

Channel Separation (Regulation: FCC 15.247(a)(1))

UL Japan, Inc. Yamakita EMC lab.	No.2 shielded room
Date:	2008/3/19
Temp./Humid.:	24 deg. C. / 39 %
Engineer:	Tatsuya Arai
Test mode:	Transmitting

Limit: ≥25kHz or 2/3 * 20dB Bandwidth (Power: No greater than 125mW)

1. Hopping, DH5: 1.012MHz (2/3*20dB Bandwidth:2/3*1.148MHz = 765.3kHz)

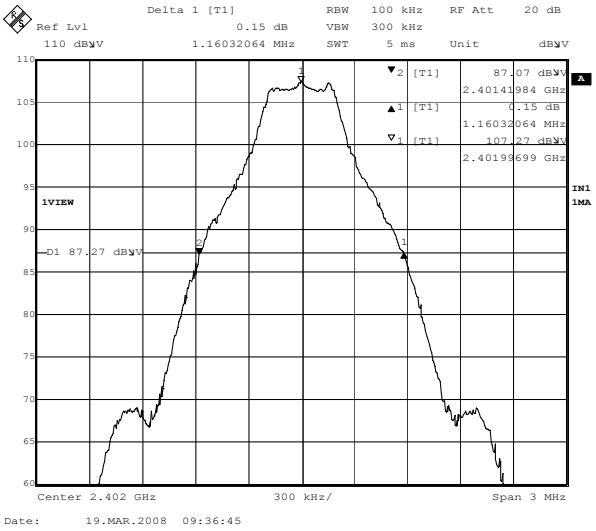


20dB Bandwidth (Regulation: FCC 15.247(a)(1))

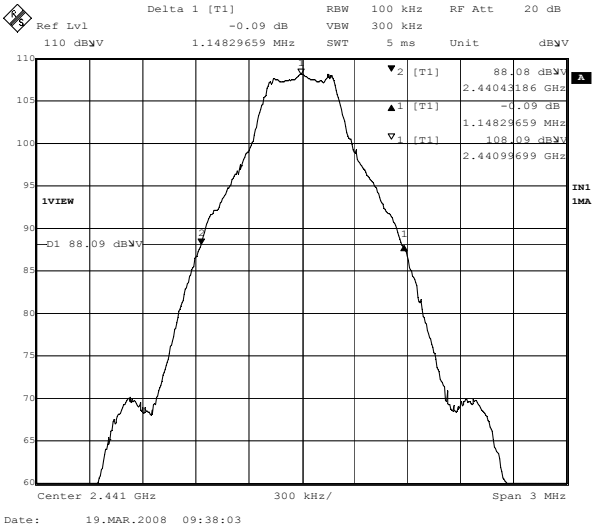
UL Japan, Inc. Yamakita EMC lab.	No.2 shielded room
Date:	2008/3/19
Temp./Humid.:	24 deg. C. / 39 %
Engineer:	Tatsuya Arai
Test mode:	Transmitting

[Hopping off, DH5]

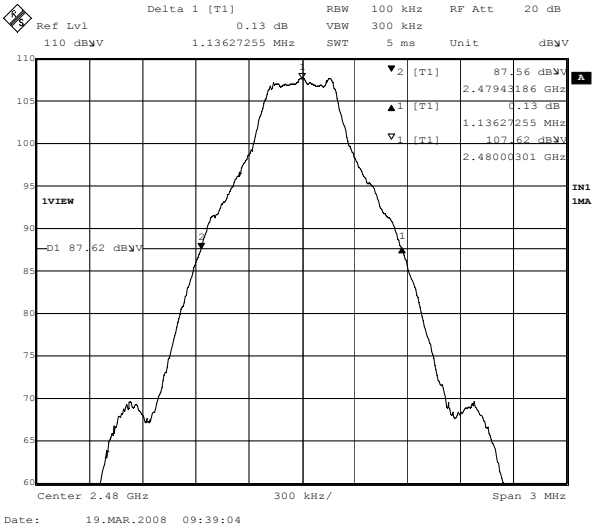
1. ch : 2402MHz/20dB Bandwidth:1.160MHz



2. ch : 2441MHz/20dB Bandwidth:1.148MHz



3. ch : 2480MHz/20dB Bandwidth:1.136MHz

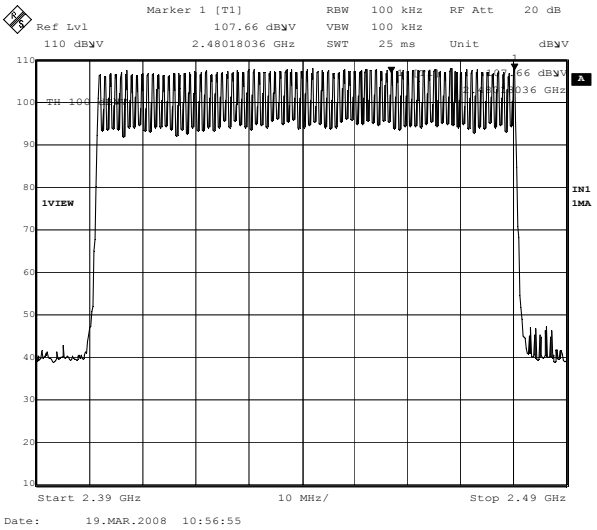


Channel Utilization (Regulation: FCC 15.247(a)(1)(iii))

UL Japan, Inc. Yamakita EMC lab.	No.2 shielded room
Date:	2008/3/19
Temp./Humid.:	24 deg. C. / 39 %
Engineer:	Tatsuya Arai
Test mode:	Transmitting

Hopping, DH5: 79ch

1.



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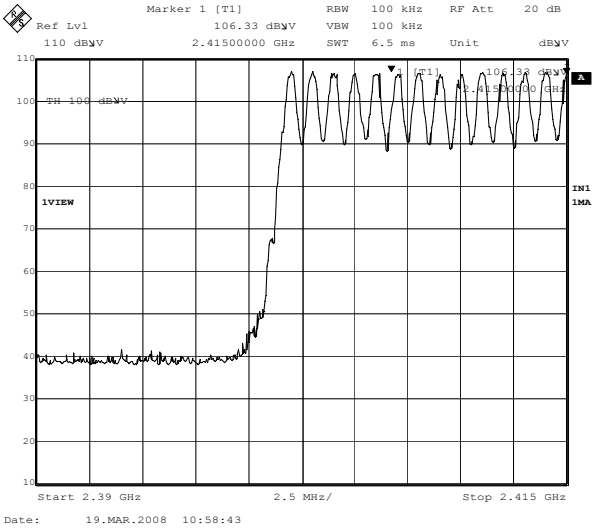

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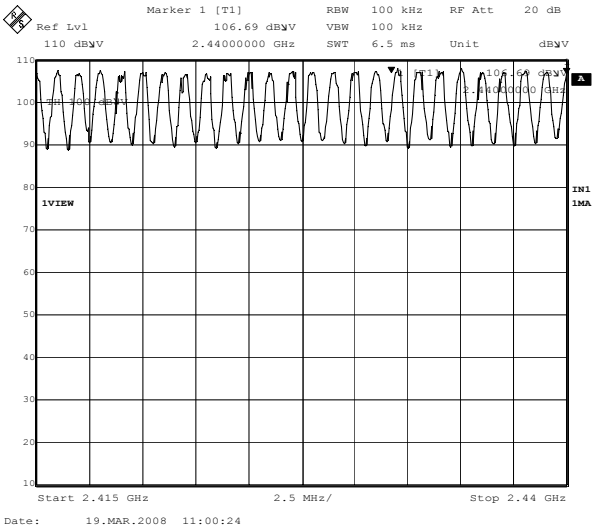

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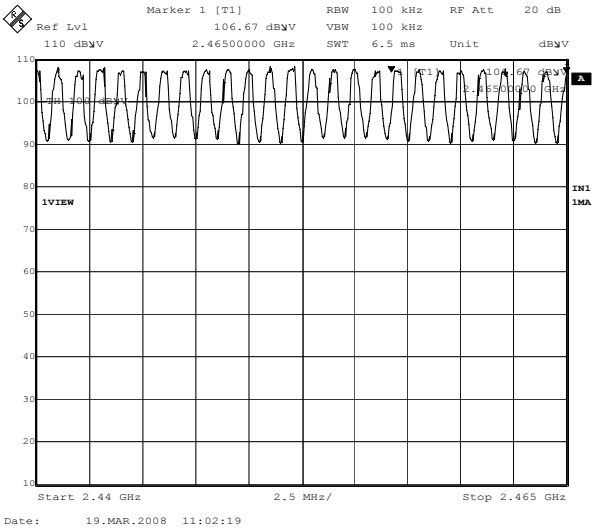
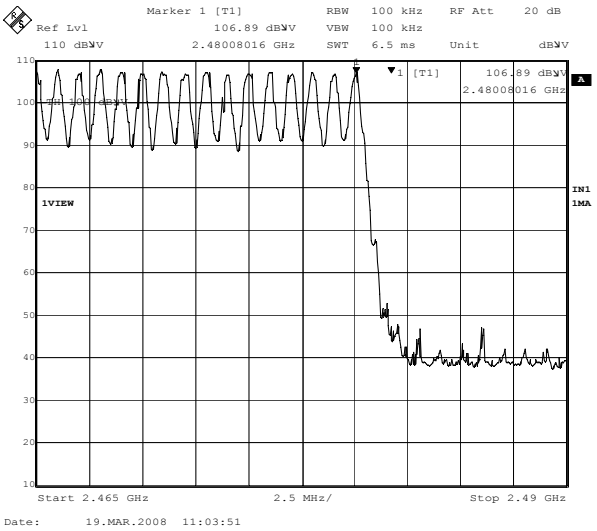

Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
106.67 dBµV
VBW 100 kHz
110 dBµV
2.46500000 GHz
SWT 6.5 ms
Unit dBµV
1 [T1]
106.67 dBµV
2.46500000 GHz
1VIEW
Start 2.44 GHz
2.5 MHz/
Stop 2.465 GHz
Date: 19.MAR.2008 11:02:19

5.

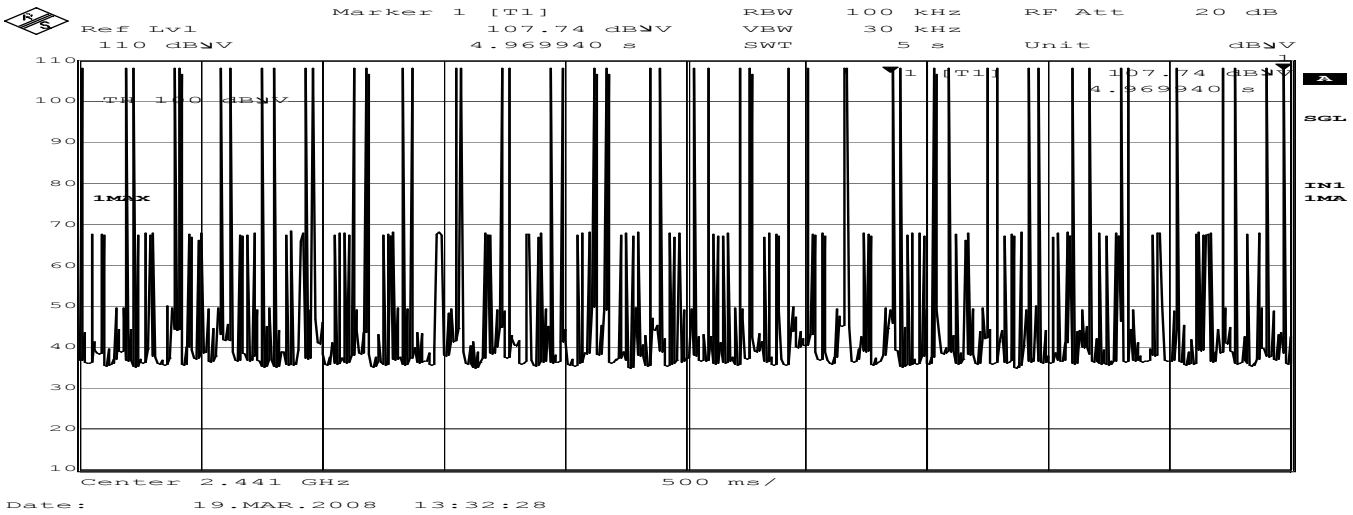

Marker 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
106.89 dBµV
VBW 100 kHz
110 dBµV
2.48008016 GHz
SWT 6.5 ms
Unit dBµV
1 [T1]
106.89 dBµV
2.48008016 GHz
1VIEW
Start 2.465 GHz
2.5 MHz/
Stop 2.49 GHz
Date: 19.MAR.2008 11:03:51

Dwell Time (Regulation: FCC 15.247(a)(1)(iii))

UL Japan, Inc. Yamakita EMC lab.	No.2 shielded room
Date:	2008/3/19
Temp./Humid.:	24 deg. C. / 39 %
Engineer:	Tatsuya Arai
Test mode:	Transmitting

Hopping (DH1):

