RADIO TEST REPORT

Test Report No.: 28CE0167-YK-F

Applicant	:	**TOPCON CORPORATION**
Type of Equipment	:	**Laser Receiver**
Model No.	:	**LS-B110W**
FCC ID	:	**H5P-LS-B110W**
Test regulation	:	**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: December 25, 2007 and January 8, 2008

Tested by: Go Ishiwata & Tatsuya Arai

Makoto Hosaka

Approved by: Osamu Watatani
Manager of Yamakita EMC Lab.

Table of Contents Page

1 Applicant Information

Company Name	:	TOPCON Corporation
Brand or Trade name	:	TOPCON
Address	:	75-1 Hasunuma-cho, Itabashi-ku, Tokyo-to, 174-8580 Japan
Telephone Number	:	+81-3-3558-2577
Facsimile Number	:	+81-3-3966-0038
Contact Person	:	Yasutake Katayama

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

2.1 Identification of E.U.T.

Type of Equipment	:	Laser Receiver
Model No.	:	LS-B110W
Serial No.	:	Refer to SECTION 4 in this report.
Rating	:	DC6V (4 pieces of C type battery operation)
Country of Manufacture	:	Japan
Receipt Date of Sample	:	November 26, 2007
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)

2.2 Product Description

Model No: LS-B110W (referred to as the EUT in this report) is a Laser Receiver.

Clock frequencies	:	4.9152MHz
Equipment type	:	Transceiver

Radio Specification

Frequency band	:	Lower limit 2405MHz Upper limit 2480MHz
Bandwidth & channel spacing	:	80MHz & 5MHz
Type of modulation	:	DSSS
Antenna type	:	Ceramic chip antenna
Antenna connector type	:	N/A
Antenna gain	:	+1.64dBi
ITU code	:	F1D
Operating voltage (Inner)	:	DC3.3V
Operation temperature range	:	-20 to +60 deg.C.

FCC 15.31 (e)
The TOPCON product provides stable voltage (DC3.3V) constantly to the EUT (RF Module) regardless of input voltage.
Therefore, the EUT complies with the requirement.

FCC Part 15.203
The antenna is not removable from the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3 Test Specification, Procedures and Results

3.1 Test specification

Test specification : FCC Part15 Subpart C: 2008, final revised on January 30, 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 January 30, 2008 does not influence the test specification applied to the EUT.

3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted Emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A *1	-	N/A
6dB Bandwidth	FCC Public Notice Guidance on Measurement for Digital Transmission Systems Section15.247	FCC 15.247 (a)(2) & 15.209	Conducted	N/A	-	Complied
Maximum Peak Output Power	FCC Public Notice Guidance on Measurement for Digital Transmission Systems Section15.247	FCC 15.247 (b)(3) & 15.209	Conducted	N/A		Complied
Out of Band Emission & Restricted Band Edges	FCC Public Notice Guidance on Measurement for Digital Transmission Systems Section15.247 and DA 00-705	15.247 (d) & 15.209	Conducted / Radiated	N/A	Tx: 0.1dB (7215.00MHz, AV, Horizontal, Tx 2405MHz)	Complied
Power Density	FCC Public Notice Guidance on Measurement for Digital Transmission Systems Section15.247	FCC 15.247 (e) & 15.209	Conducted	N/A	-	Complied

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

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.

3.3 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

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

Radiated Emission Test

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

3.4 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

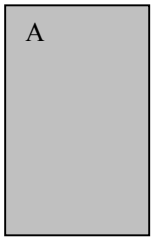
4 System Test Configuration

4.1 Justification

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

Transmitting -2405MHz (Low)
-2440MHz (Middle)
-2480MHz (High)

4.2 Configuration of Tested System



* Test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Laser Receiver	LS-B110W	67100881 *1)	TOPCON CORPORATION	**EUT**
			5610002e *2)		

*1) for Radiated emission test
*2) for Antenna port conducted test

5 6dB Bandwidth & Occupied Bandwidth (99%)

Test Procedure
The bandwidth was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass
Date : January 8, 2008 Test engineer : Tatsuya Arai

6 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 : January 8, 2008 Test engineer : Tatsuya Arai

7 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 radiated measurement.

Summary of the test results: Pass
Date : January 8, 2008 Test engineer : Tatsuya Arai

8 Out of Band Emissions (Radiated)

8.1 Operating environment

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

8.2 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.

8.3 Test conditions

Frequency range : 30MHz - 26.5GHz
Test distance : 3m
EUT operation mode : Transmitting

8.4 Test procedure

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m.
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: 10Hz
Measuring antenna	Biconical (30-300MHz) Logperiodic (300MHz-1GHz)	Horn

8.5 Band edge

Band edge level at 2390MHz, 2400MHz and 2483.5MHz is below the limits of FCC 15.209. Refer to the data of Radiated emission.
On 2483.5MHz, the marker-delta function was used according to DA 00-705.

8.6 Results

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

Date : December 25, 2007 and January 8, 2008
Test engineer : Go Ishiwata and Makoto Hosaka

9 Peak Power Density

Test Procedure
The peak power density was measured with a spectrum analyzer connected to the antenna port.

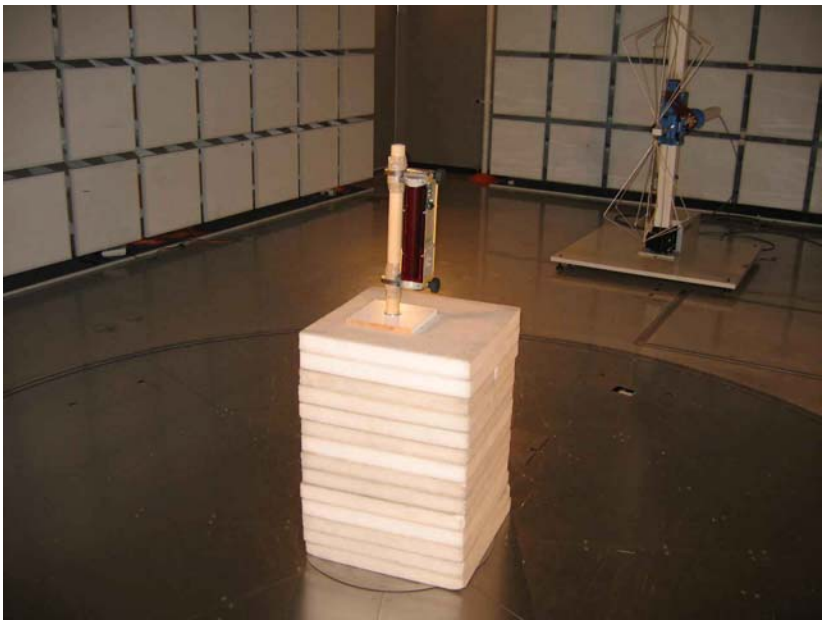
Summary of the test results: Pass
Date : January 8, 2008 Test engineer : Tatsuya Arai

