

EMI TEST REPORT

Test Report No.: 23KE0041-YK-4

Applicant	:	NIHON KOHDEN CORPORATION
Type of Equipment	:	Telemetry Unit
Model No.	:	ZB-101AA
FCC ID	:	B6BZB-101AA
Test standard	:	FCC Part15 Subpart C, Section 15.247
Test Result	:	Complied

- 1. This test report shall not be reproduced except in full or partial, without the written approval of UL Apex Co., Ltd.
- 2. The results in this report apply only to the sample tested.

Date of test:

July 3 and 4, 2003

Tested by:

Ichiro Isozaki

Approved by:

an

Osamu Watatani Site Manager of Yamakita EMC Lab.

UL Apex Co., Ltd. YAMAKITA EMC LAB.

907 Kawanishi, Yamakita-machi, Ashigarakami-gun, Kanagawa-ken, 258-0124 JAPAN

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1 GENERAL INFORMATION

Company Name	: NIHON KOHDEN CORPORATION
Brand Name	: NIHON KOHDEN
Address	: 1-31-4 Nishiochiai Shinjuku-ku, Tokyo, 161-8560 Japan
Telephone Number	: +81 3 5996 8066
Facsimile Number	: +81 3 5996 8103
Contact Person	: Kazuteru Yanagihara
Type of Equipment	: Telemetry Unit
Model No.	: ZB-101AA
Serial No.	: 91002
Rating	: DC9V (The EUT is operated by battery)
Country of Manufacture	: Japan
Receipt Date of Sample	: June 30, 2003
Condition of E.U.T.	: Production prototype
Regulation(s)	: FCC Part15 Subpart C, Section 15.247
Test Site	: UL Apex Yamakita EMC Lab. No.1 Open Test Site

1.1 Tested Methodology

The measurements were performed according to the procedures in ANSI C63.4 (2001). These tests were also referred to FCC 97-114 "Guidance on Measurement for Direct Sequence Spread Spectrum Systems".

1.2 Test Facility

This site has been fully described in a report submitted to FCC office, and accepted on September 20, 2002.(No.1 Open Test Site Registration No.: 95486)NVLAP Lab. code:200441-0

2 PRODUCT DESCRIPTION

Model: ZB-101AA, (referred to as the EUT in this report), is a Telemetry Unit.

Clock frequency used in EUT : 2MHz, 16MHz, 44MHz

Frequency Characteristics	: 2412 - 2462MHz
Channel Characteristics	: 11 channel selectable by 5MHz spacing
Modulation	: DBPSK, DQPSK, CCK
Antenna Type	: C-coupling exciter circuit antenna
Antenna Gain	: MAX2.15dBi
ITU Emission Code(s)	: G1D
Power Supply	: DC 3.3V±0.3V
Operation Temperature ran	ge : 10 - 40 deg. C.
Antenna Connector Type	: none

*FCC Part15.31 (e)

The host device ZB-101AA provides the Wireless LAN module with stable power supply (DC3.3V), and the power is not changed when voltage of the Telemetry Unit is varied. Therefore, the Telemetry Unit power supply regulation.

*FCC Part 15.203 Antenna requirement

The EUT uses a transmitting antenna that is an integral part of the equipment, it is impossible for end users to replace the antenna without use of a special tool. Therefore, the equipment complies with the requirement of 15.203.

3 SYSTEM TEST CONFIGURATION

3.1 Justification

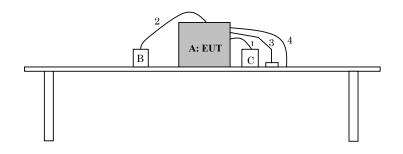
The system was configured in typical fashion (as a customer would normally use it) for testing.