Count 1



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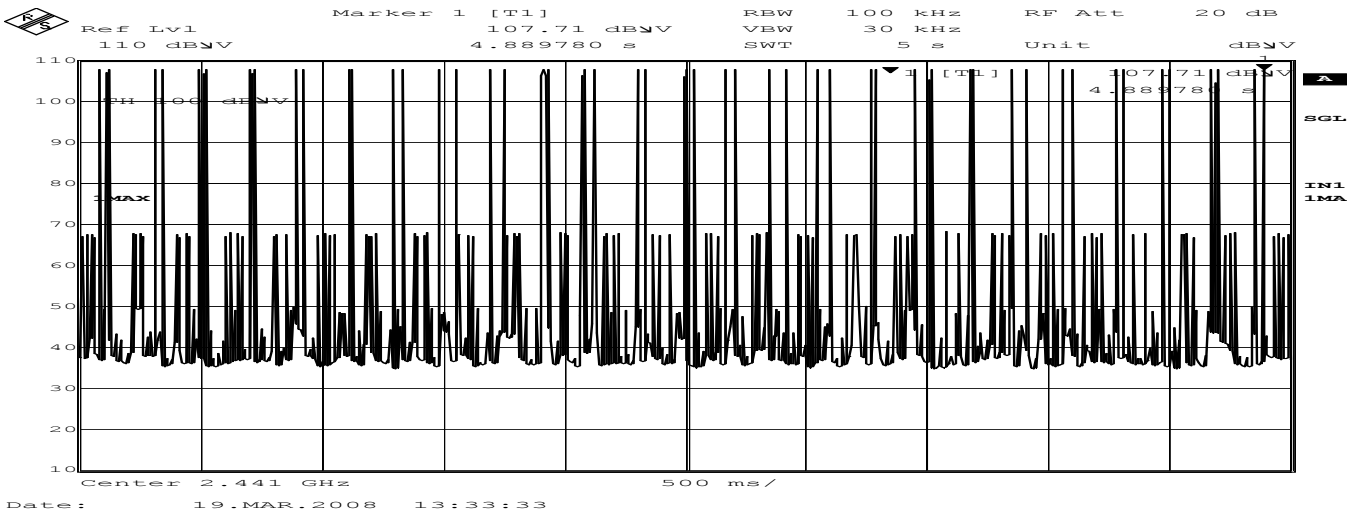

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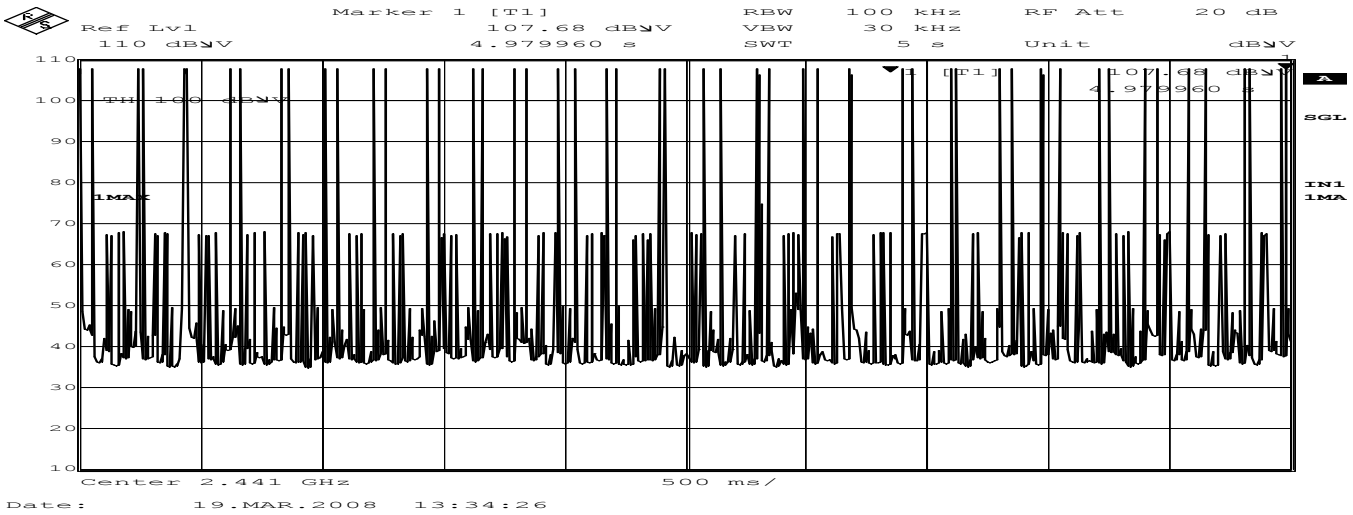
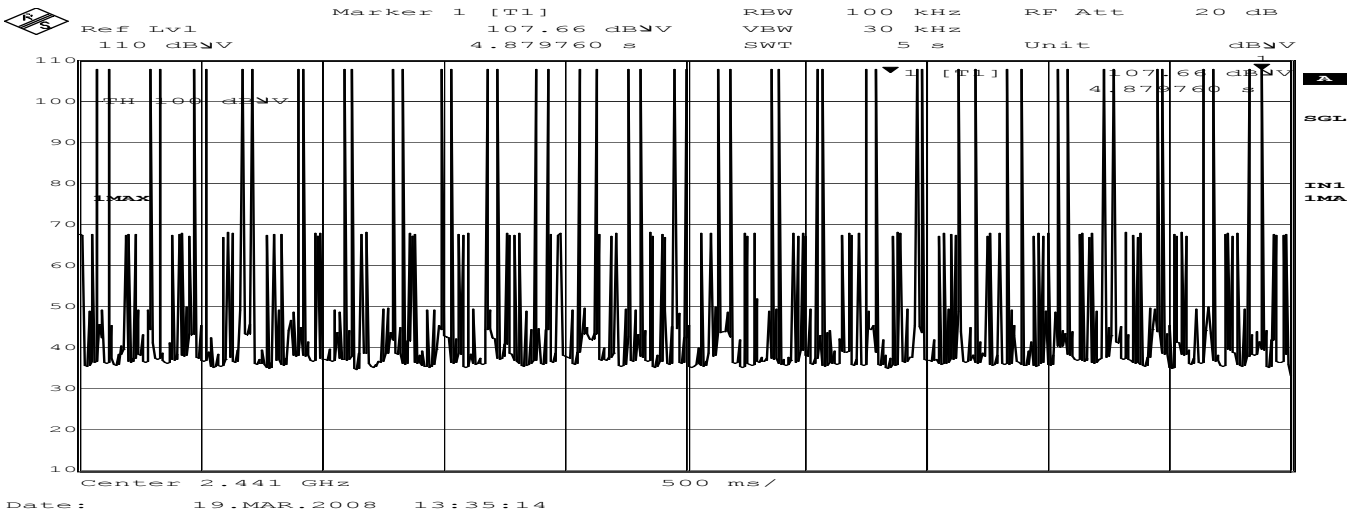
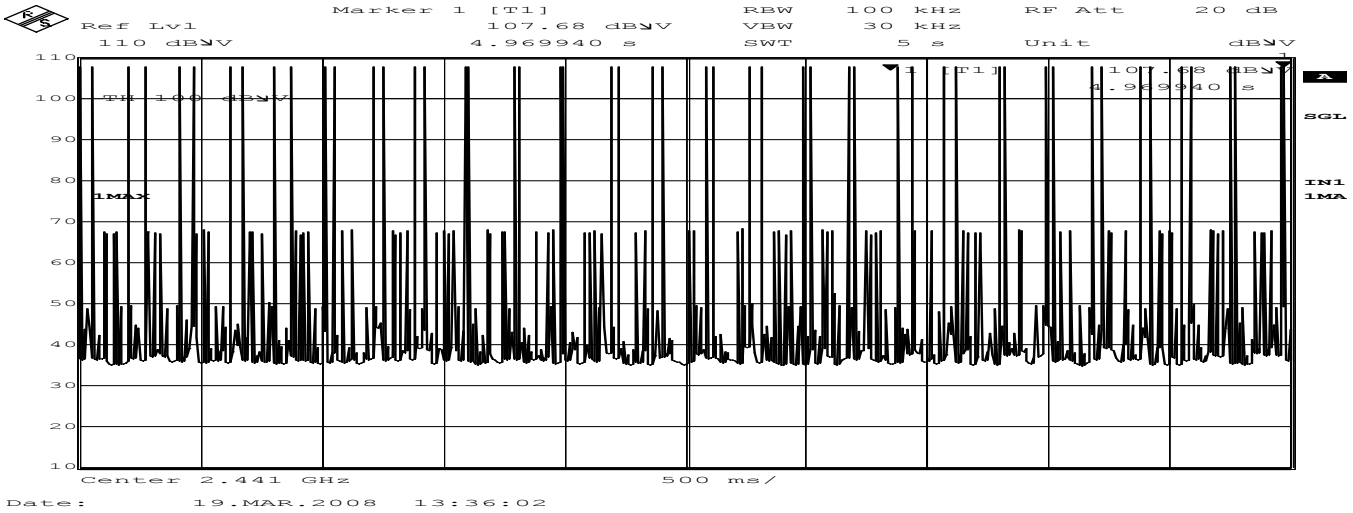


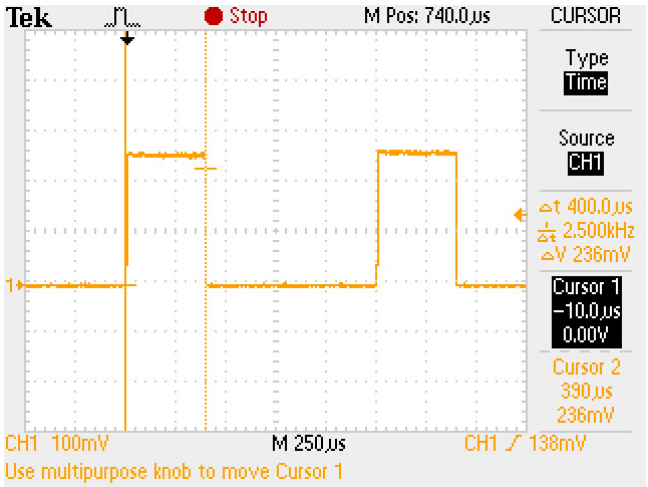
Count 4



Count 5



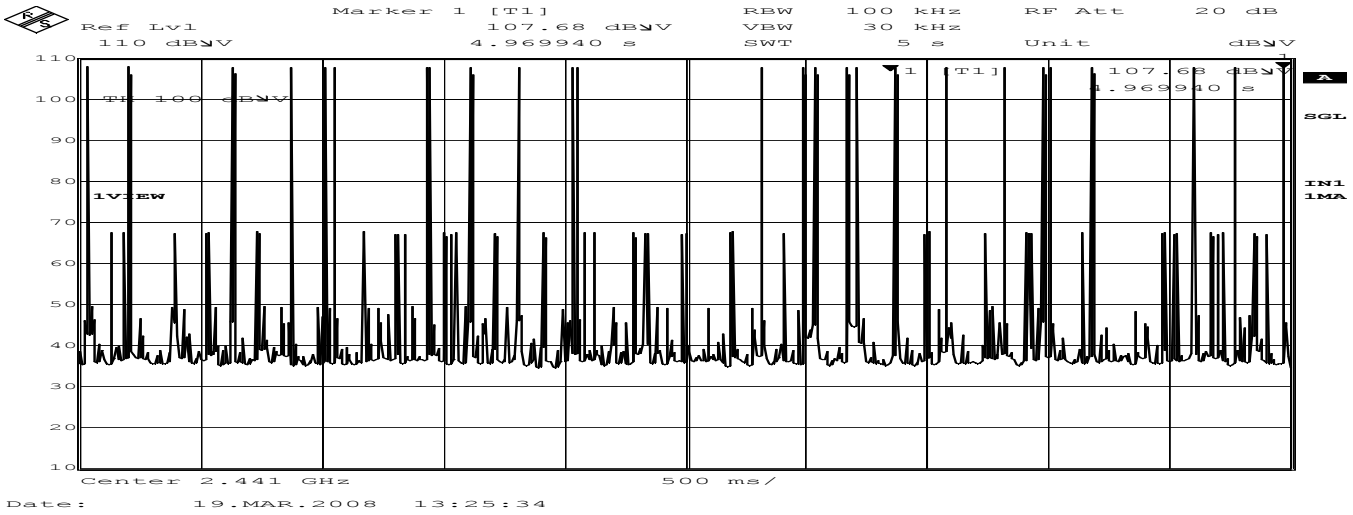
Duty cycle(Hopping DH1)



Average times of rising in 5 sec. of sweep = (49 + 46 + 50 + 50 + 49) / 5 = 48.8
Average times of rising in 1 sec. = 48.8 / 5s = 9.76
Average times of rising in 0.4x = 0.4 * 79ch * 9.76 = 308.42
Dwell time = 308.42 * 0.400 = 123.37 [ms]
Limit : Dwell Time < 0.4[s]

Hopping (DH3):