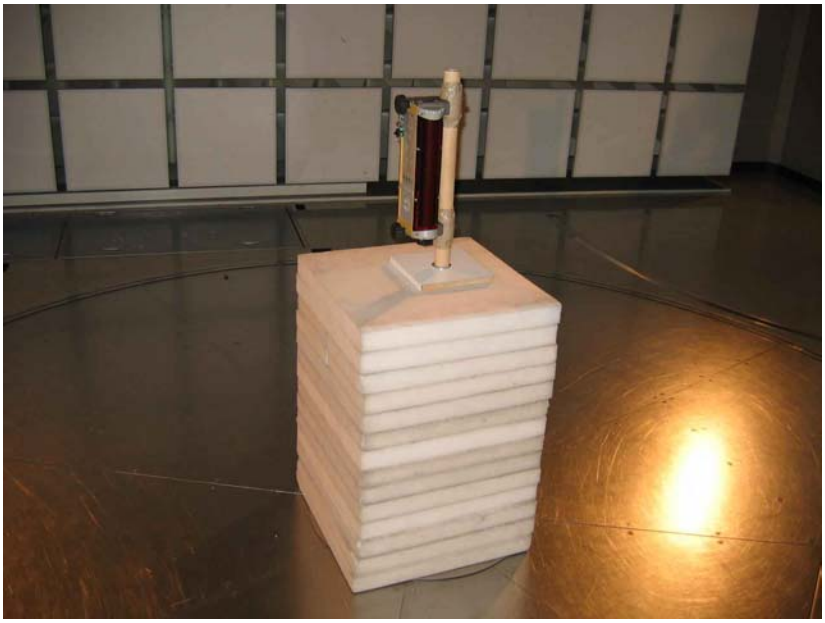
APPENDIX 1: Photographs of test setup

APPENDIX 2: Test Data

APPENDIX 3: Test instruments

Radiated emission



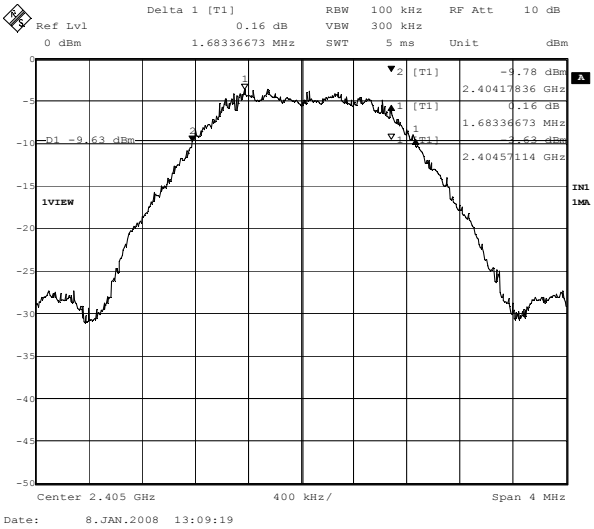


6dB Bandwidth: FCC 15.247(a)(2)

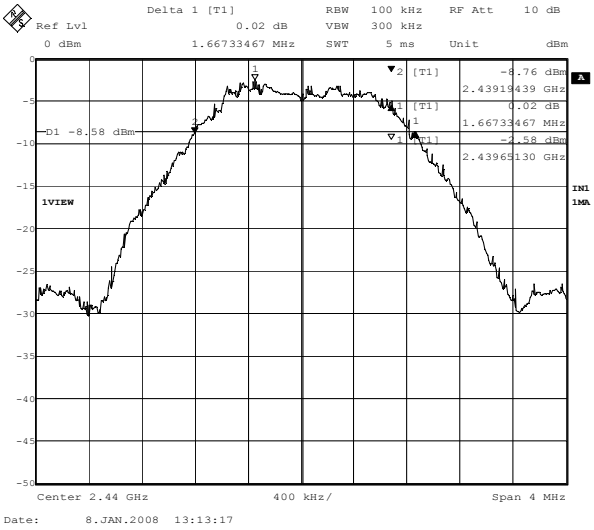
UL Japan, Inc. Yamakita No.2 Shielded Room

COMPANY	**: Topcon Corporation**	**REPORT NO**	**: 28CE0167-YK-F**
EQUIPMENT	**: Laser Receiver**	**REGULATION**	**: Fcc Part15SubpartC 247(a)(2)**
MODEL NUMBER	**: LS-B110W**	**DATE**	**: 2008/01/08**
SERIAL NUMBER	**: 5610002e**	**TEMP./HUMI**	**: 23℃/41%**
		TEST MODE	**: Transmitting**
POWER	**: DC6V**	**ENGINEER**	**: Tatsuya Arai**

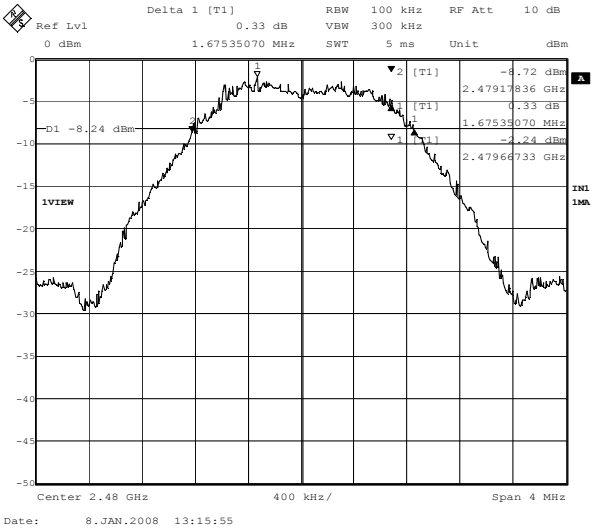
1. ch 1: 2405MHz/6dB Bandwidth:1.68MHz



2. ch 6: 2440MHz/6dB Bandwidth:1.67MHz



3. ch 11: 2480MHz/6dB Bandwidth:1.68MHz



Maximum Peak Conducted Output Power

UL Japan, Inc.
YAMAKITA NO.2 Shielded Room

COMPANY : Topcon Corporation
EQUIPMENT : Laser Receiver
MODEL NUMBE : LS-B110W
SERIAL NUMBE : 5610002e
POWER : DC6V
TEST MODE : Transmitting

REPORT NO : 28CE0167-YK-F
REGULATION : Fcc Part15SubpartC 247(b)(3)
DATE : 2008/01/15
TEMP./HUMI : 23℃/41％

ENGINEER : Tatsuya Arai

CH	FREQ [GHz]	PM Reading [dBm]	Cable Loss [dB]	Results [dBm]	Limit (1W) [dBm]	MARGIN [dB]
Low	2405.00	-1.45	0.7	-0.75	30.0	30.75
Mid	2440.00	-1.23	0.7	-0.53	30.0	30.53
High	2480.00	-1.17	0.7	-0.47	30.0	30.47

P/M: Power Meter
CABLE LOSS:KCC-D16

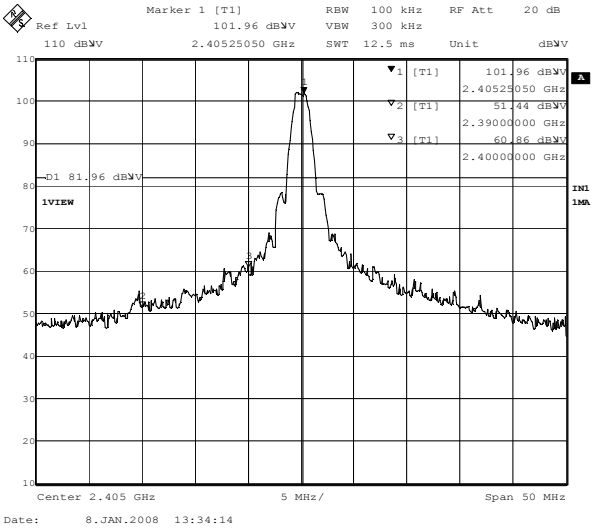
Out of Band Emission(Antenna Terminal Conducted): FCC 15.247(d)

UL Japan, Inc. Yamakita No.2 Shielded Room

COMPANY	**: Topcon Corporation**	**REPORT NO**	**: 28CE0167-YK-F**
EQUIPMENT	**: Laser Receiver**	**REGULATION**	**: Fcc Part15SubpartC 247(d)**
MODEL NUMBER	**: LS-B110W**	**DATE**	**: 2008/01/08**
SERIAL NUMBER	**: 5610002e**	**TEMP./HUMI**	**: 23deg.C./41%**
POWER	**: DC6.0V**	**ENGINEER**	**: Tatsuya Arai**

Tx Ch:2405MHz

1.