Test mode:

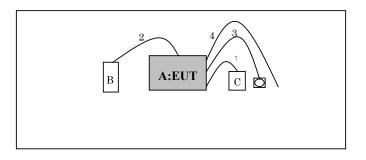
- 1. Transmitting 2412MHz (Low)
- 2. Transmitting 2437MHz (Middle)
- 3. Transmitting 2462MHz (High)

3.2 Configuration of Tested System

Front View



Top View



*Cabling was taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID	Remarks
Α	Telemetry Unit	ZB-101AA	91002	NIHON KOHDEN	B6BZB-101AA	EUT
В	ELECTRODE JUNCTION BOX	JE-011A	91002	NIHON KOHDEN	-	-
С	SpO2 ADAPTER	JL-101A	91002	NIHON KOHDEN	-	-

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	SpO2 ADAPTER Cable	0.9	Shielded	Polyvinyl chloride
2	HDR-AS-0076-L(50CM)	0.7	Shielded	Polyvinyl chloride
3	EXTERNAL EVENT KEY	0.7	Shielded	Polyvinyl chloride
4	DC Calble	1.0	Shielded	Polyvinyl chloride

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4 MEASUREMENT UNCERTAINTY

Radiated emission test

The measurement uncertainty (with 95% confidence level) for this test using Biconical antenna is ± 4.8 dB. The measurement uncertainty (with 95% confidence level) for this test using Logperiodic antenna is ± 5.2 dB. The measurement uncertainty (with 95% confidence level) for this test using Horn antenna is ± 6.6 dB.

The result is within Yamakita EMC lab's uncertainty.

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5 SUMMARY OF TESTS

5.1 §15.247(a)(2) 6dB Bandwidth (Antenna Port Conducted)

Test Procedure

The minimum 6dB bandwidth was measured with a spectrum analyzer connected to the antenna port.

Test data	: APPENDIX Page 13
Test result	: Pass
Test instruments	: KTR-01, KCC-D7

5.2 § 15.247(b)(3) Maximum Peak Out Put Power (Antenna Port Conducted)

Test Procedure

The Maximum Peak Output power was measured with a power meter connected to the antenna port. * Antenna Gain dose not exceed 6dBi.

Test data	: APPENDIX Page 14
Test result	: Pass
Test instruments	: KPM-05, KPSS-01

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5.3 § 15.247(c) Out of Band Emissions (Radiated)

Test Procedure

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.

The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

The Radiated Electric Field Strength intensity has been measured on an open test site 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. EUT emission levels were compared when the EUT antenna position was vertical polarization and horizontal polarization.

In 30-1000MHz, X axis was worst under both vertical and horizontal polarization.

In above 1GHz, Z axis was worst under vertical antenna polarization and Y axis was worst under horizontal antenna polarization.

See the photographs in page 12.

Radiated spurious emissions

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. The result was also satisfied the general limits specified in Sec.15.209 (a).

Measurement range : 30MHz to 1000MHz CISPR QP Detector, IF BW 120kHz

: 1GHz to 26GHz PK and AV Detector

It was confirmed that spurious emission frequencies which are over the limits in 15.209(a) (2037.99MHz, 2062.99MHz and 2087.99MHz) are >20dB lower than fandamental waves. These spurious emission frequencies are not the restricted band regulated in 15.205(a).

Test data: APPENDIX Page 15 to 17 (30 - 1000MHz)
: APPENDIX Page 18 to 23 (1 - 26GHz)
: APPENDIX Page 24 to 29
(Out of Band Emission :2038MHz, 2063MHz and 2088MHz)
: APPENDIX Page 30 to 33
(Band Edges: 2390MHz/ 2483.5MHz, Restricted band Charts)Photographs of test setup: Page 11
Test result: Pass
Test instruments: KAF-01, KAF-02, KAT10-S1, KAT6-01, KBA-03, KTR-01, KTR-02, KFL-01
KCC-10/11/12/13/18, KCC-D3/D7, KHA-01, KLA-01, KOTS-01, KSA-01

5.4 § 15.247(c) 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.