Count 1



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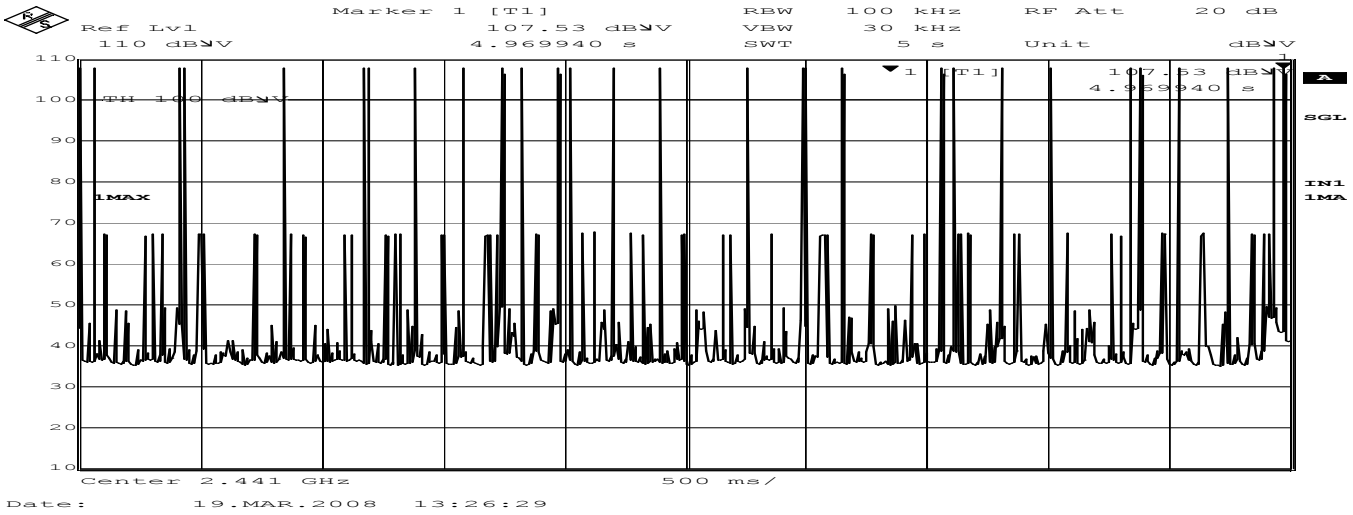

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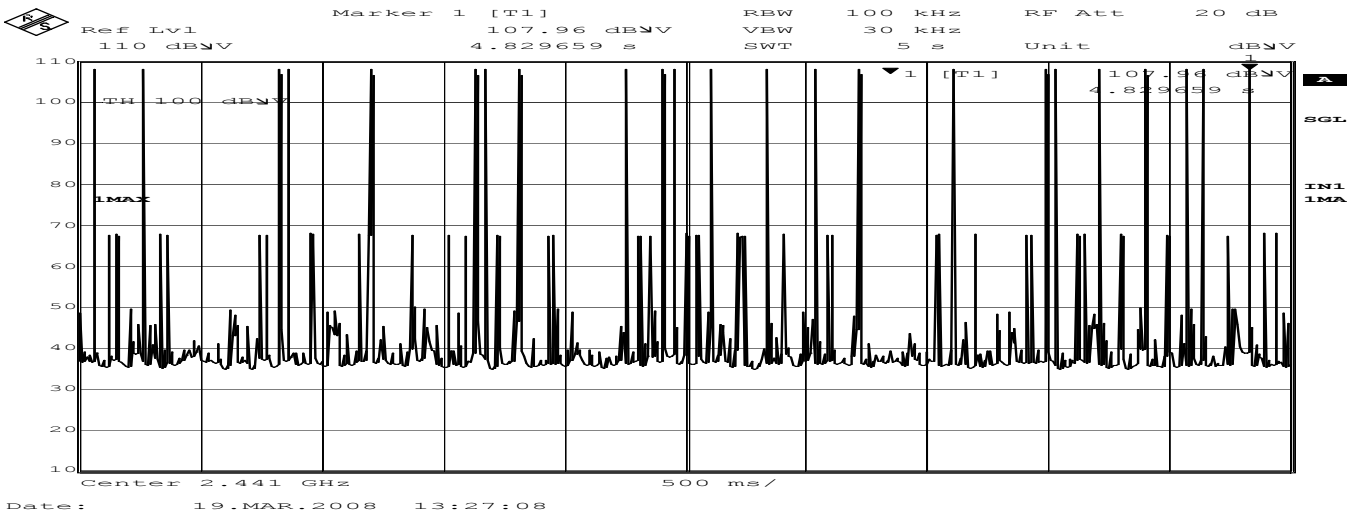

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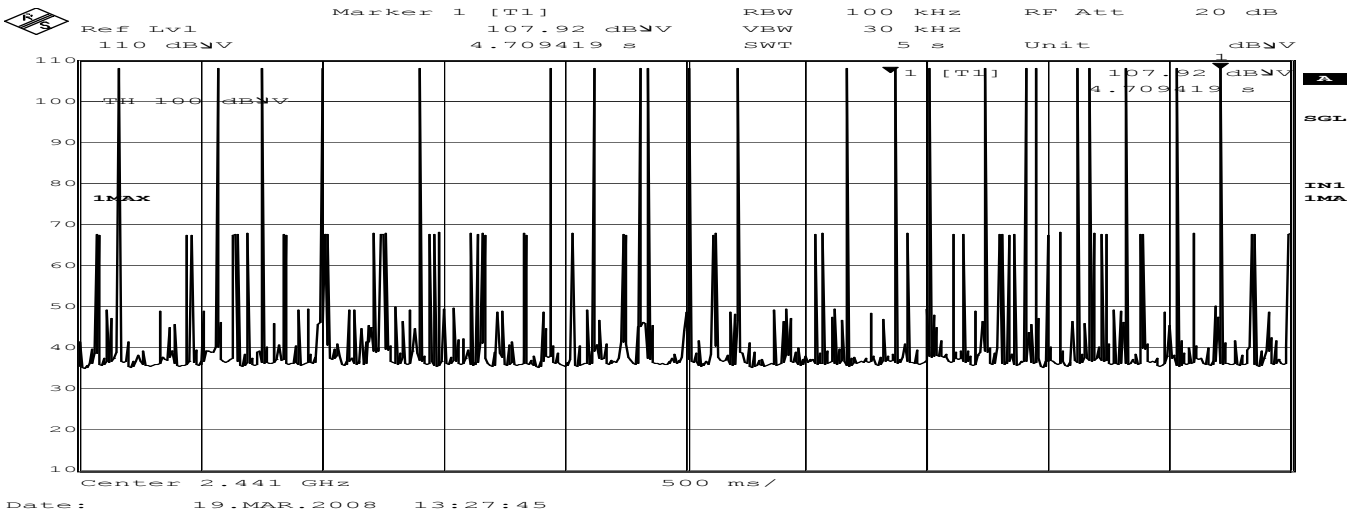

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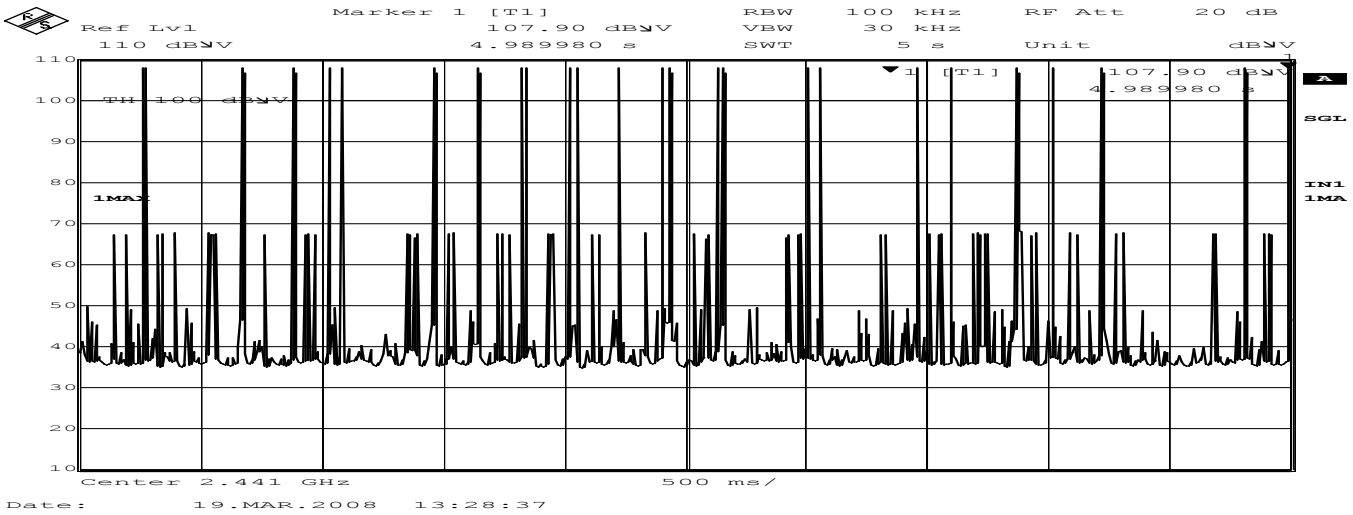
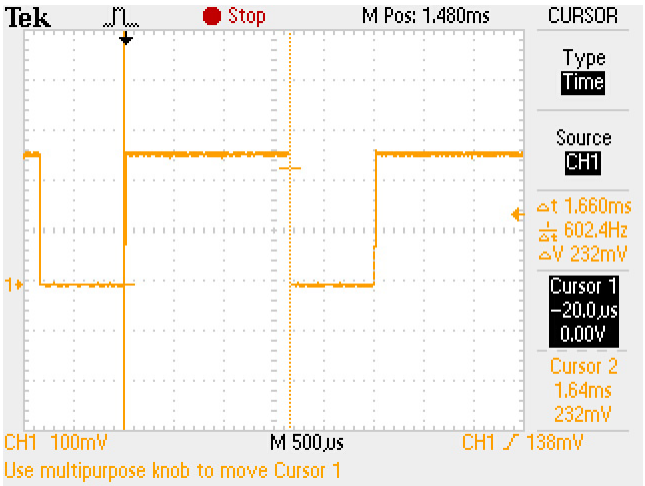


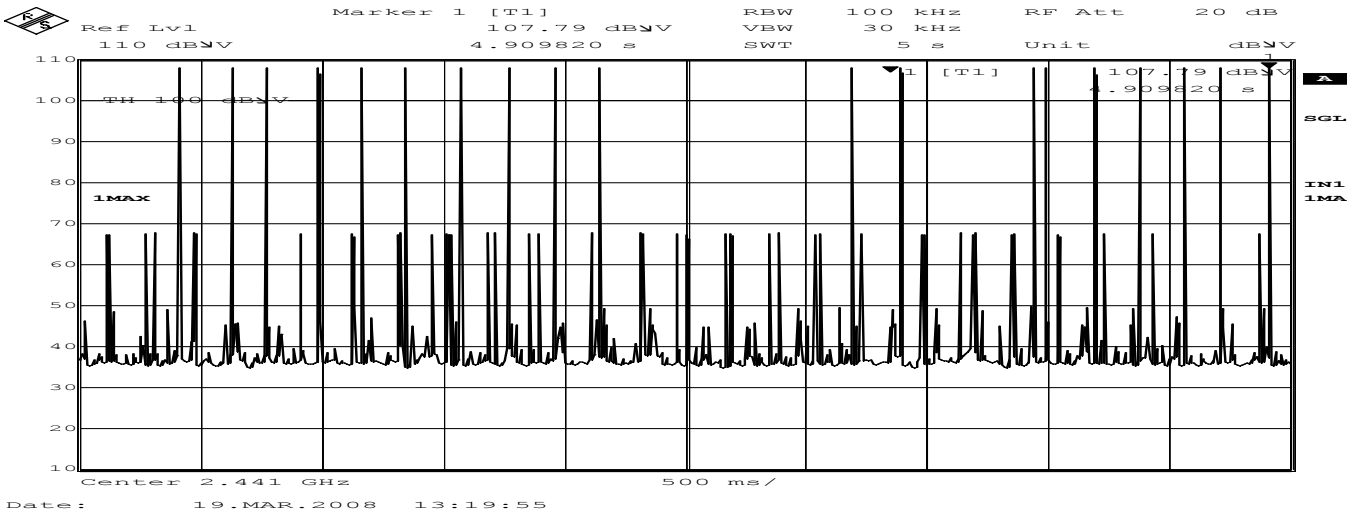
Duty cycle(Hopping DH3)



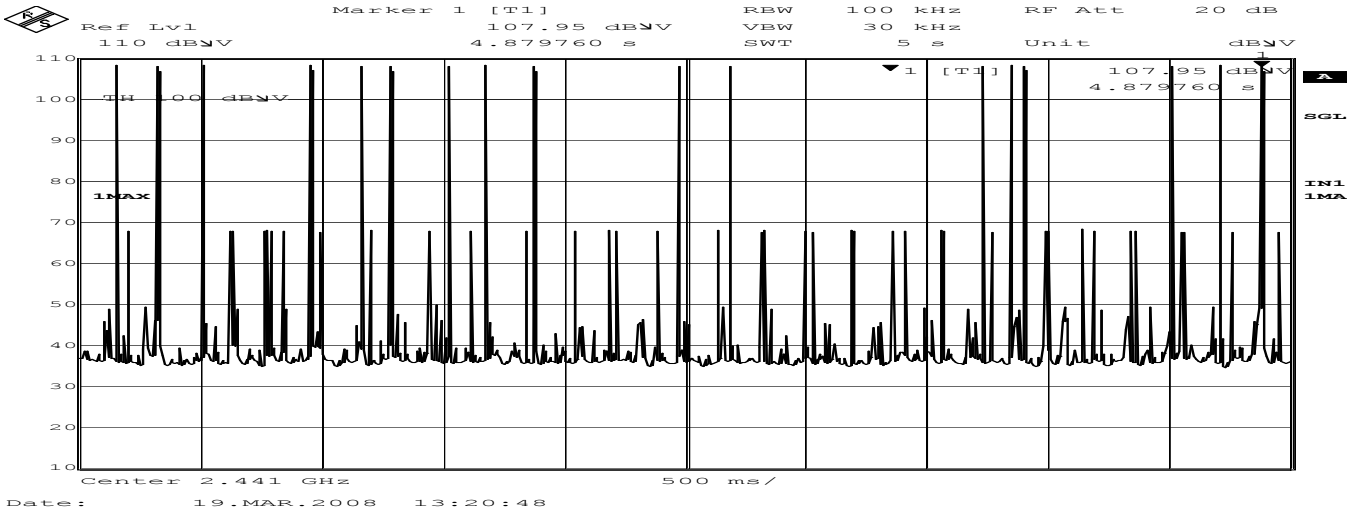
Average times of rising in 5 sec. of sweep = (25 + 28 + 23+ 22 + 25) / 5 = 24.6
Average times of rising in 1 sec. = 24.6 / 5s = 4.92
Average times of rising in 0.4x = 0.4 * 79ch * 4.92 = 155.47
Dwell time = 155.47 * 1.66 = 258.08 [ms]
Limit : Dwell Time < 0.4[s]