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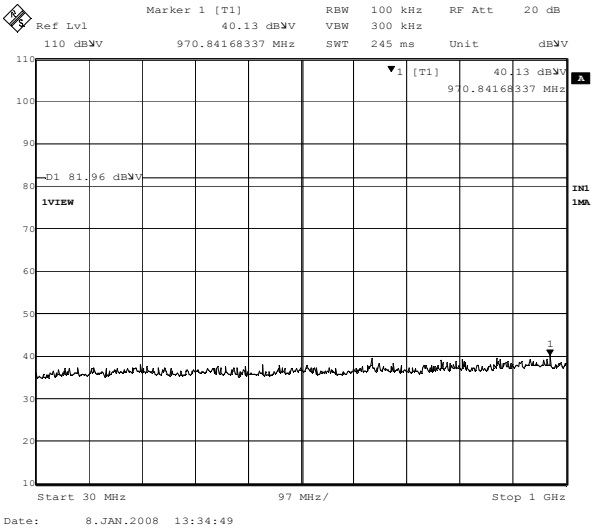

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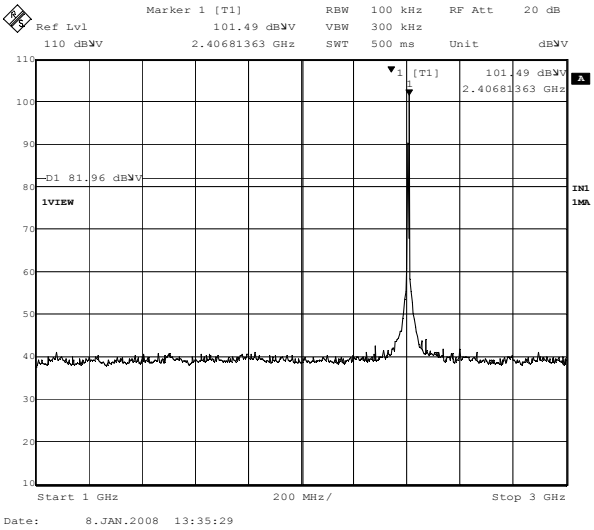


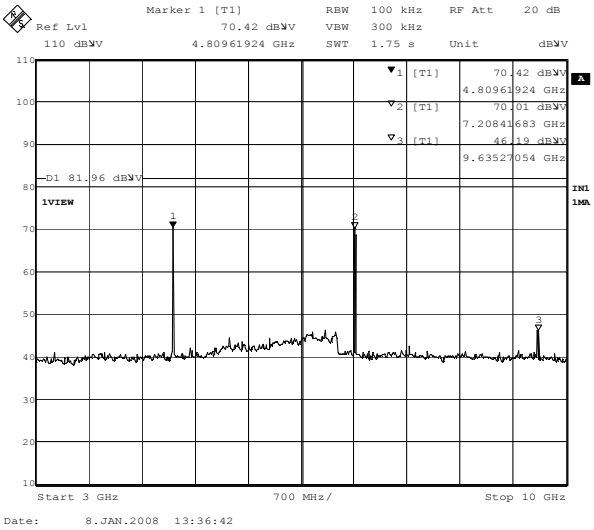
Out of Band Emission(Antenna Terminal Conducted): FCC 15.247(d)

UL Japan, Inc. Yamakita No.2 Shielded Room

COMPANY	**: Topcon Corporation**	**REPORT NO**	**: 28CE0167-YK-F**
EQUIPMENT	**: Laser Receiver**	**REGULATION**	**: Fcc Part15SubpartC 247(d)**
MODEL NUMBER	**: LS-B110W**	**DATE**	**: 2008/01/08**
SERIAL NUMBER	**: 5610002e**	**TEMP./HUMI**	**: 23deg.C./41%**
POWER	**: DC6.0V**	**ENGINEER**	**: Tatsuya Arai**

Tx Ch:2405MHz

4.



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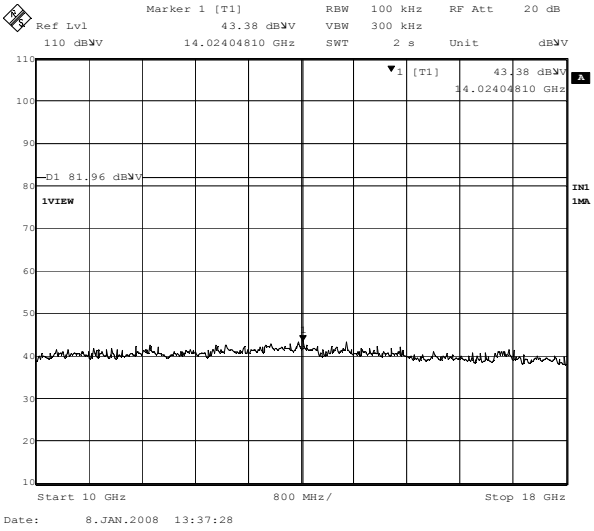

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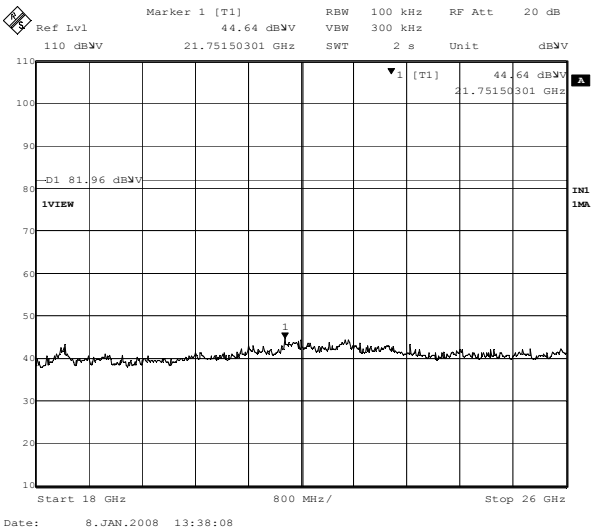

Out of Band Emission(Antenna Terminal Conducted): FCC 15.247(d)

UL Japan, Inc. Yamakita No.2 Shielded Room

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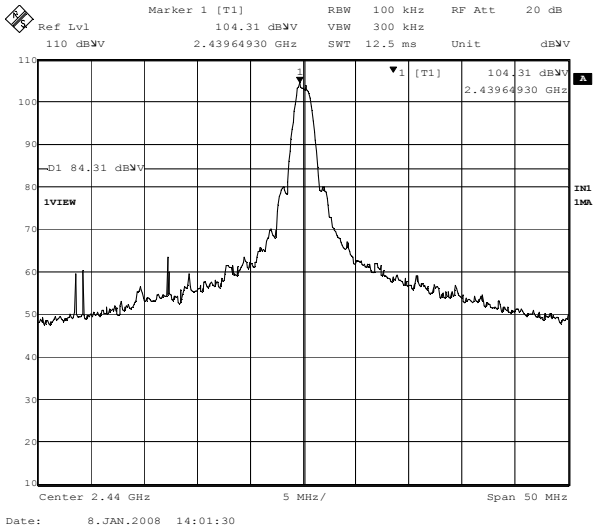
MODEL NUMBER	**: LS-B110W**	**DATE**	**: 2008/01/08**
SERIAL NUMBER	**: 5610002e**	**TEMP./HUMI**	**: 23deg.C./41%**
POWER	**: DC6.0V**	**ENGINEER**	**: Tatsuya Arai**

Tx Ch:2440MHz

1.