Test data	: APPENDIX Page 34 to 39
Test result	: Pass
Test instruments	: KTR-01, KCC-D7

5.5 § 15.247(d) Power Density (Antenna Port Conducted)

Test Procedure

The Power Density was measured with a spectrum analyzer connected to the antenna port.

Test data	: APPENDIX Page 40 to 41
Test result	: Pass
Test instruments	: KTR-01, KCC-D7

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APPENDIX 1: Photographs of test setup

1.Page 11	:	Radiated emission
2.Page 12	:	Pre check of worse-case position

APPENDIX 2: Test Data

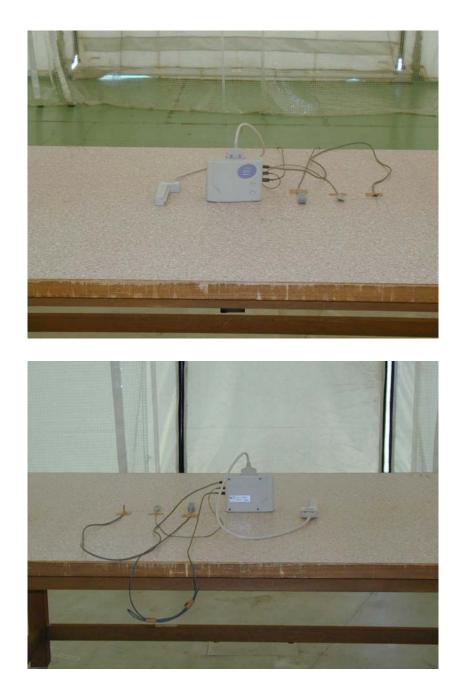
1.Page 13	:	6dB Bandwidth (Antenna Port Conducted)
2.Page 14	:	Maximum Peak Power (Antenna Port Conducted)
3.Page 15 - 33	:	Out Band of Emissions (Radiated)
4.Page 34 - 39	:	Out Band of Emissions (Antenna Port Conducted)
5.Page 40 - 41	:	Power Density (Antenna Port Conducted)

APPENDIX 3: Test instruments

Page 42 :	Test instruments
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Radiated emission



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Pre check of worse-case position

X axis



Y axis



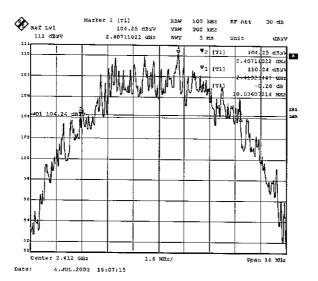
Z axis



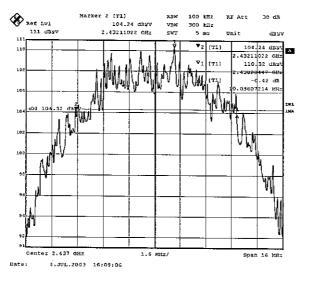
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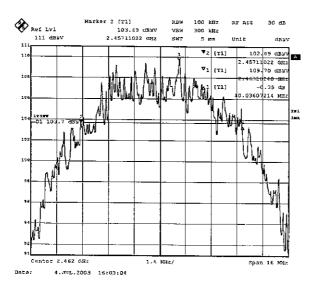
1. Ch Low:2412MHz



2. Ch Mid:2437MHz



3. Ch High:2462MHz



FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4

I. Inzaki

Peak Out Put Power(Conducted)

UL Apex Co., Ltd. YAMAKITA EMC NO.1 OPEN SITE

COMPANY : NIHON KOHDEN CORPORATION EQUIPMENT : Telemetry Unit MODEL : ZB-101AA FCC ID :B6BZB-101AA POWER : DC9V Mode : Transmitting

REPORT NO : 23KE0041-YK-4 **REGULATION** : Fcc Part15SubpartC 247(b) DATE : 2003/ 07/04 Temp./Humi. : 24°C/59%