Hopping (DH5):

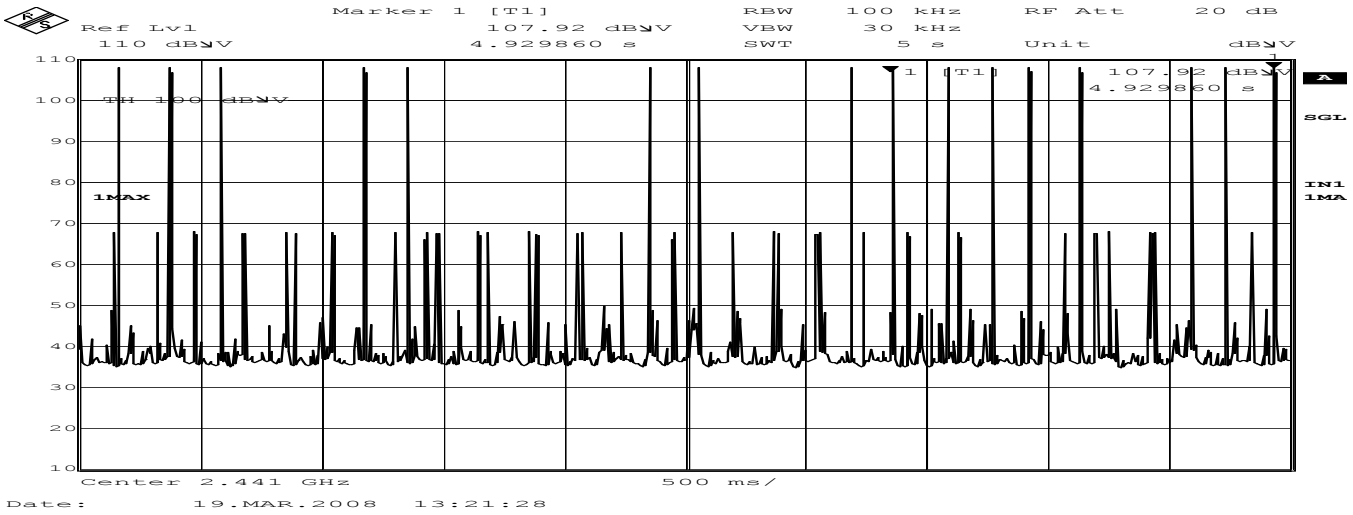
Count 1



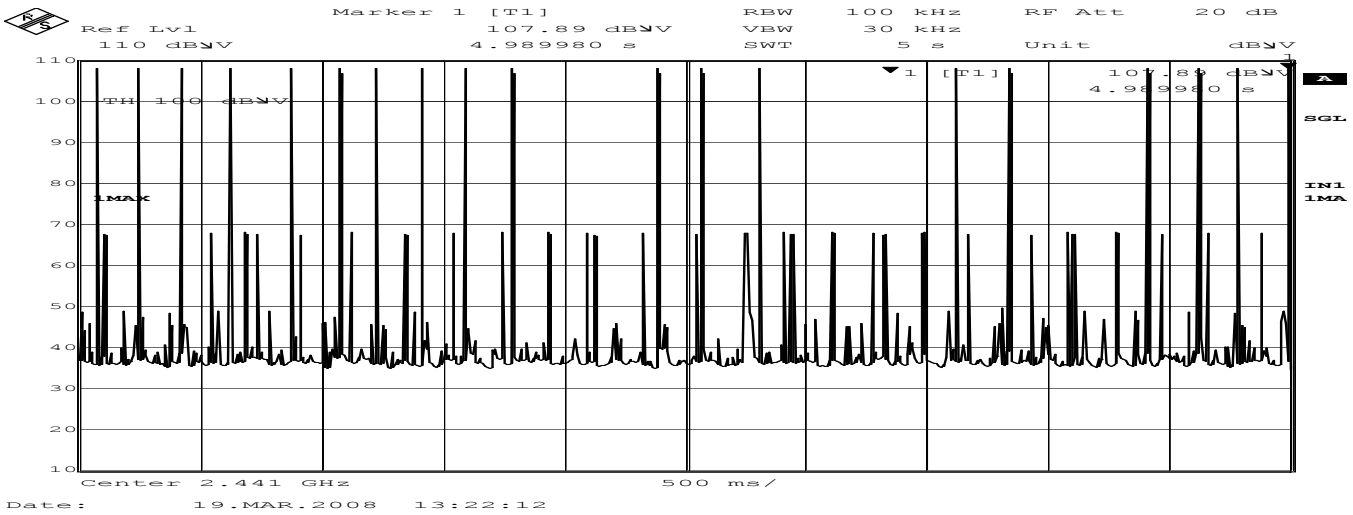
Count 2



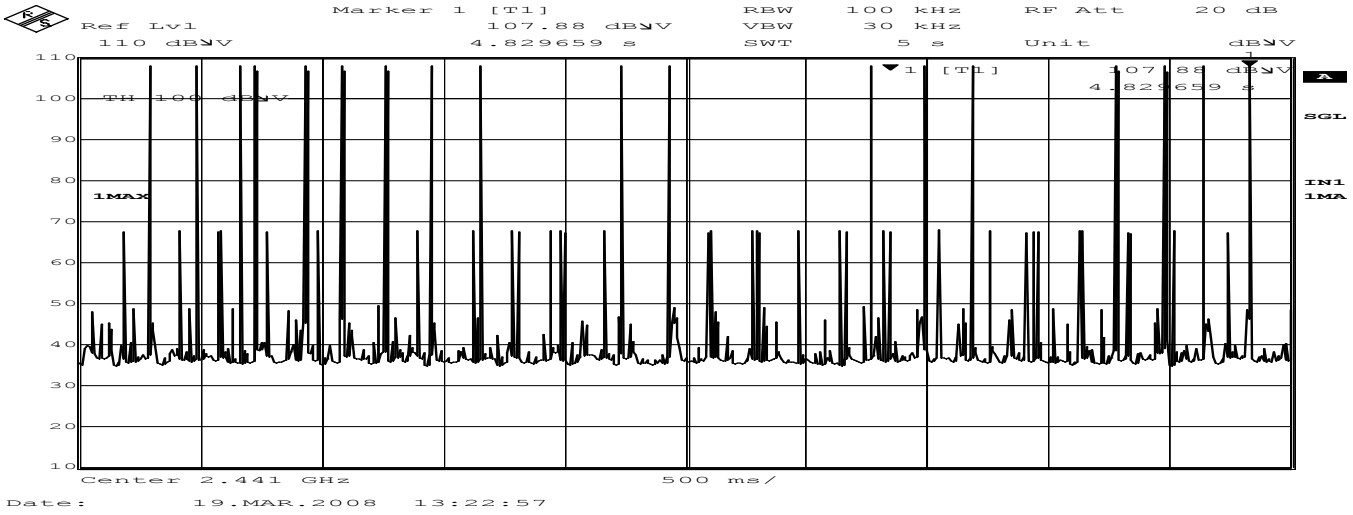
Count 3



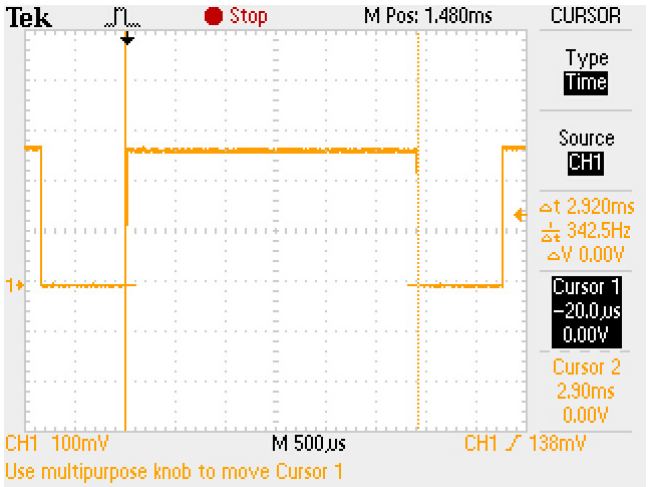
Count 4



Count 5



Duty cycle(Hopping DH5)



Average times of rising in 5 sec. of sweep = (19 + 17 + 16 + 19 + 18) / 5 = 17.8
Average times of rising in 1 sec. = 17.8 / 5s = 3.56
Average times of rising in 0.4x = 0.4 * 79ch * 3.56 = 112.50
Dwell time = 112.50 * 2.92 = 328.50 [ms]
Limit : Dwell Time < 0.4[s]

Maximum Peak Conducted Output Power (Regulation: FCC 15.247(b)(1))

UL Japan, Inc Yamakita EMC lab.
No.2 Shielded Room

DATE: 2008.3.19
TEMP./HUMID 24deg.C/39%
TEST MODE: Transmitting

ENGINEER: Tatsuya Arai

DH5

CH	FREQ [GHz]	P/M Reading [dBm]	Cable Loss [dB]	Results [dBm]	Limit (125mW) [dBm]	MARGIN [dB]
Low	2402.00	0.87	1.10	1.97	20.96	18.99
Mid	2441.00	1.05	1.10	2.15	20.96	18.81
High	2480.00	0.71	1.10	1.81	20.96	19.15

Limit: 125mW=20.96dBm
P/M: Power Meter
CABLE LOSS:Customer's cable + KCC-D7

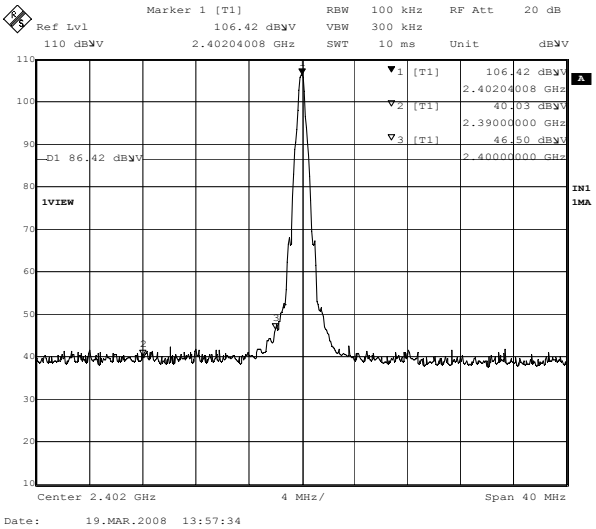
Out of Band Emission (Antenna Terminal Conducted) (Regulation: FCC 15.247(d))

UL Japan, Inc. Yamakita EMC lab.	No.2 shielded room
Date:	2008/3/19
Temp./Humid.:	24 deg. C. / 39 %
Engineer:	Tatsuya Arai
Test mode:	Transmitting

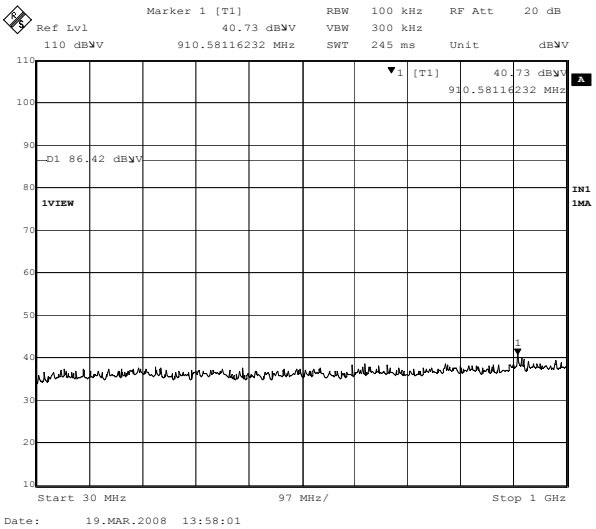
[Transmitting DH5]

Ch:2402MHz

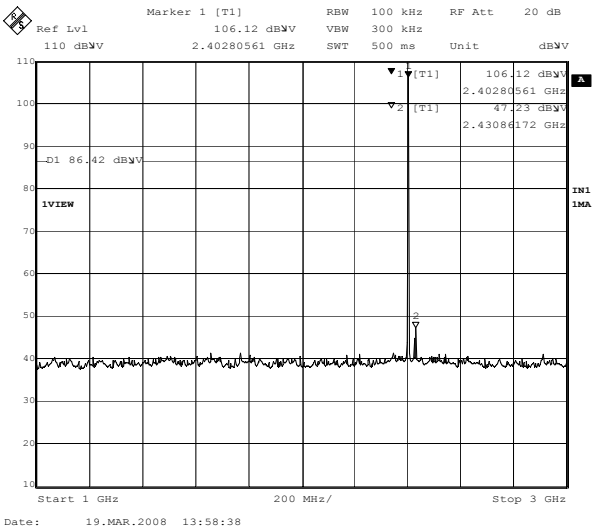
1.