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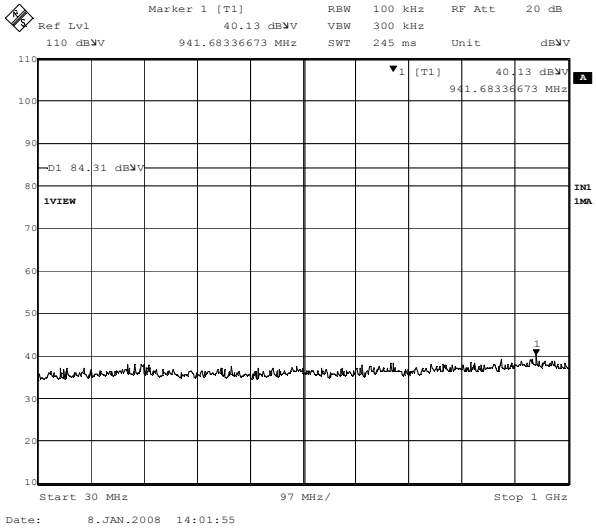

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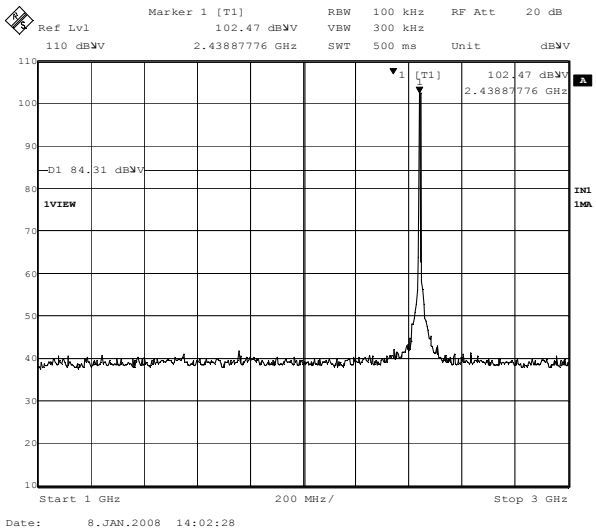


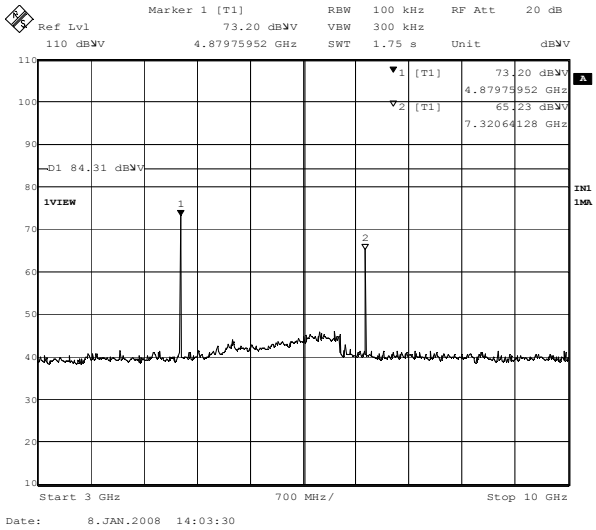
Out of Band Emission(Antenna Terminal Conducted): FCC 15.247(d)

UL Japan, Inc. Yamakita No.2 Shielded Room

COMPANY	**: Topcon Corporation**	**REPORT NO**	**: 28CE0167-YK-F**
EQUIPMENT	**: Laser Receiver**	**REGULATION**	**: Fcc Part15SubpartC 247(d)**
MODEL NUMBER	**: LS-B110W**	**DATE**	**: 2008/01/08**
SERIAL NUMBER	**: 5610002e**	**TEMP./HUMI**	**: 23deg.C./41%**
POWER	**: DC6.0V**	**ENGINEER**	**: Tatsuya Arai**

Tx Ch:2440MHz

4.



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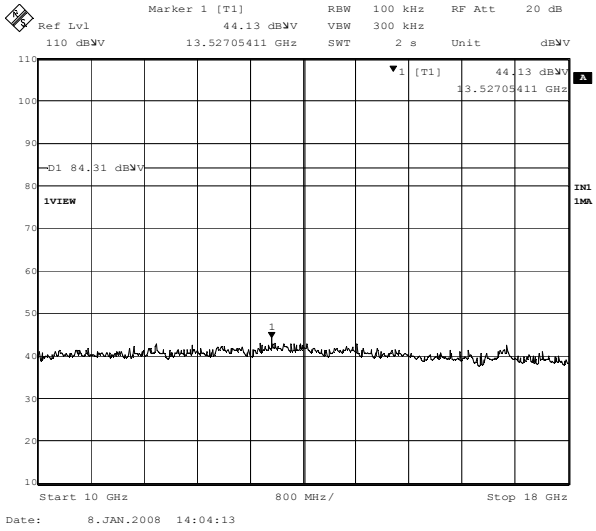

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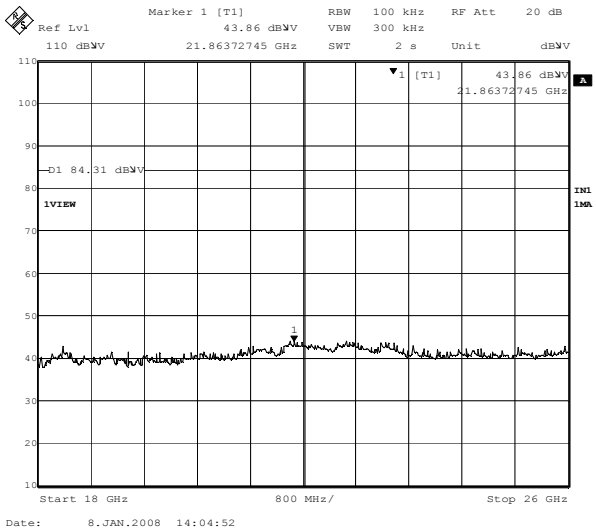

Out of Band Emission(Antenna Terminal Conducted): FCC 15.247(d)

UL Japan, Inc. Yamakita No.2 Shielded Room

COMPANY	**: Topcon Corporation**	**REPORT NO**	**: 28CE0167-YK-F**
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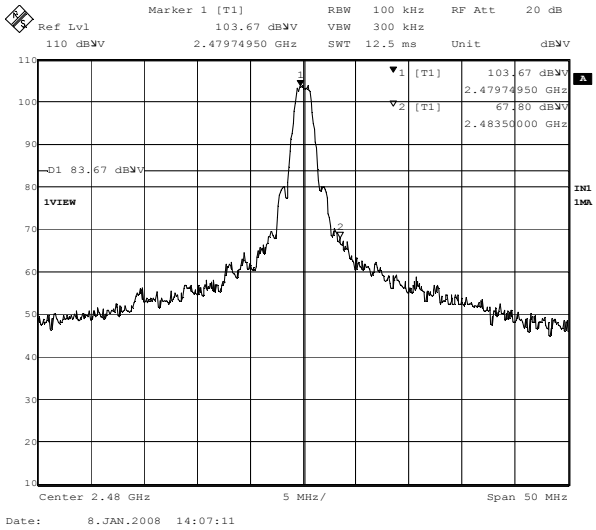
SERIAL NUMBER	**: 5610002e**	**TEMP./HUMI**	**: 23deg.C./41%**
POWER	**: DC6.0V**	**ENGINEER**	**: Tatsuya Arai**

Tx Ch:2480MHz

1.