ENGINEEŘ

: Ichiro Isozaki

CH	FREQ	PM Reading	Cable Loss	Results	Limit	MARGIN
					(1W)	
	[MHz]	[dBm]	[dB]	[dBm]	[dBm]	[dB]
Low	2412.00	15.70	0.35	16.05	30.0	13.95
Mid	2437.00	15.70	0.35	16.05	30.0	13.95
High	2462.00	15.10	0.35	15.45	30.0	14.55

UL Apex Co., Ltd. Yamakita No.1 Open Test Site Report No. : 23KE0041-YK-4

Kind Mode Seria Power Node Reman Date Test Tempo Humio	rks Distan erature	ce	t	: Tel : ZB- : 910 : DC9 : Tra : 7/3 : 3 m : 24 : 68	V nsmitti ∕2003 ℃	Unit ing(24	2MHz)		nginee	((r :	Ichiro	J 16 Isoza	zaki Ki
No.	FREQ.	ANT TYPE	REAI HOR [dB]		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESI HOR [dB µ]	JLT I VER V/m] [dl	LIMITS BµV/m]	HOR	RGIN VER HB]
1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11.	99. 01 121. 01 143. 01 176. 03 198. 02 209. 00 231. 01 308. 02 319. 01 341. 01 781. 01	BB BB BB BB BB BB BB BB BB BB BB BB	38. 1 46. 2 35. 5 44. 6 42. 9 42. 5 41. 6 42. 9 45. 0 41. 6 29. 6	40. 6 41. 8 38. 6 30. 6 28. 4 32. 8 33. 9 34. 5 34. 0 31. 1 28. 2	$10.0 \\ 13.6 \\ 14.7 \\ 16.1 \\ 16.4 \\ 16.5 \\ 16.8 \\ 14.7 \\ 15.1 \\ 15.7 \\ 21.3$	28. 4 28. 4 28. 3 28. 1 28. 1 28. 1 28. 0 27. 9 27. 9 28. 0 29. 2	2.8 3.1 3.4 3.6 3.8 4.0 4.7 4.8	6.0 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1	28.3 40.3 31.1 42.1 40.9 40.8 40.5 40.5 40.5 43.1 40.4 35.9	30. 8 35. 9 34. 2 28. 1 26. 4 31. 1 32. 8 32. 1 32. 1 29. 9 34. 5	43. 5 43. 5 43. 5 43. 5 43. 5 43. 5 43. 5 43. 5 46. 0 46. 0 46. 0 46. 0 46. 0	15.23.212.41.42.62.75.55.55.52.95.610.1	12. 7 7. 6 9. 3 15. 4 17. 1 12. 4 13. 2 13. 9 13. 9 16. 1 11. 5

CALCULATION: READING [dB μ V] + ANT. FACTOR [dB/m] + CABLE LOSS [dB] - AMP. GAIN [dB] + ATTEN [dB].

■ ANTENNA: KBA-03 (BBA9106) 30-299. 99MHz/KLA-01 (USLP9143) 300-1000MHz ■ CABLE: KCC-10/11/12/13/18 ■ PREAMP: KAF-01 (8447D) ■ EMI RECEIVER: KTR-02 (ESCS30)