2.



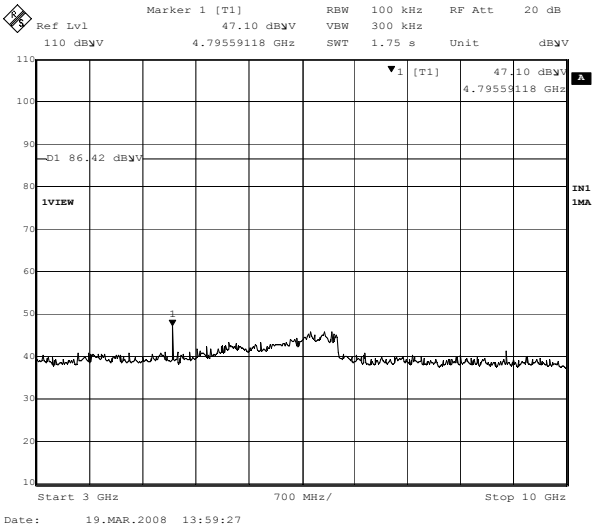
3.



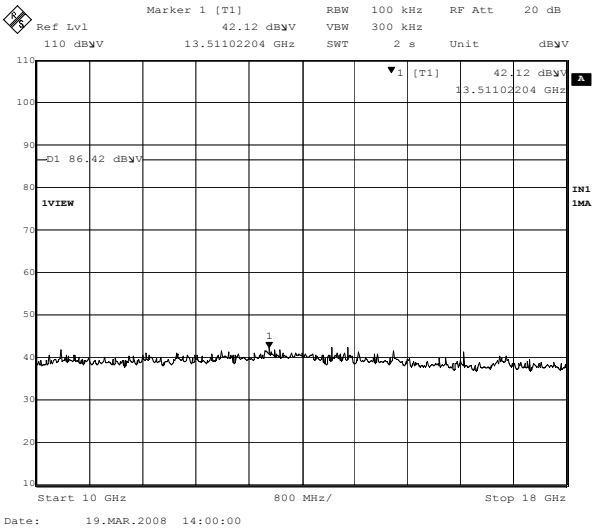
[Transmitting DH5]

Ch:2402MHz

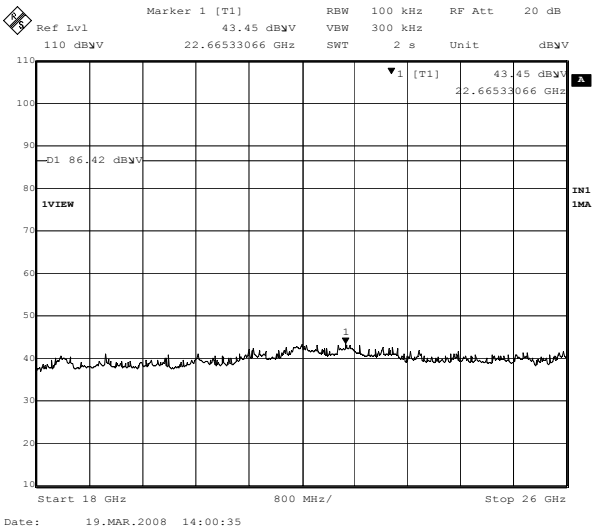
4.



5.



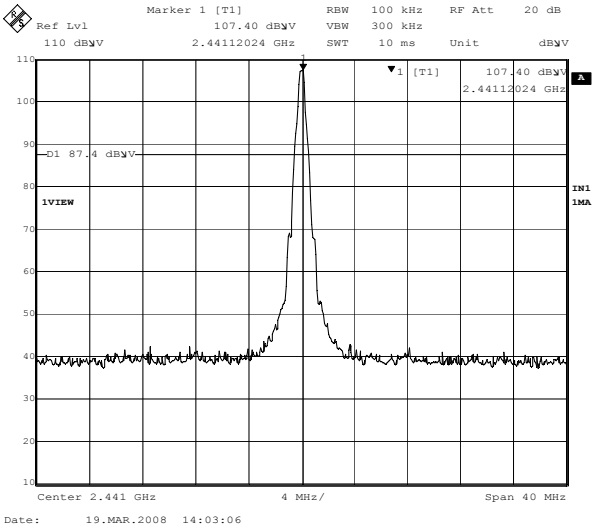
6.



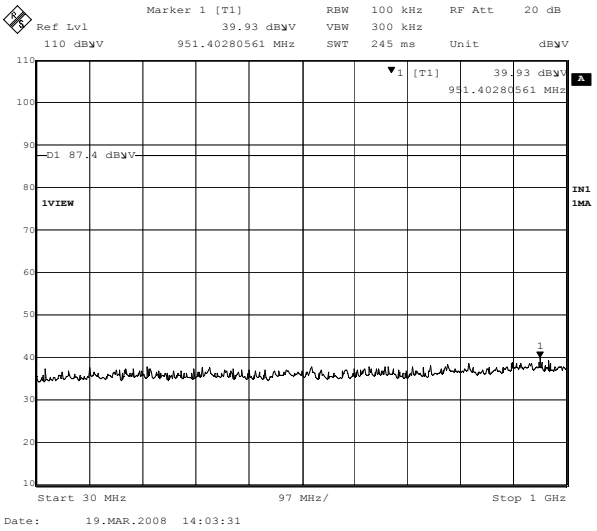
[Transmitting DH5]

Ch:2441MHz

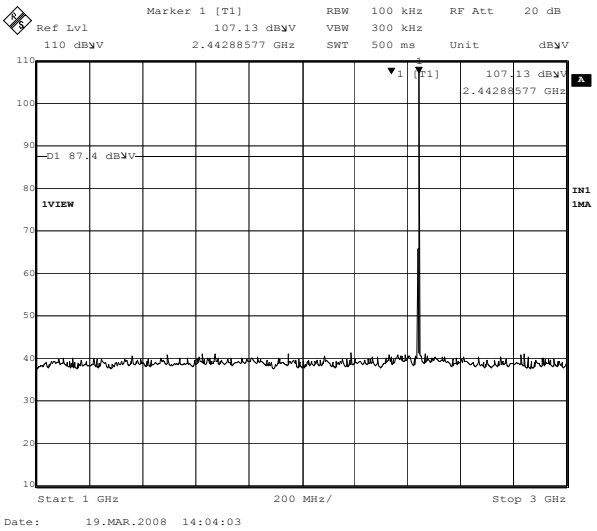
1.



2.



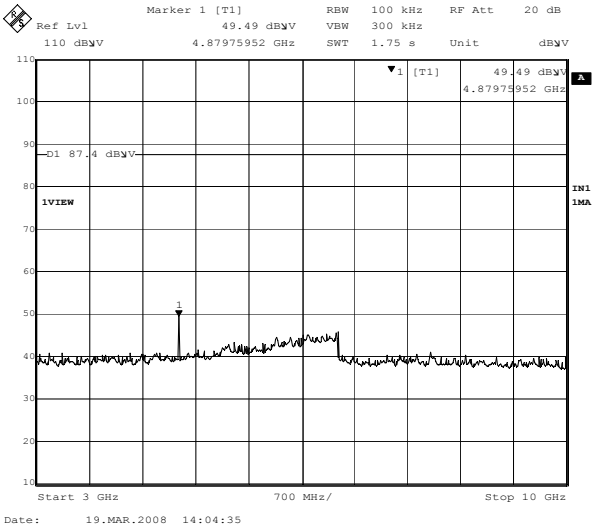
3.



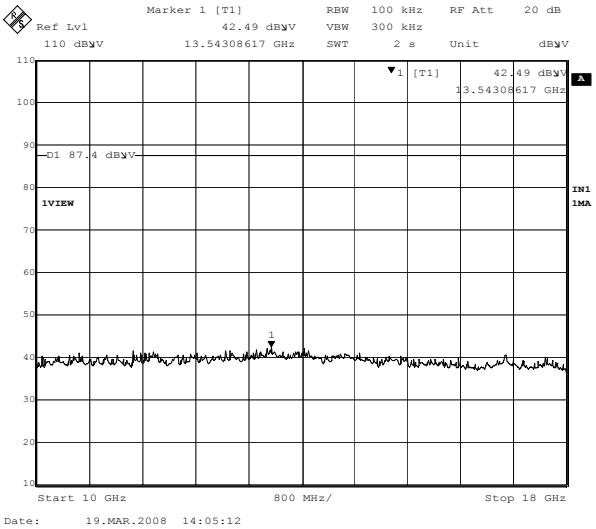
[Transmitting DH5]

Ch:2441MHz

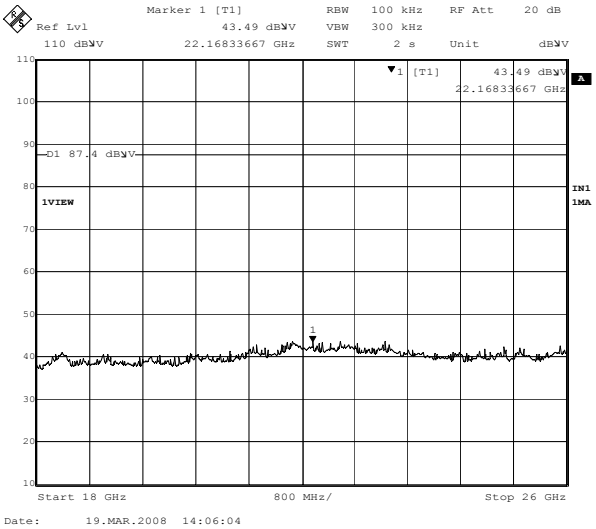
4.



5.



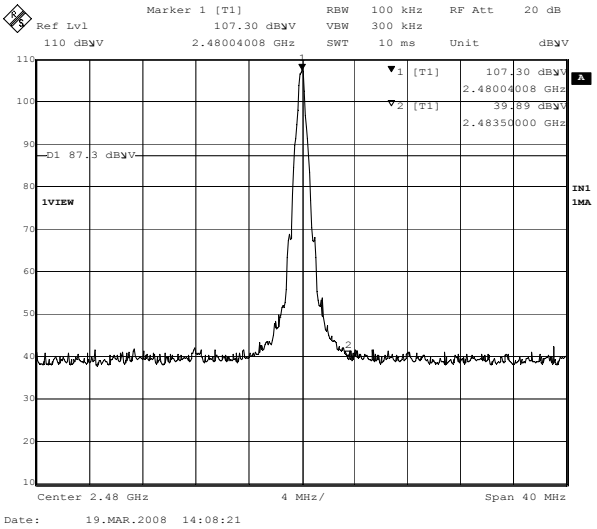
6.



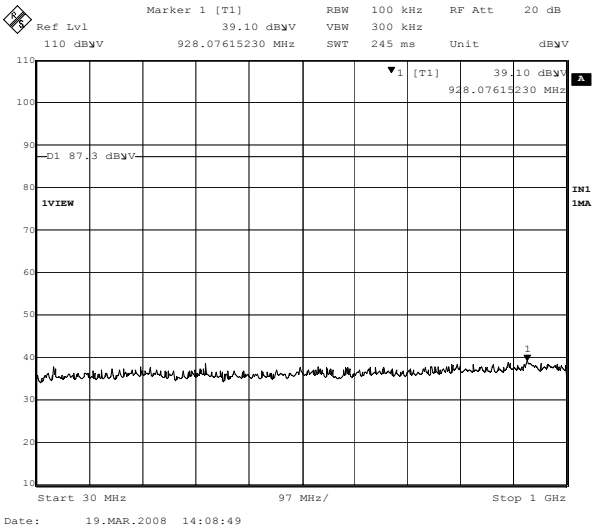
[Transmitting DH5]

Ch:2480MHz

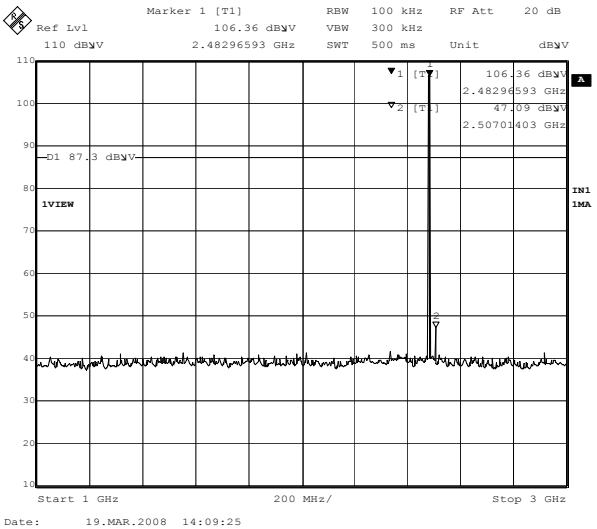
1.



2.