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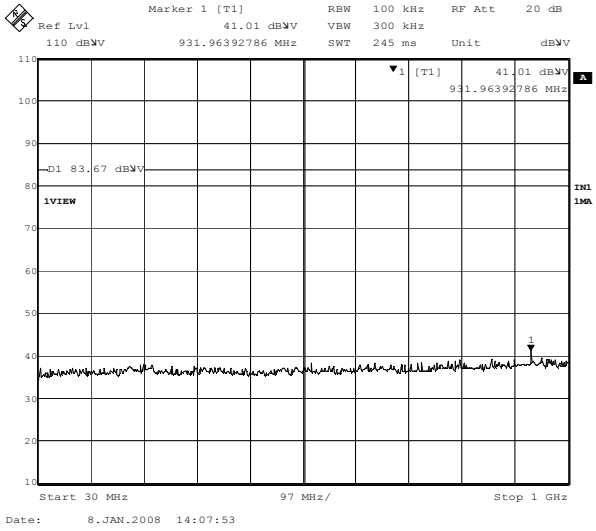

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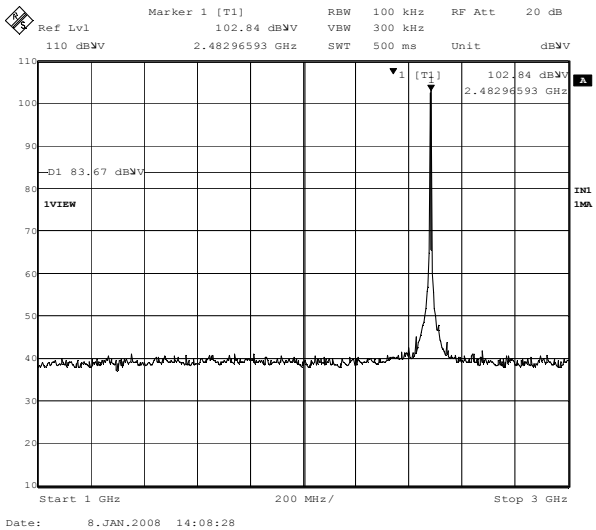

Out of Band Emission(Antenna Terminal Conducted): FCC 15.247(d)

UL Japan, Inc. Yamakita No.2 Shielded Room

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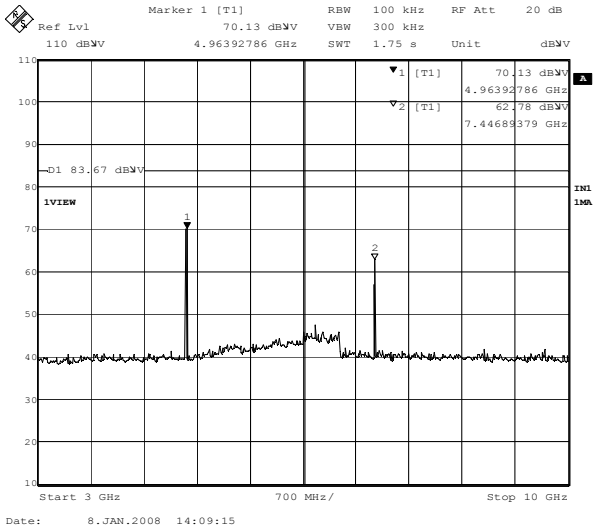
SERIAL NUMBER	**: 5610002e**	**TEMP./HUMI**	**: 23deg.C./41%**
POWER	**: DC6.0V**	**ENGINEER**	**: Tatsuya Arai**

Tx Ch:2480MHz

4.



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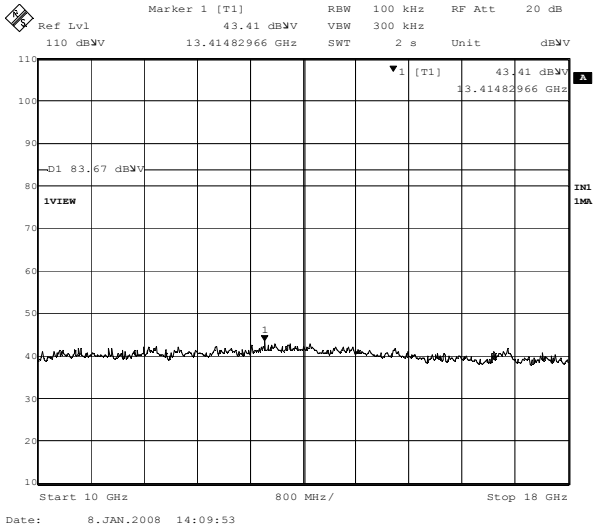

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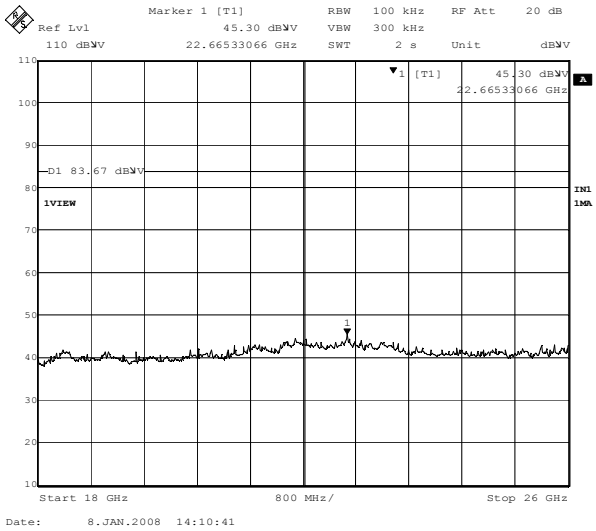


DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28CE0167-YK-F

Applicant : TOPCON Corporation
Kind of Equipment : Laser Receiver
Model No. : LS-B110W
Serial No. : 67100881
Power : DC6V
Mode : Transmitting (2405MHz)
Remarks : -
Date : 12/25/2007
Test Distance : 3 m
Temperature : 23 ℃ Engineer : Go Ishiwata
Humidity : 32 %
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.	85.06	BB	23.6	30.8	7.6	28.6	1.6	5.8	10.0	17.2	40.0	30.0	22.8
2.	112.01	BB	22.0	26.0	12.2	28.4	1.9	5.8	13.5	17.5	43.5	30.0	26.0
3.	144.01	BB	22.5	26.3	14.6	28.3	2.2	5.8	16.8	20.6	43.5	26.7	22.9
4.	177.62	BB	21.2	26.1	16.3	28.1	2.4	5.8	17.6	22.5	43.5	25.9	21.0
5.	432.01	BB	21.4	21.3	17.4	28.7	4.2	5.9	20.2	20.1	46.0	25.8	25.9
6.	576.00	BB	21.3	21.0	19.4	29.1	5.1	5.9	22.6	22.3	46.0	23.4	23.7

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

■ANTENNA:KBA-03(BBA9106)30-299.99MHz/KLA-03(USLP9143)300-1000MHz
■CABLE:KCC-30/31/32/34■PREAMP:KAF-05(8447D)■EMI RECEIVER:KTR-04