UL Apex Co., Ltd. Yamakita No.1 Open Test Site Report No.: 23KE0041-YK- 4

Kind Mode Seri Powe Mode Rema Date Test Temp Humi	rks Distan erature	ce		: Tel 2B- 910 DC9 Tra 7/3 3 m 24 : 68	V nsmitti ⁄2003 ℃	Unit ng(243	37MHz)		nginee	(r :	Ichiro	Isoza	zoki ki
No.	FREQ.	ANT	READ		ANT	AMP	CABLE	ATTEN.	RESI		LIMITS		RGIN
	[MHz]	TYPE	HOR [dB,		FACTOR [dB/m]	GAIN [dB]	LOSS [dB]	[dB]	HOR [dB μ]	VER //m] [d]	3μV/m]	HOR [c	VER fB]
1.	99.01	BB	37.9	40.5	10.0	28.4	2.6	6.0	28.1	30.7	43.5	15.4	12.8
2. 3.	121.01	BB	47.4	40.3	13.6	28.4	2.8	6.1	41.5	34.4	43.5	2.0	9.1
э. 4.	143.01 176.03	BB BB	35.6 44.9	$39.0 \\ 31.5$	14.7 16.1	28.3 28.1	3.1 3.4	6.1	31.2	34.6 29.0	43. 5	12.3	8.9
5.	198.01	BB	44. 9 44. 6	32.4	16.4	28.1 28.1	3.4 3.6	6.1 6.1	42.4 42.6	29.0 30.4	43. 5 43. 5	$\begin{array}{c} 1.1\\ 0.9 \end{array}$	14.5 13.1
6.	209.00	BB	42.0	31.4	16.5	28.1	3.8	6. 1	40.3	29.7	43.5 43.5	0.9 3.2	13.1
7.	231.01	BB	42.9	34.9	16.8	28.0	4.0	6.1	41.8	33.8	46.0	4.2	12.2
8.	308.02	BB	41.7	32.8	14.7	27.9	4.7	6.1	39. 3	30.4	46.0	6.7	15.6
9.	319.01	BB	43.9	36.9	15.1	27.9	4.8	6.1	42.0	35.0	46.0	4.0	11.0
10.	341.01	BB	41.5	35.7	15.7	28.0	5.0	6.1	40.3	34.5	46.0	5.7	11.5
11.	781.01	BB	28.6	28.3	21.3	29.2	8.1	6.1	34.9	34.6	46.0	11.1	11.4

CALCULATION: READING [dB μ V] + ANT. FACTOR [dB/m] + CABLE LOSS [dB] - AMP. GAIN [dB] + ATTEN [dB].

■ ANTENNA: KBA-03 (BBA9106) 30-299. 99MHz/KLA-01 (USLP9143) 300-1000MHz ■ CABLE: KCC-10/11/12/13/18 ■ PREAMP: KAF-01 (8447D) ■ EMI RECEIVER: KTR-02 (ESCS30)

UL Apex Co., Ltd. Yamakita No.1 Open Test Site Report No.: 23KE0041-YK= 4

Kind Mode Seri Powe Mode Rema Date Test Temp Humi	rks Distan erature	ce	ŀt	Tel ZB- 910 DC9 Tra 7/3 3 m 24 68	V nsmitti ∕2003 ℃	Unit ing(24	62MHz)	ON	Engineer		: Ichiro	J NO.	zaki ki
No.	FREQ.	ANT		DING	ANT	AMP	CABLE	ATTEN.	RESUL		LIMITS		RGIN
	[MHz]	TYPE	HOR [dB	νer μV]	FACTOR [dB/m]	GAIN [dB]	LOSS [dB]	[dB]		VER m]	[dBµV/m]	HOR [•	VER dB]
1.	99.01	BB	37.0	40.6	10.0	28.4		6.0		30.8		16.3	12.7
2. 3.	121.01	BB BB	40.1	41.6	13.6	28.4	2.8	6.1		35.7		9.3	7.8
з. 4.	143.01 176.02	BB	36, 2 43, 2	37.2 30.9	14.7 16.1	28.3 28.1	3.1 3.4	6.1 6.1		32. 8 28. 4		$11.7 \\ 2.8$	10.7
т. 5.	198.01	BB	45.3	34. 5	16.4	28.1	3.4 3.6	6.1		40. 4 32. 5		2.8 0.2	15. 1 11. 0
6.	209.01	BB	43.2	32.3	16.5	28.1	3.8	6.1		30. (2.0	12.9
7.	231.01	BB	41.6	34.1	16.8	28.0	4.0	6.1		33. (5.5	13.0
8.	308.02	BB	42.8	37.5	14.7	27.9	4.7	6, 1		35. 1		5.6	10.9
9.	319.01	BB	42.3	37.7	15. 1	27.9	4.8	6.1	40.4	35, 8	3 46.0	5.6	10.2
10.	341.01	BB	40.7	33.8	15.7	28.0	5.0	6.1		32.6		6.5	13.4
11.	781.01	BB	29.8	29.3	21.3	29.2	8.1	6.1	36. 1	35. e	6 46.0	9.9	10.4