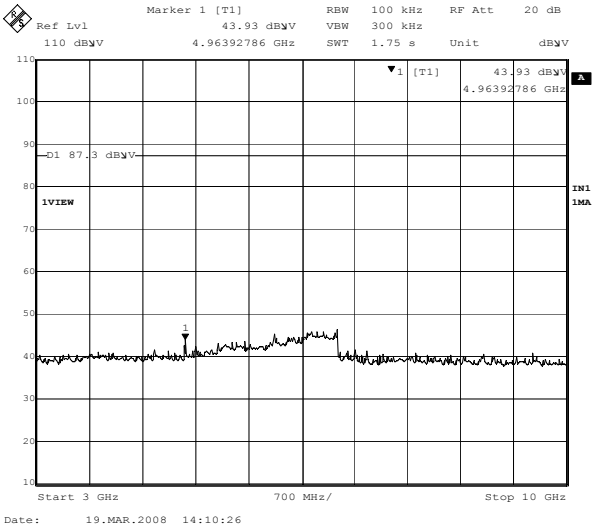
3.



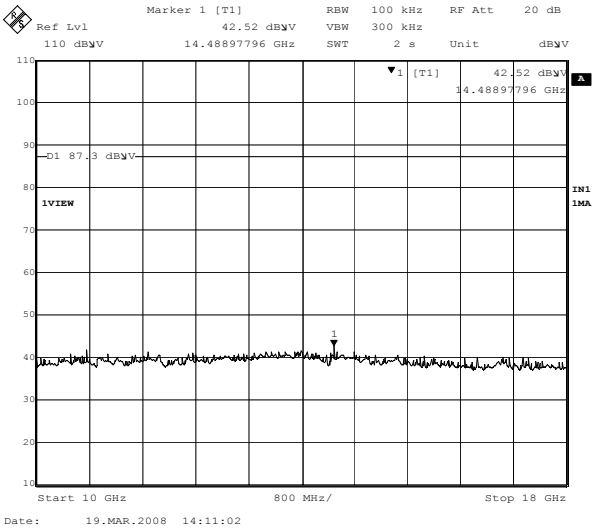
[Transmitting DH5]

Ch:2480MHz

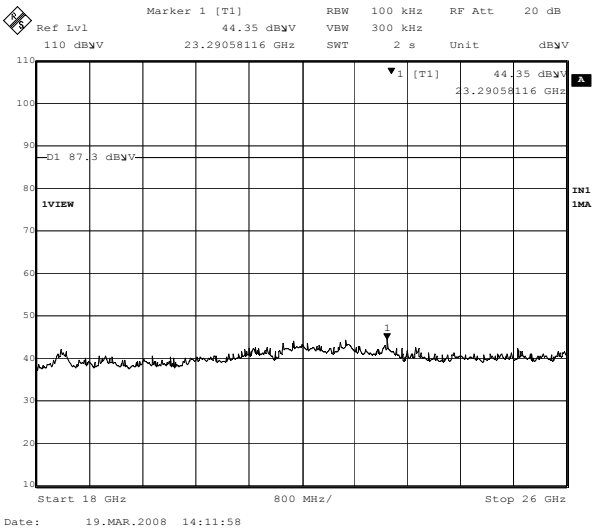
4.



5.



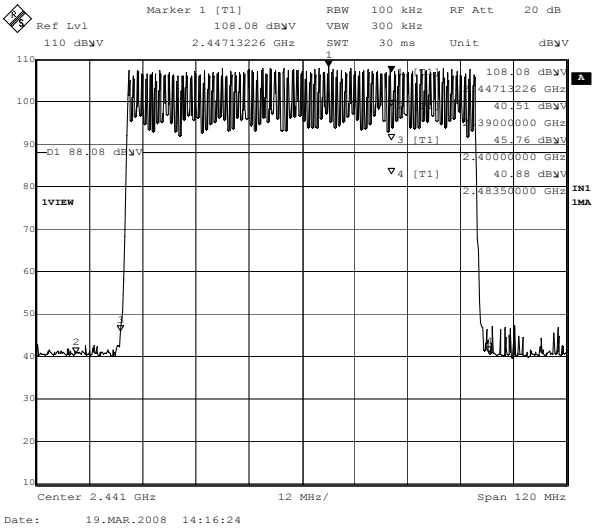
6.



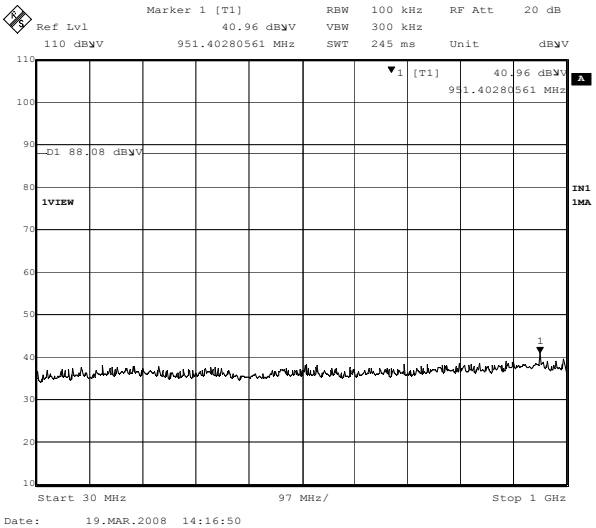
[Transmitting DH5]

Hopping

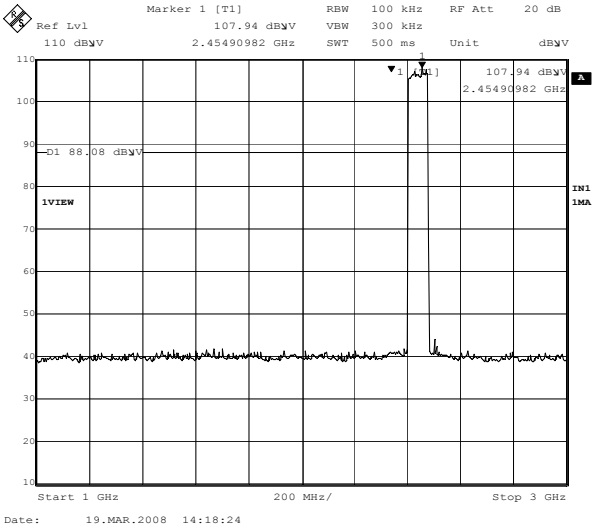
1.



2.



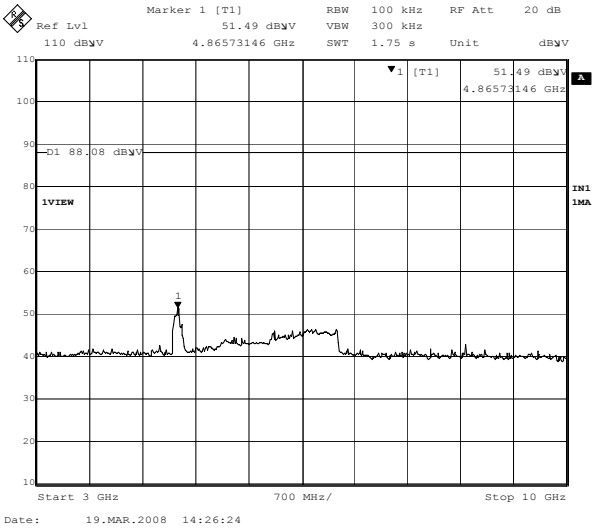
3.



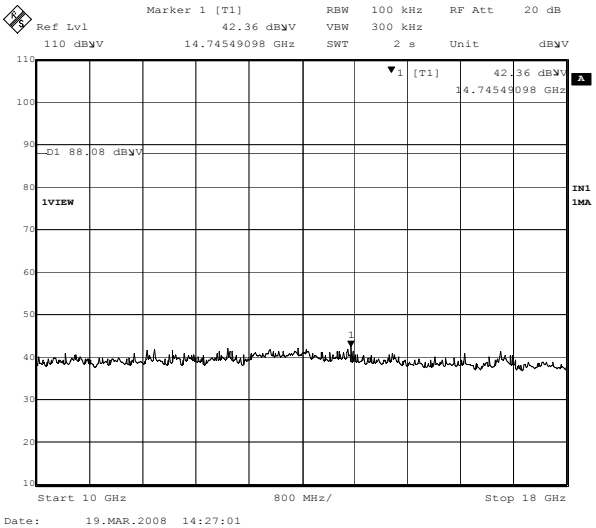
[Transmitting DH5]

Hopping

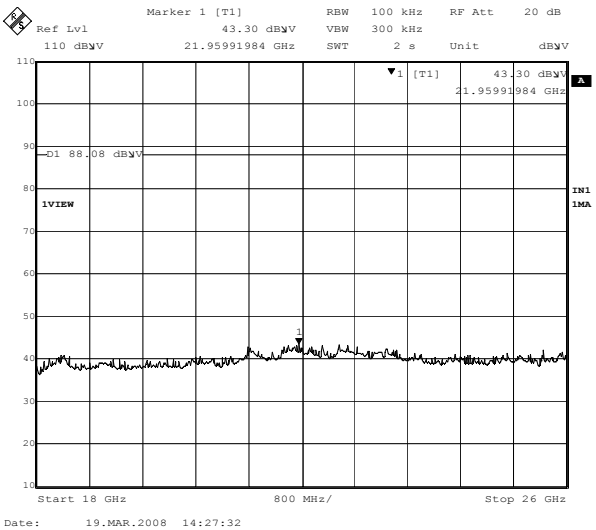
4.



5.



6.

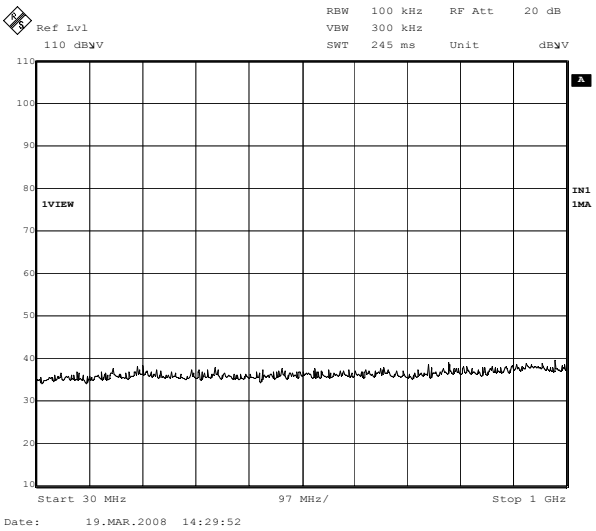


UL Japan, Inc. Yamakita EMC lab.	No.2 shielded room
Date:	2008/3/19
Temp./Humid.:	24 deg. C. / 39 %
Engineer:	Tatsuya Arai
Test mode:	Receiving

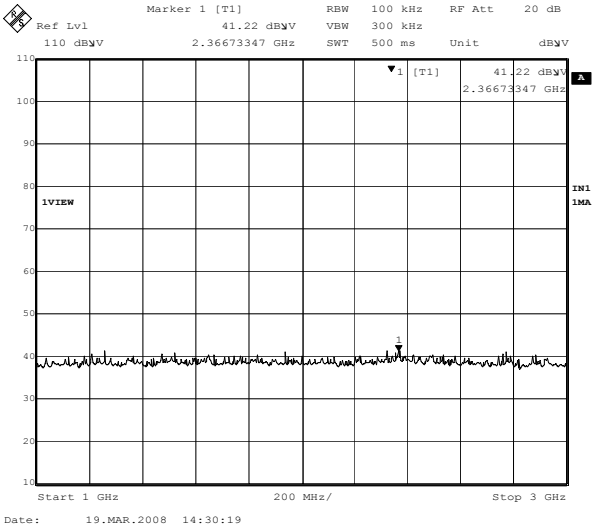
[Receiving]

Ch:2441MHz

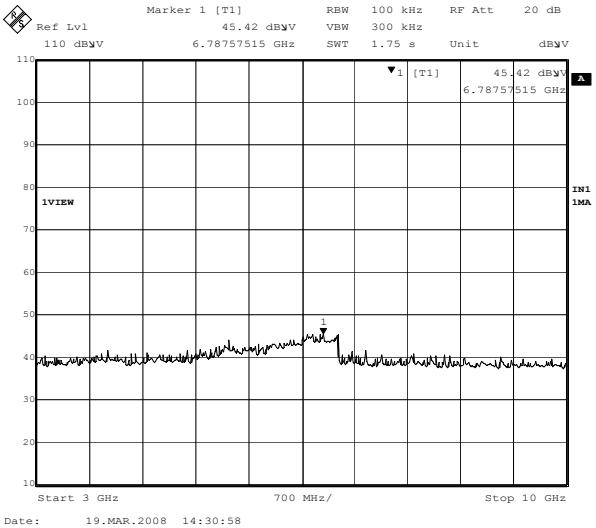
1.



2.



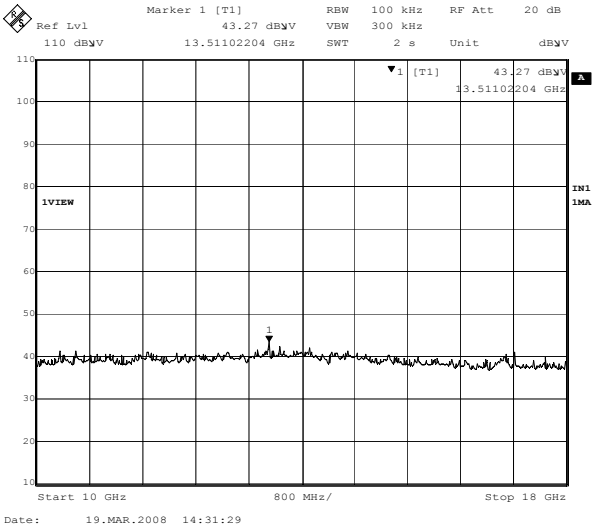
3.