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28CE0167-YK-F

Applicant : TOPCON Corporation
Kind of Equipment : Laser Receiver
Model No. : LS-B110W
Serial No. : 67100881
Power : DC6V
Mode : Transmitting (2440MHz)
Remarks : -
Date : 12/25/2007
Test Distance : 3 m
Temperature : 23 ℃ Engineer : Go Ishiwata
Humidity : 32 %
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.	82.86	BB	23.6	30.6	7.2	28.6	1.6	5.8	9.6	16.6	40.0	30.4	23.4
2.	112.01	BB	21.9	25.9	12.2	28.4	1.9	5.8	13.4	17.4	43.5	30.1	26.1
3.	144.00	BB	22.6	25.8	14.6	28.3	2.2	5.8	16.9	20.1	43.5	26.6	23.4
4.	177.63	BB	20.9	26.4	16.3	28.1	2.4	5.8	17.3	22.8	43.5	26.2	20.7
5.	432.00	BB	21.0	21.2	17.4	28.7	4.2	5.9	19.8	20.0	46.0	26.2	26.0
6.	720.01	BB	21.2	20.8	20.3	29.1	5.6	5.9	23.9	23.5	46.0	22.1	22.5

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

■ANTENNA:KBA-03(BBA9106)30-299.99MHz/KLA-03(USLP9143)300-1000MHz
■CABLE:KCC-30/31/32/34■PREAMP:KAF-05(8447D)■EMI RECEIVER:KTR-04

Page:

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28CE0167-YK-F

Applicant : TOPCON Corporation
Kind of Equipment : Laser Receiver
Model No. : LS-B110W
Serial No. : 67100881
Power : DC6V
Mode : Transmitting (2480MHz)
Remarks : -
Date : 12/25/2007
Test Distance : 3 m
Temperature : 23 ℃ Engineer : Go Ishiwata
Humidity : 32 %
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.	84.80	BB	23.7	30.6	7.6	28.6	1.6	5.8	10.1	17.0	40.0	29.9	23.0
2.	112.00	BB	22.2	26.3	12.2	28.4	1.9	5.8	13.7	17.8	43.5	29.8	25.7
3.	144.01	BB	22.4	26.0	14.6	28.3	2.2	5.8	16.7	20.3	43.5	26.8	23.2
4.	177.63	BB	21.1	26.0	16.3	28.1	2.4	5.8	17.5	22.4	43.5	26.0	21.1
5.	576.00	BB	21.1	21.1	19.4	29.1	5.1	5.9	22.4	22.4	46.0	23.6	23.6
6.	720.00	BB	21.0	20.9	20.3	29.1	5.6	5.9	23.7	23.6	46.0	22.3	22.4

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

■ANTENNA:KBA-03(BBA9106)30-299.99MHz/KLA-03(USLP9143)300-1000MHz
■CABLE:KCC-30/31/32/34■PREAMP:KAF-05(8447D)■EMI RECEIVER:KTR-04

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28CE0167-YK-F

Applicant : TOPCON Corporation
Kind of Equipment : Laser Receiver
Model No. : LS-B110W
Serial No. : 67100881
Power : DC6V
Mode : Transmitting (2405MHz)
Remarks : PK RBW:1MHz, VBW:1MHz
Date : 1/8/2008
Test Distance : 3 m
Temperature : 21 ℃ Engineer : Makoto Hosaka
Humidity : 47 %
Regulation : FCC Part15C §15.209(PK Detection)

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	50.0	46.7	28.5	35.4	5.0	9.9	58.0	54.7	74.0	16.0	19.3
2.	2400.00	BB	58.0	57.2	28.5	35.3	5.0	9.9	66.1	65.3	74.0	7.9	8.7
3.	4810.00	BB	54.6	53.1	32.9	34.1	5.7	0.7	59.8	58.3	74.0	14.2	15.7
4.	7215.00	BB	55.6	53.1	36.5	34.7	7.6	0.1	65.1	62.6	74.0	8.9	11.4
5.	9620.00	BB	43.4	44.7	37.7	35.3	7.7	0.6	54.1	55.4	74.0	19.9	18.6
6.	12025.00	BB	42.9	42.7	40.0	35.0	8.9	0.5	57.3	57.1	74.0	16.7	16.9

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

■ANTENNA:KHA-01(SAS-200 571)1-18GHz/KHA-03(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.: 28CE0167-YK-F

Applicant : TOPCON Corporation
Kind of Equipment : Laser Receiver
Model No. : LS-B110W
Serial No. : 67100881
Power : DC6V
Mode : Transmitting (2405MHz)
Remarks : AV RBW:1MHz, VBW:10Hz
Date : 1/8/2008
Test Distance : 3 m
Temperature : 21 ℃ Engineer : Makoto Hosaka
Humidity : 47 %
Regulation : FCC Part15C §15.209(AV Detection)

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	36.1	34.0	28.5	35.4	5.0	9.9	44.1	42.0	54.0	9.9	12.0
2.	2400.00	BB	40.6	39.9	28.5	35.3	5.0	9.9	48.7	48.0	54.0	5.3	6.0
3.	4810.00	BB	44.2	43.0	32.9	34.1	5.7	0.7	49.4	48.2	54.0	4.6	5.8
4.	7215.00	BB	44.4	42.3	36.5	34.7	7.6	0.1	53.9	51.8	54.0	0.1	2.2
5.	9620.00	BB	33.4	34.1	37.7	35.3	7.7	0.6	44.1	44.8	54.0	9.9	9.2
6.	12025.00	BB	32.6	32.6	40.0	35.0	8.9	0.5	47.0	47.0	54.0	7.0	7.0

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

■ANTENNA:KHA-01(SAS-200 571)1-18GHz/KHA-03(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.: 28CE0167-YK-F

Applicant : TOPCON Corporation
Kind of Equipment : Laser Receiver
Model No. : LS-B110W
Serial No. : 67100881
Power : DC6V
Mode : Transmitting (2440MHz)
Remarks : PK RBW:1MHz, VBW:1MHz
Date : 1/8/2008
Test Distance : 3 m
Temperature : 21 ℃ Engineer : Makoto Hosaka
Humidity : 47 %
Regulation : FCC Part15C §15.209(PK Detection)

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.	4880.00	BB	53.5	50.7	33.1	34.1	5.8	0.7	59.0	56.2	74.0	15.0	17.8
2.	7320.00	BB	52.2	48.0	36.7	34.8	7.7	0.1	61.9	57.7	74.0	12.1	16.3
3.	9760.00	BB	43.7	43.0	37.7	35.4	7.7	0.6	54.3	53.6	74.0	19.7	20.4
4.	12200.00	BB	43.6	42.7	40.2	34.8	9.0	0.4	58.4	57.5	74.0	15.6	16.5

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

■ANTENNA:KHA-01(SAS-200 571)1-18GHz/KHA-03(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.: 28CE0167-YK-F

Applicant : TOPCON Corporation
Kind of Equipment : Laser Receiver
Model No. : LS-B110W
Serial No. : 67100881
Power : DC6V
Mode : Transmitting (2440MHz)
Remarks : AV RBW:1MHz, VBW:10Hz
Date : 1/8/2008
Test Distance : 3 m
Temperature : 21 ℃ Engineer : Makoto Hosaka
Humidity : 47 %
Regulation : FCC Part15C §15.209(AV Detection)

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.	4880.00	BB	42.9	40.6	33.1	34.1	5.8	0.7	48.4	46.1	54.0	5.6	7.9
2.	7320.00	BB	40.9	36.9	36.7	34.8	7.7	0.1	50.6	46.6	54.0	3.4	7.4
3.	9760.00	BB	33.1	32.8	37.7	35.4	7.7	0.6	43.7	43.4	54.0	10.3	10.6
4.	12200.00	BB	32.8	33.1	40.2	34.8	9.0	0.4	47.6	47.9	54.0	6.4	6.1

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

■ANTENNA:KHA-01(SAS-200 571)1-18GHz/KHA-03(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.: 28CE0167-YK-F