CALCULATION: READING[dB μ V] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB].

ANTENNA: KBA-03 (BBA9106) 30-299. 99MHz/KLA-01 (USLP9143) 300-1000MHz CABLE: KCC-10/11/12/13/18 PREAMP: KAF-01 (8447D) ENI RECEIVER: KTR-02 (ESCS30)

UL Apex Co., Ltd. Yamakita No.1 Open Test Site Report No.: 23KE0041-YK- 4

Kin Mod Ser Pow Mod Rem Dat Tes Tem Hum	le Iarks	се	t	: Tel : ZB- : 910 : DC9 : Tra : 7/3 : 3 m : 24 : 68	V nsmitti ∕2003 ℃	Unit ing(24	12MHz)		Engineer ection)		: Ichiro	Isoza	n <i>aki</i> ki
No.	FREQ.	ANT TYPE	REAI HOR		ANT FACTOR	AMP GAIN	CABLE LOSS	ATTEN.	RESU HOR	LT VER	LIMITS	MA HOR	RGIN VER
	[MHz]		[dB]		[dB/m]	[dB]	[dB]	[dB]			[dBµV/m]		dB]
1.	2037.99	BB	59.5	57.9	30.6	36.9	3.9	10.0		65.5		6.9	8.5
2. 3.	2301.97 2346.06	BB BB	51. 9 52. 6	49.4 48.6	30.6 30.6	36.9 36.9		10.0		57.1		14.4	16.9
3. 4.	2340.00	BB	52. 0 53. 8	40.0 51.0	30.6	36.9	4.1 4.1	10. 0 10. 0		56.4 58.8		$13.6 \\ 12.4$	$17.6 \\ 15.2$
5.	4075.97	BB	48.8	46.8	33.0	36.2		0.7		49.7		$\frac{12.4}{22.3}$	24, 3
6.	4824.00	BB	44.1	43.1	34.7	35.2		0.6		48.8		24.2	25.2
7.	7236.00	BB	43.6	44.1	37.7	36.8		0.5		52.0		22.5	22.0
8,	8151, 93	BB	46.7	47.8	37.8	37.0	6.7	0.6		55.9	74.0	19.2	18.1
9.	9648.00	BB	45.2	46.3	39.0	36.9	7.2	0.5		56.1		19.0	17.9
10.	12060.00	BB	44.5	43.6	42.1	36.3	8.1	0.5		58.0		15.1	16.0
11.	14472.00	BB	43.5	43.3	41.2	35.2		0.2		56.8		17.0	17.2
12. 13.	16884.00 19296.00	BB BB	44.0 39.8	43. 1 40. 0	41.6 39.1	35.0 34.7	8.8	0.5 0.0		59.0		14.1	15.0
		BB	39.8 40.7	40.0	39.1 39.2	34. 1 34. 3	9.4 9.9	0.0	-	53.8 55.6		20.4 18.5	20.2 18.4
	24120.00	BB	39.1	39.0	40.3	35.5	10.9	0.0		54. 7		19.2	19.3

CALCULATION: READING[dB μ V] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB]. ■ANTENNA:KHA-01 (SAS-200 571) 1-18GHz/KHA-03 (3160-09) 18-26GHz ■CABLE:KCC-D3/D7■PREAMP:KAF-02 (8449B) ■EM1 RECEIVER:KTR-01 (ES140)