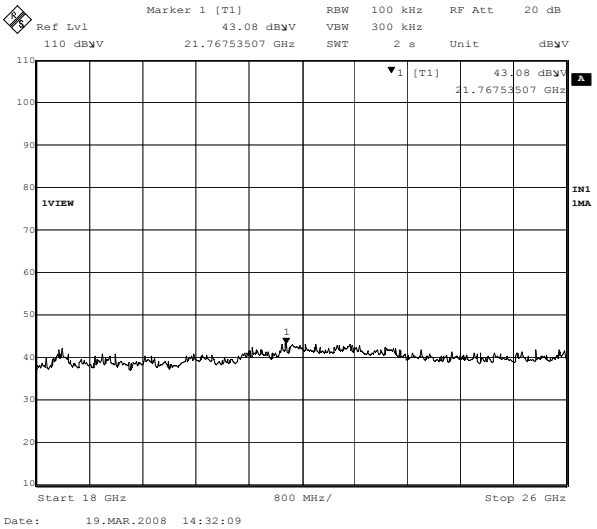
[Receiving]

Ch:2441MHz

4.



5.



DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28GE0195-HO-01-A

Applicant : Hitachi Maxell, Ltd.
Kind of Equipment : Digital Pen
Model No. : DP-301
Serial No. : AJX-AAB-D53-AE
Power : DC1.5V
Mode : Transmitting 2402MHz
Remarks :
Date : 3/18/2008
Test Distance : 3 m
Temperature : 22 ℃ Engineer : Tatsuya Arai
Humidity : 42 %
Regulation : FCC Part15C §15.209

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	62.47	BB	37.6	42.6	7.6	28.6	1.3	6.0	23.9	28.9	40.0	16.1	11.1
2.	494.00	BB	27.2	26.5	18.5	29.1	4.6	6.0	27.2	26.5	46.0	18.8	19.5
3.	520.00	BB	27.5	26.2	18.9	29.1	4.7	6.0	28.0	26.7	46.0	18.0	19.3

CALCULATION: READING + ANT.FACTOR + CABLE LOSS - AMP.GAIN + ATTEN.

■ANTENNA:KBA-03(BBA9106)30-299.99MHz/KLA-03(USLP9143)300-1000MHz
■CABLE:KCC-A2/A3■PREAMP:KAF-05(8447D)■EMI RECEIVER:KTR-04(ESVS)

Page:

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28GE0195-HO-01-A

Applicant : Hitachi Maxell, Ltd.
Kind of Equipment : Digital Pen
Model No. : DP-301
Serial No. : AJX-AAB-D53-AE
Power : DC1.5V
Mode : Transmitting 2441MHz
Remarks :
Date : 3/18/2008
Test Distance : 3 m
Temperature : 22 ℃ Engineer : Tatsuya Arai
Humidity : 42 %
Regulation : FCC Part15C §15.209

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	62.47	BB	39.5	45.4	7.6	28.6	1.3	6.0	25.8	31.7	40.0	14.2	8.3
2.	494.00	BB	26.6	26.1	18.5	29.1	4.6	6.0	26.6	26.1	46.0	19.4	19.9
3.	520.00	BB	26.7	25.6	18.9	29.1	4.7	6.0	27.2	26.1	46.0	18.8	19.9

CALCULATION: READING + ANT.FACTOR + CABLE LOSS - AMP.GAIN + ATTEN.

■ANTENNA:KBA-03(BBA9106)30-299.99MHz/KLA-03(USLP9143)300-1000MHz
■CABLE:KCC-A2/A3■PREAMP:KAF-05(8447D)■EMI RECEIVER:KTR-04(ESVS)

Page:

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28GE0195-HO-01-A

Applicant : Hitachi Maxell, Ltd.
Kind of Equipment : Digital Pen
Model No. : DP-301
Serial No. : AJX-AAB-D53-AE
Power : DC1.5V
Mode : Transmitting 2480MHz
Remarks :
Date : 3/18/2008
Test Distance : 3 m
Temperature : 22 ℃ Engineer : Tatsuya Arai
Humidity : 42 %
Regulation : FCC Part15C §15.209

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	62.47	BB	38.7	44.2	7.6	28.6	1.3	6.0	25.0	30.5	40.0	15.0	9.5
2.	494.00	BB	27.1	26.7	18.5	29.1	4.6	6.0	27.1	26.7	46.0	18.9	19.3
3.	520.00	BB	27.3	26.2	18.9	29.1	4.7	6.0	27.8	26.7	46.0	18.2	19.3

CALCULATION: READING + ANT.FACTOR + CABLE LOSS - AMP.GAIN + ATTEN.

■ANTENNA:KBA-03(BBA9106)30-299.99MHz/KLA-03(USLP9143)300-1000MHz
■CABLE:KCC-A2/A3■PREAMP:KAF-05(8447D)■EMI RECEIVER:KTR-04(ESVS)

Page:

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28GE0195-HO-01-A

Applicant : Hitachi Maxell, Ltd.
Kind of Equipment : Digital Pen
Model No. : DP-301
Serial No. : AJX-AAB-D53-AE
Power : DC1.5V
Mode : Receiving 2441MHz
Remarks :
Date : 3/18/2008
Test Distance : 3 m
Temperature : 22 ℃ Engineer : Tatsuya Arai
Humidity : 42 %
Regulation : FCC Part15B §15.109(a)

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	62.47	BB	37.7	42.9	7.6	28.6	1.3	6.0	24.0	29.2	40.0	16.0	10.8
2.	494.00	BB	26.4	25.9	18.5	29.1	4.6	6.0	26.4	25.9	46.0	19.6	20.1
3.	520.00	BB	25.9	25.4	18.9	29.1	4.7	6.0	26.4	25.9	46.0	19.6	20.1

CALCULATION: READING + ANT.FACTOR + CABLE LOSS - AMP.GAIN + ATTEN.

■ANTENNA:KBA-03(BBA9106)30-299.99MHz/KLA-03(USLP9143)300-1000MHz
■CABLE:KCC-A2/A3■PREAMP:KAF-05(8447D)■EMI RECEIVER:KTR-04(ESVS)

Page:

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28GE0195-HO-01-A

Applicant : Hitachi Maxell, Ltd.
Kind of Equipment : Digital Pen
Model No. : DP-301
Serial No. : AJX-AAB-D53-AE
Power : DC1.5V
Mode : Transmitting 2402MHz
Remarks : PK (RBW: 1MHz, VBW: 1MHz)
Date : 3/18/2008
Test Distance : 3 m
Temperature : 22 ℃ Engineer : Tatsuya Arai
Humidity : 42 %
Regulation : FCC Part15C §15.209(a)(PK)1-18GHz:3m/18-40GHz:1m

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	2390.00	BB	44.9	44.8	27.3	35.4	5.0	0.0	41.8	41.7	74.0	32.2	32.3
2.	2400.00	BB	58.1	53.9	27.3	35.3	5.0	0.0	55.1	50.9	74.0	18.9	23.1
3.	4804.00	BB	51.4	51.2	31.5	34.1	5.7	0.0	54.5	54.3	74.0	19.5	19.7
4.	7206.00	BB	44.5	44.0	35.8	34.7	7.6	0.0	53.2	52.7	74.0	20.8	21.3
5.	9608.00	BB	44.6	44.7	38.2	35.3	7.7	0.0	55.2	55.3	74.0	18.8	18.7

CALCULATION: READING + ANT.FACTOR + CABLE LOSS - AMP.GAIN + ATTEN.

■ANTENNA:KHA-02(SAS-200 571)1-18GHz/KHA-04(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-07(8449B)■EMI RECEIVER:KTR-01(ESI40)

Page:

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28GE0195-HO-01-A

Applicant : Hitachi Maxell, Ltd.
Kind of Equipment : Digital Pen
Model No. : DP-301
Serial No. : AJX-AAB-D53-AE
Power : DC1.5V
Mode : Transmitting 2402MHz
Remarks : AV (RBW: 1MHz, VBW: 300Hz)
Date : 3/18/2008
Test Distance : 3 m
Temperature : 22 ℃ Engineer : Tatsuya Arai
Humidity : 42 %
Regulation : FCC Part15C §15.209(a) 1-18GHz:3m/18-40GHz:1m

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	2390.00	BB	31.8	31.5	27.3	35.4	5.0	0.0	28.7	28.4	54.0	25.3	25.6
2.	2400.00	BB	51.1	46.8	27.3	35.3	5.0	0.0	48.1	43.8	54.0	5.9	10.2
3.	4804.00	BB	45.8	45.2	31.5	34.1	5.7	0.0	48.9	48.3	54.0	5.1	5.7
4.	7206.00	BB	31.0	31.2	35.8	34.7	7.6	0.0	39.7	39.9	54.0	14.3	14.1
5.	9608.00	BB	31.9	32.0	38.2	35.3	7.7	0.0	42.5	42.6	54.0	11.5	11.4

CALCULATION: READING + ANT.FACTOR + CABLE LOSS - AMP.GAIN + ATTEN.

■ANTENNA:KHA-02(SAS-200 571)1-18GHz/KHA-04(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-07(8449B)■EMI RECEIVER:KTR-01(ESI40)

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28GE0195-HO-01-A

Applicant : Hitachi Maxell, Ltd.
Kind of Equipment : Digital Pen
Model No. : DP-301
Serial No. : AJX-AAB-D53-AE
Power : DC1.5V
Mode : Transmitting 2441MHz
Remarks : PK (RBW: 1MHz, VBW: 1MHz)
Date : 3/18/2008
Test Distance : 3 m
Temperature : 22 ℃ Engineer : Tatsuya Arai
Humidity : 42 %
Regulation : FCC Part15C §15.209(a)(PK)1-18GHz:3m/18-40GHz:1m

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	4882.00	BB	49.1	50.6	31.7	34.1	5.8	0.0	52.5	54.0	74.0	21.5	20.0
2.	7323.00	BB	43.4	43.8	35.9	34.8	7.7	0.0	52.2	52.6	74.0	21.8	21.4
3.	9764.00	BB	45.3	45.3	38.2	35.4	7.7	0.0	55.8	55.8	74.0	18.2	18.2

CALCULATION: READING + ANT.FACTOR + CABLE LOSS - AMP.GAIN + ATTEN.

■ANTENNA:KHA-02(SAS-200 571)1-18GHz/KHA-04(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-07(8449B)■EMI RECEIVER:KTR-01(ESI40)

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28GE0195-HO-01-A

Applicant : Hitachi Maxell, Ltd.
Kind of Equipment : Digital Pen
Model No. : DP-301
Serial No. : AJX-AAB-D53-AE
Power : DC1.5V
Mode : Transmitting 2441MHz
Remarks : AV (RBW: 1MHz, VBW: 300Hz)
Date : 3/18/2008
Test Distance : 3 m
Temperature : 22 ℃ Engineer : Tatsuya Arai
Humidity : 42 %
Regulation : FCC Part15C §15.209(a) 1-18GHz:3m/18-40GHz:1m

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	4882.00	BB	41.8	43.9	31.7	34.1	5.8	0.0	45.2	47.3	54.0	8.8	6.7
2.	7323.00	BB	31.1	31.2	35.9	34.8	7.7	0.0	39.9	40.0	54.0	14.1	14.0
3.	9764.00	BB	32.1	32.1	38.2	35.4	7.7	0.0	42.6	42.6	54.0	11.4	11.4

CALCULATION: READING + ANT.FACTOR + CABLE LOSS - AMP.GAIN + ATTEN.

■ANTENNA:KHA-02(SAS-200 571)1-18GHz/KHA-04(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-07(8449B)■EMI RECEIVER:KTR-01(ESI40)

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28GE0195-HO-01-A

Applicant : Hitachi Maxell, Ltd.
Kind of Equipment : Digital Pen
Model No. : DP-301
Serial No. : AJX-AAB-D53-AE
Power : DC1.5V
Mode : Transmitting 2480MHz
Remarks : PK (RBW: 1MHz, VBW: 1MHz)
Date : 3/18/2008
Test Distance : 3 m
Temperature : 22 ℃ Engineer : Tatsuya Arai
Humidity : 42 %
Regulation : FCC Part15C §15.209(a)(PK)1-18GHz:3m/18-40GHz:1m

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	2483.50	BB	43.0	49.0	27.4	35.3	5.1	0.0	40.2	46.2	74.0	33.8	27.8
2.	4960.00	BB	54.3	53.6	31.8	34.1	5.8	0.0	57.8	57.1	74.0	16.2	16.9
3.	7440.00	BB	43.6	43.3	36.1	34.8	7.9	0.0	52.8	52.5	74.0	21.2	21.5
4.	9920.00	BB	44.3	44.7	38.2	35.4	7.7	0.0	54.8	55.2	74.0	19.2	18.8

CALCULATION: READING + ANT.FACTOR + CABLE LOSS - AMP.GAIN + ATTEN.