Applicant : TOPCON Corporation
Kind of Equipment : Laser Receiver
Model No. : LS-B110W
Serial No. : 67100881
Power : DC6V
Mode : Transmitting (2480MHz)
Remarks : PK RBW:1MHz, VBW:1MHz
Date : 1/8/2008
Test Distance : 3 m
Temperature : 21 ℃ Engineer : Makoto Hosaka
Humidity : 47 %
Regulation : FCC Part15C §15.209(PK Detection)

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.	4960.00	BB	52.3	51.7	33.4	34.1	5.8	0.7	58.1	57.5	74.0	15.9	16.5
2.	7440.00	BB	52.1	46.4	36.8	34.8	7.9	0.2	62.2	56.5	74.0	11.8	17.5
3.	9920.00	BB	44.1	44.0	37.7	35.4	7.7	0.6	54.7	54.6	74.0	19.3	19.4
4.	12400.00	BB	43.2	42.8	40.3	34.6	9.1	0.4	58.4	58.0	74.0	15.6	16.0

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

■ANTENNA:KHA-01(SAS-200 571)1-18GHz/KHA-03(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-07(8449B)■EMI RECEIVER:KTR-01(ESI40)

*Band edge: Refer to page 29

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 28CE0167-YK-F

Applicant : TOPCON Corporation
Kind of Equipment : Laser Receiver
Model No. : LS-B110W
Serial No. : 67100881
Power : DC6V
Mode : Transmitting (2480MHz)
Remarks : AV RBW:1MHz, VBW:10Hz
Date : 1/8/2008
Test Distance : 3 m
Temperature : 21 ℃ Engineer : Makoto Hosaka
Humidity : 47 %
Regulation : FCC Part15C §15.209(AV Detection)

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.	4960.00	BB	42.9	41.6	33.4	34.1	5.8	0.7	48.7	47.4	54.0	5.3	6.6
2.	7440.00	BB	41.2	35.6	36.8	34.8	7.9	0.2	51.3	45.7	54.0	2.7	8.3
3.	9920.00	BB	33.8	33.8	37.7	35.4	7.7	0.6	44.4	44.4	54.0	9.6	9.6
4.	12400.00	BB	32.4	32.4	40.3	34.6	9.1	0.4	47.6	47.6	54.0	6.4	6.4

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

■ANTENNA:KHA-01(SAS-200 571)1-18GHz/KHA-03(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-07(8449B)■EMI RECEIVER:KTR-01(ESI40)

*Band edge: Refer to page 29

Radiated Spurious Emission (above 1GHz) (Delta Marker method data)

UL Japan, inc. Yamakita EMC Lab.
No.1 semi-anechoic chamber

Company	TOPCON Corporation	Report No.	28CE0167-YK-F
Equipment	Laser Receiver	REGULATION	FCC Part15 Subpart C 15.247(d) / RSS-21
Model	LS-B110W	TEST DISTANCE	3m
Sample No.	67100881	DATE	01.08.2008
Power	DC6V	TEMPERATURE	21 deg.C
Mode	Transmitting (2480MHz)	HUMIDITY	47%
Remarks	-	ENGINEER	Makoto Hosaka

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

No.	FREQ	S/A READING		ANT	AMP	CABLE	Hi-Pass	Dwell	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN	LOSS	Filter	Factor	HOR	VER	PK	HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss													
1**	2483.50	68.5	64.9	28.3	35.3	5.1	9.9	-	76.5	72.9	74.0	-2.5	1.1

** Reference data

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

No.	FREQ	S/A READING		ANT	AMP	CABLE	Hi-Pass	Dwell	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN	LOSS	Filter	Factor	HOR	VER	AV	HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + Filter Loss													
1**	2483.50	48.3	46.1	28.3	35.3	5.1	9.9	-	56.3	54.1	54.0	-2.3	-0.1

** Reference data

S/A Reading

		Polarity	Hor [dBuV]		Ver [dBuV]	
		Detector	PK	AV	PK	AV
		RBW \ VBW	1MHz	10Hz	1MHz	10Hz
Step 1)	Fundamental(2480.2MHz)	1MHz	90.3	82.6	89.0	80.9
Step 2)	Fundamental(2480.2MHz)	30kHz	83.5		81.8	
	Band-edge(2483.5MHz)	30kHz	42.6		37.9	
	Amplitude delta *1	-	40.9		43.9	
Step 3)	Field strength of band-edge *2	-	49.4	41.7	45.0	36.9

*1 Amplitude delta = Fundamental(RBW:30kHz) - Band-edge(RBW:30kHz)
*2 Field strength of band-edge = Fundamental(RBW:1MHz) - Amplitude delta

Marker-Delta Method (RBW:30kHz)

No.	FREQ	Field strength of band-edge*		ANT	AMP	CABLE	ATT	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN	LOSS		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												
PK DETECT												
1	2483.5	49.4	45.0	28.3	35.3	5.1	9.9	57.4	53.0	74.0	16.6	21.0
AV DETECT												
1	2483.5	41.7	36.9	28.3	35.3	5.1	9.9	49.7	44.9	54.0	4.3	9.1

Power Density (Conducted)

UL Japan, Inc.
YAMAKITA NO.2 Shielded Room

COMPANY : Topcon Corporation
EQUIPMENT : Laser Receiver
MODEL NUMBE : LS-B110W
SERIAL NUMBE : 5610002e
POWER : DC6V
TEST MODE : Transmitting

REPORT NO : 28CE0167-YK-F
REGULATION : Fcc Part15SubpartC 247(e)
DATE : 2008/01/15
TEMP./HUMI : 23℃/41％

ENGINEER : Tatsuya Arai

CH	FREQ [GHz]	SA Reading [dBm]	Cable Loss [dB]	Results [dBm]	Limit (1W) [dBm]	MARGIN [dB]
Low	2405.00	-15.43	0.7	-14.73	8.0	22.73
Mid	2440.00	-14.79	0.7	-14.09	8.0	22.09
High	2480.00	-14.06	0.7	-13.36	8.0	21.36

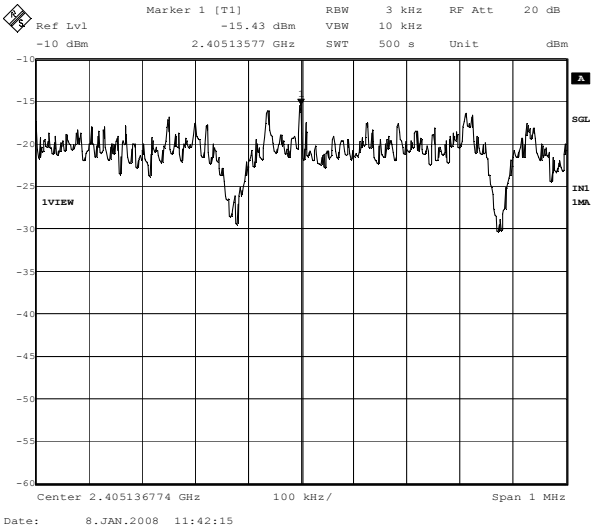
SA: Spectrum Analyzer
CABLE LOSS:KCC-D16

Power Density: FCC 15.247(e)