UL Apex Co., Ltd. Yamakita No.1 Open Test Site Report No.: 23KE0041-YK = 4

Kin Mod Ser Pow Mod Rem Dat Tes Tem Hum	e arks	ce		: Tel : ZB- : 910 : DC9 : Tra : 7/3 : 3 m : 24 : 68	V nsmitti /2003 °C	Unit ng(24	12MHz)	Ī	Enginee stion)	(r :	lchird	D Isoza	182 afri
No.	FREQ.	ANT TYPE	REAE HOR		ANT FACTOR	AMP GAIN	CABLE LOSS	ATTEN.	RES HOR	ULT VER	LIMITS	MA HOR	RGIN VER
	[MHz]		[dB,		[dB/m]	[dB]	[dB]	[dB]			iΒµV/m]		[dB]
1.		BB	57.9	55.3	30.6	36.9	3.9	10.0	65.5	62.9		-11.5	-8.9
2.	2301.97	BB	41.7	39.3	30.6	36.9	4.0	10.0	49.4	47.0	54.0	4.6	7.0
3.	2346.06	BB	42.5	38.9	30.6	36.9	4.1	10.0	50.3	46.7	54.0	3.7	7.3
4.	2390.00	BB	42.7	39.3	30.6	36.9		10.0	50.5	47.1	54.0	3.5	6.9
5.	4075.97	BB	40.7	39.6	33.0	36.2	5.4		43.6	42.5	54.0	10.4	11.5
6. 7.	4824.00 7236.00	BB BB	32.0 32.0	31.8 32.0	34. 7 37. 7	35.2 36.8		0.6 0.5	37.7 39.9	37.5	54.0	16.3	16.5
8.	8151.93	BB	32.0 37.6	39.9	37.8	30.0	6.5 6.7	0.5	39.9 45.7	39.9 48.0	54.0 54.0	14.1 8.3	14.1
9.	9648.00	BB	33.2	33, 2	39.0	36.9	7.2		43.0	40.0 43.0	54.0 54.0	8.3 11.0	6.0 11.0
10.	12060.00	BB	33.2	33.0	42.1	36.3		0.5	47.6	47.4	54.0 54.0	6.4	6.6
11.	14472.00	BB	32.0	32.1	41.2	35.2		0.3	45.5	45.6	54.0 54.0	8.5	8.4
12.	16884.00	BB	32.9	32.7	41.6	35.0			48.8	48.6	54.0 54.0	5. 2	o. 4 5. 4
13.	19296.00	BB	26.0	26.2	39.1	34.7	9.4	0.0	39.8	40.0	54.0	14.2	14.0
14.	21708.00	BB	28.0	27.8	39.2	34.3		0.0	42.8	42.6	54.0	11.2	11. 4
	24120.00	BB	26.4	26.5	40.3	35.5	10.9	0.0	42.1	42.2	54.0	11.9	11.8

CALCULATION: READING [dB μ V] + ANT. FACTOR [dB/m] + CABLE LOSS [dB] - AMP. GAIN [dB] + ATTEN [dB].

ANTENNA: KHA-01 (SAS-200 571) 1-18GHz/KHA-03 (3160-09) 18-26GHz CABLE: KCC-D3/D7 PREAMP: KAF-02 (8449B) EMI RECEIVER: KTR-01 (ESI40)

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UL Apex Co., Ltd. Yamakita No.1 Open Test Site Report No. : 23KE0041-YK ~ 4