■ANTENNA:KHA-02(SAS-200 571)1-18GHz/KHA-04(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-07(8449B)■EMI RECEIVER:KTR-01(ESI40)

Page:

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28GE0195-HO-01-A

Applicant : Hitachi Maxell, Ltd.
Kind of Equipment : Digital Pen
Model No. : DP-301
Serial No. : AJX-AAB-D53-AE
Power : DC1.5V
Mode : Transmitting 2480MHz
Remarks : AV (RBW: 1MHz, VBW: 300Hz)
Date : 3/18/2008
Test Distance : 3 m
Temperature : 22 ℃ Engineer : Tatsuya Arai
Humidity : 42 %
Regulation : FCC Part15C §15.209(a) 1-18GHz:3m/18-40GHz:1m

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	2483.50	BB	31.7	31.4	27.4	35.3	5.1	0.0	28.9	28.6	54.0	25.1	25.4
2.	4960.00	BB	49.8	49.0	31.8	34.1	5.8	0.0	53.3	52.5	54.0	0.7	1.5
3.	7440.00	BB	31.0	31.0	36.1	34.8	7.9	0.0	40.2	40.2	54.0	13.8	13.8
4.	9920.00	BB	31.9	31.9	38.2	35.4	7.7	0.0	42.4	42.4	54.0	11.6	11.6

CALCULATION: READING + ANT.FACTOR + CABLE LOSS - AMP.GAIN + ATTEN.

■ANTENNA:KHA-02(SAS-200 571)1-18GHz/KHA-04(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-07(8449B)■EMI RECEIVER:KTR-01(ESI40)

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28GE0195-HO-01-A

Applicant : Hitachi Maxell, Ltd.
Kind of Equipment : Digital Pen
Model No. : DP-301
Serial No. : AJX-AAB-D53-AE
Power : DC1.5V
Mode : Receiving 2441MHz
Remarks : PK (RBW: 1MHz, VBW: 1MHz)
Date : 3/18/2008
Test Distance : 3 m
Temperature : 22 ℃ Engineer : Tatsuya Arai
Humidity : 42 %
Regulation : FCC Part15B CLASS B(PK)

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	2441.00	BB	44.0	44.2	27.4	35.3	5.1	0.0	41.2	41.4	74.0	32.8	32.6
2.	4882.00	BB	42.8	43.8	31.7	34.1	5.8	0.0	46.2	47.2	74.0	27.8	26.8
3.	7323.00	BB	44.0	43.5	35.9	34.8	7.7	0.0	52.8	52.3	74.0	21.2	21.7

CALCULATION: READING + ANT.FACTOR + CABLE LOSS - AMP.GAIN + ATTEN.

■ANTENNA:KHA-02(SAS-200 571)1-18GHz/KHA-04(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-07(8449B)■EMI RECEIVER:KTR-01(ESI40)

Page:

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28GE0195-HO-01-A

Applicant : Hitachi Maxell, Ltd.
Kind of Equipment : Digital Pen
Model No. : DP-301
Serial No. : AJX-AAB-D53-AE
Power : DC1.5V
Mode : Receiving 2441MHz
Remarks : AV (RBW: 1MHz, VBW: 300Hz)
Date : 3/18/2008
Test Distance : 3 m
Temperature : 22 ℃ Engineer : Tatsuya Arai
Humidity : 42 %
Regulation : FCC Part15B §15.109(a)

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	2441.00	BB	31.4	31.5	27.4	35.3	5.1	0.0	28.6	28.7	54.0	25.4	25.3
2.	4882.00	BB	30.7	30.6	31.7	34.1	5.8	0.0	34.1	34.0	54.0	19.9	20.0
3.	7323.00	BB	30.9	31.0	35.9	34.8	7.7	0.0	39.7	39.8	54.0	14.3	14.2

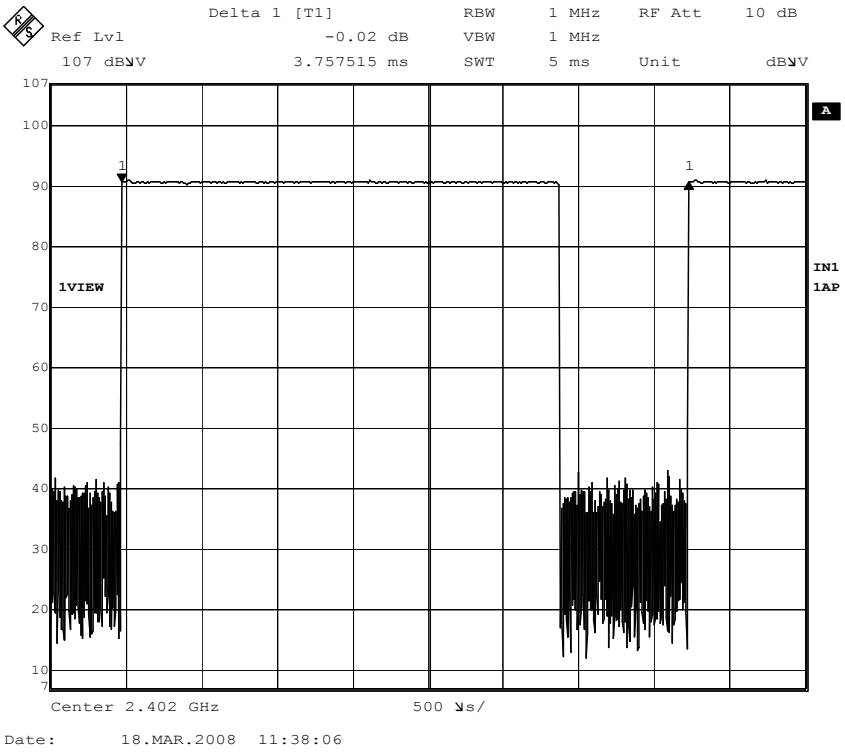
CALCULATION: READING + ANT.FACTOR + CABLE LOSS - AMP.GAIN + ATTEN.

■ANTENNA:KHA-02(SAS-200 571)1-18GHz/KHA-04(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-07(8449B)■EMI RECEIVER:KTR-01(ESI40)

Duty Cycle

UL Japan, Inc. Yamakita EMC lab.	No.1 Anechoic Chamber
Date:	2008/3/18
Temp./Humid.:	22 deg. C. / 42 %
Engineer:	Tatsuya Arai
Test mode:	Transmitting

Fundamental (band edge) and Harmonics



Duty Cycle: 3.76ms

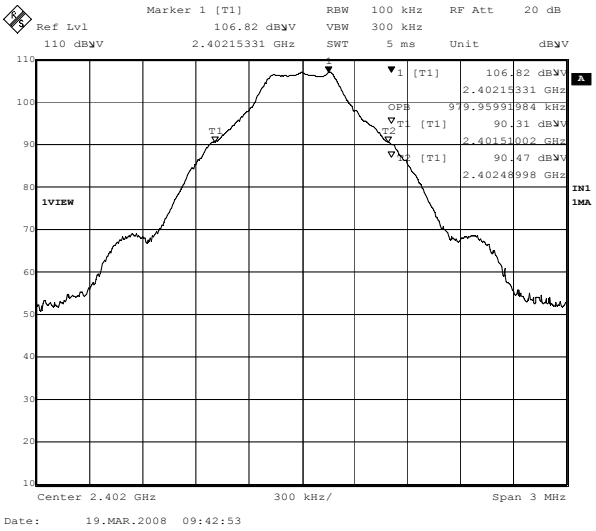
AV Detector VBW: 1000 / 3.76ms = 265.96Hz → 300Hz

Occupied Bandwidth (99%) (Regulation: RSS-Gen 4.6.1)

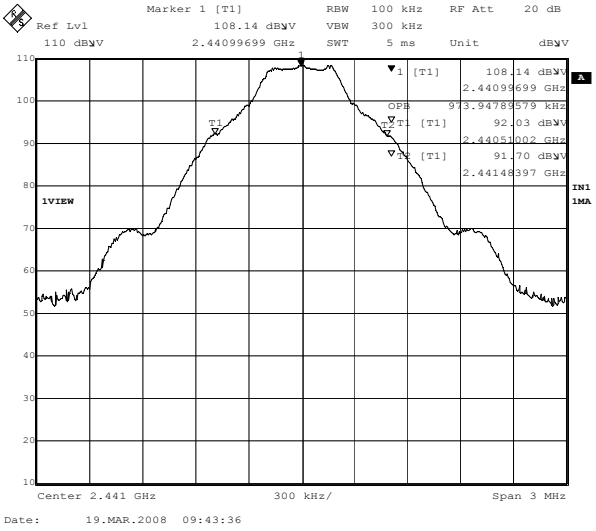
UL Japan, Inc. Yamakita EMC lab.	No.2 shielded room
Date:	2008/3/19
Temp./Humid.:	24 deg. C. / 39 %
Engineer:	Tatsuya Arai
Test mode:	Transmitting

[Hopping off, DH5]

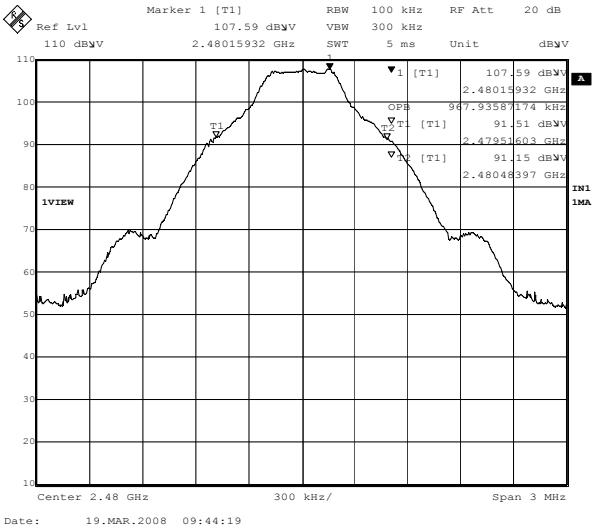
1. ch : 2402MHz/Occupied Bandwidth:980.0kHz



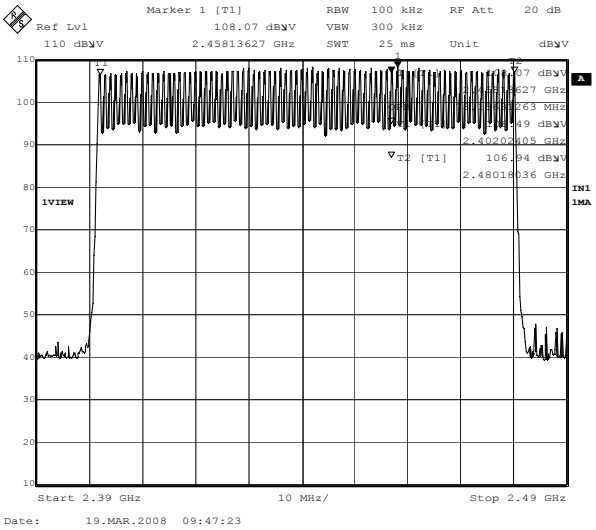
2. ch : 2441MHz/Occupied Bandwidth:973.9kHz



3. ch : 2480MHz/Occupied Bandwidth:967.9kHz



4. Hopping, DH5/Occupied Bandwidth:78.2MHz



APPENDIX 3
Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
YA-RE	Radiated emission(software)	UL Japan	RE(Ver.1.5)	RE	-
KAEC-01	Anechoic Chamber	JSE	Semi 3m	RE	2007/08/26 * 12
KAF-05	Pre Amplifier	Agilent	8447D	RE	2007/04/13 * 12
KAT6-01	Attenuator	INMET	18N-6dB	RE	2008/03/17 * 12
KBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2007/12/27 * 12
KCC-A2/A3	Coaxial Cable	Fujikura	5D-2W	RE	2007/05/15 * 12
KLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2007/12/27 * 12
KOS-02	Humidity Indicator	Custom	CTH-190	RE	2006/07/10 * 24
KSA-04	Spectrum Analyzer	Advantest	R3271A	RE	2007/09/25 * 12
KTR-04	Test Receiver	Rohde & Schwarz	ESVS10	RE	2007/10/30 * 12
KJM-07	Measure	KOMELON	KMC-36	RE	-
KTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE/AT 1,2,3,4,6	2007/04/12 * 12
KHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2007/04/14 * 12
KHA-04	Horn Antenna	EMCO	3160-09	RE	2007/04/14 * 12
KCC-D3/D7	Coaxial Cable	Rosenberger/Advantest	2201/JUN-08-01-061	RE	2007/04/11 * 12
KAF-07	Pre Amplifier	Hewlett Packard	8449B	RE	2007/12/10 * 12
KDT-01	Coaxial Crystal Detector	Agilent	8473C	AT 4	Pre Check
KOSC-01	Oscilloscope	Tektronix	TDS-2022B	AT 4	2007/05/15 * 12
KCC-D7	Coaxial Cable	Advantest	A01002	AT all	2007/04/11 * 12
KPSS-03	Power sensor	Agilent	E9327A	AT5	2007/05/31 * 12
KPM-07	Power Meter	Agilent	E4416A	AT 5	2007/05/29 * 12
KOS-01	Humidity Indicator	Custom	CTH-190	AT all	2006/07/14 * 24

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.

Test Item :

RE: Out of Band Emission (Radiated)

AT: Antenna terminal conducted test

1: Carrier Frequency Separation

2: 20dB Bandwidth

3: Number of Hopping Frequency

4: Dwell time

5: Maximum Peak Output Power

6: Out of Band Emission (Conducted)