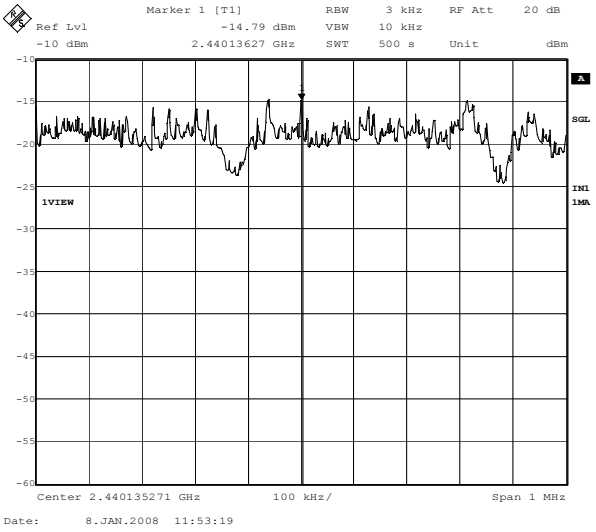
UL Japan, Inc. Yamakita No.2 Shielded Room

COMPANY	: Topcon Corporation	REPORT NO	: 28CE0167-YK-F
EQUIPMENT	: Laser Receiver	REGULATION	: FCC Part15SubpartC 247(e)
MODEL NUMBER	: LS-B110W	DATE	: 2008/01/08
SERIAL NUMBER	: 5610002e	TEMP./HUMI	: 22℃/41%
POWER	: DC6.0V	TEST MODE	: Transmitting
		ENGINEER	: Tatsuya Arai

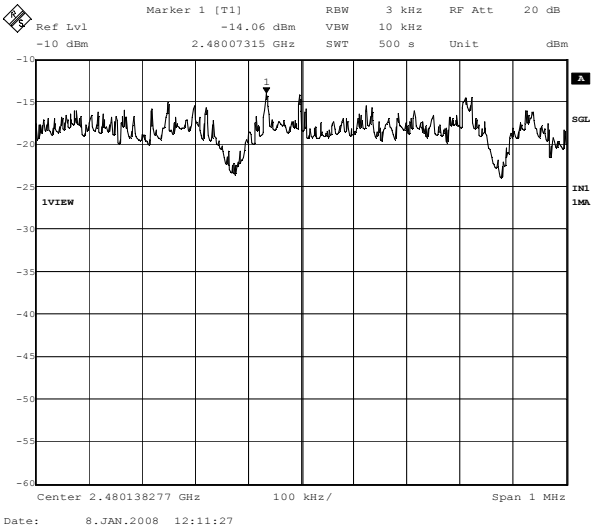
1. ch : 2405MHz



2. ch : 2440MHz



3. ch : 2480MHz

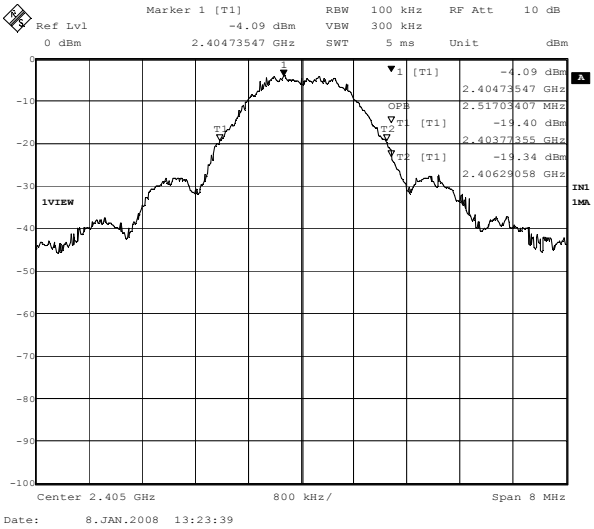


Occupied Bandwidth(99%)

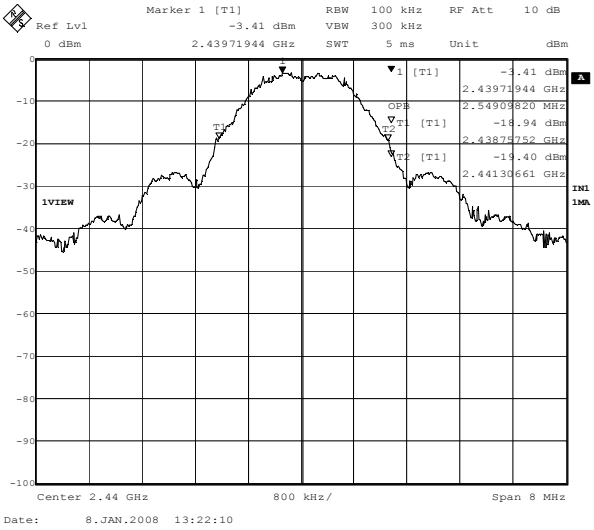
UL Japan, Inc. Yamakita No.2 Shielded Room

COMPANY	: Topcon Corporation	REPORT NO	: 28CE0167-YK-F
EQUIPMENT	: Laser Receiver	REGULATION	: RSS-210
MODEL NUMBER	: LS-B110W	DATE	: 2008/01/08
SERIAL NUMBER	: 5610002e	TEMP./HUMI	: 22℃/41%
POWER	: DC6.0V	TEST MODE	: Transmitting
		ENGINEER	: Tatsuya Arai

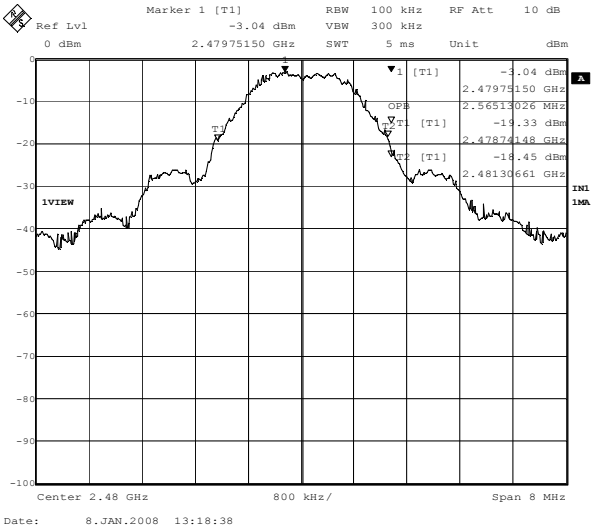
1. ch: 2405MHz/ Occupied Bandwidth:2.52MHz



2. ch: 2440MHz/ Occupied Bandwidth:2.55MHz



3. ch: 2480MHz/ Occupied Bandwidth:2.57MHz



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(NSA)	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	2007/03/28 * 12
KBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2007/12/27 * 12
KCC-30/31/32 /34/KRM-03	Coaxial Cable/RF Relay Matrix	Fujikura/Suhner/TSJ	5D-2W/S04272B/RFM-E421	RE	2007/11/01 * 12
KLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2007/12/27 * 12
KSA-04	Spectrum Analyzer	Advantest	R3271A	RE	2007/09/25 * 12
KTR-04	Test Receiver	Rohde & Schwarz	ESVS10	RE	2007/10/30 * 12
KOS-02	Humidity Indicator	Custom	CTH-190	RE	2006/07/10 * 24
KJM-01	Measure	TAJIMA	GL19-55	RE	-
KTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE, AT(ALL)	2007/04/12 * 12
KCC-D16	Coaxial Cable	INSULATED WIRE INC	KPS-1501-200-KPS	AT(ALL)	2007/02/05 * 12
KPM-08	Power meter	Anritsu	ML2495A	AT4	2007/09/12 * 12
KPSS-04	Power sensor	Anritsu	MA2411B	AT4	2007/09/12 * 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: Radiated emission ,
AT: Antenna terminal disturbance voltage
1: 6dB Bandwidth
2: Maximum Peak Output Power
3: Out of Band Emissions (Antenna Port Conducted)
4: Peak Power Density
5: Occupied Bandwidth

*Some calibrations were performed after the tested dates, however those EMI test equipment have been controlled by means of an unbroken chains of calibrations.