EDEO					0	J. 203 (F	YK Detec	ction)				íki
TREW.	ANT	READ		ANT	AMP	CABLE	ATTEN.	RESU		LIMITS		RGIN
[MHz]	TYPE	HOR [dB µ		FACTOR [dB/m]	GAIN [dB]	LOSS [dB]	[dB]	HOR [dB μ V	VER /m] [[dBµV/m]	HOR [c	VER dB]
2062.99	BB	57.0	58.7	30.6	36.9		10.0	64.6			9.4	7.7
												16.5
												17.0
												14.8
												23, 9
												20.1
								55.4 50 0				20.0
												14.4
												15.3
												13.8 20.7
												18.0
24370.00	BB											19.7
	2062. 99 2326. 99 2370. 99 4126. 00 4874. 00 7311. 00 9748. 00 2185. 00 4622. 00 7059. 00 9496. 00 1933. 00	[MHz] 2062. 99 BB 2326. 99 BB 2370. 99 BB 4126. 00 BB 4874. 00 BB 7311. 00 BB 9748. 00 BB 2185. 00 BB 4622. 00 BB 7059. 00 BB 9496. 00 BB 1933. 00 BB	[MHz] [dB µ] 2062. 99 BB 57. 0 2326. 99 BB 48. 5 2370. 99 BB 52. 2 4126. 00 BB 47. 5 4874. 00 BB 45. 3 9748. 00 BB 45. 6 2185. 00 BB 43. 6 7059. 00 BB 44. 3 9496. 00 BB 39. 6 1933. 00 BB 40. 0	$\begin{bmatrix} MHz \end{bmatrix} & \begin{bmatrix} dB \ \mu \ V \end{bmatrix}$ 2062. 99 BB 57. 0 58. 7 2326. 99 BB 48. 5 49. 8 2370. 99 BB 52. 2 49. 2 4126. 00 BB 47. 5 47. 0 4874. 00 BB 45. 3 45. 8 9748. 00 BB 45. 6 44. 2 2185. 00 BB 45. 6 44. 2 2185. 00 BB 43. 6 44. 2 2185. 00 BB 43. 6 44. 2 7059. 00 BB 43. 6 44. 2 9496. 00 BB 39. 6 39. 5 1933. 00 BB 40. 0 40. 1								

CALCULATION: READING $[dB \mu V]$ + ANT. FACTOR [dB/m] + CABLE LOSS [dB] - AMP. GAIN [dB] + ATTEN [dB].

ANTENNA: KHA-01 (SAS-200 571) 1-18GHz/KHA-03 (3160-09) 18-26GHz CABLE: KCC-D3/D7 PREAMP: KAF-02 (8449B) EMI RECEIVER: KTR-01 (ESI40)

UL Apex Co., Ltd. Yamakita No.1 Open Test Site Report No.: 23KE0041-YK= 4

Kind Nod Ser Powe Mod Rem Dat Tes Tem Hum	e arks	ce	t	: Tele : ZB-1 : 9100 : DC9V : Tran : 7/3/ : 3 m : 24 ° : 68 9	/ nsmitti /2003 /C %	Unit ng(243	37MHz)		inginee tion)	r :	Ichiro		zaki ki
No.	FREQ. [MHz]	ANT TYPE	READ HOR [dB]	VER	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESU HOR [dB µ \	JLT VER //m] [d]	LIMITS BµV/m]	HOR	RGIN VER dB]
	$\begin{array}{c} 2062.\ 99\\ 2326.\ 99\\ 2370.\ 99\\ 4126.\ 00\\ 4874.\ 00\\ 7311.\ 00\\ 9748.\ 00\\ 12185.\ 00\\ 14622.\ 00\\ 17059.\ 00\\ 19496.\ 00\\ 21933.\ 00\\ 24370.\ 00\\ \end{array}$	BB BB BB BB BB BB BB BB BB BB BB BB BB	$54.1 \\ 38.3 \\ 44.9 \\ 41.4 \\ 31.6 \\ 33.0 \\ 33.2 \\ 32.5 \\ 32.3 \\ 32.8 \\ 26.4 \\ 27.9 \\ 26.5 \\ 100000000000000000000000000000000000$	56. 939. 340. 337. 131. 733. 833. 532. 632. 532. 826. 527. 826. 4	$\begin{array}{c} 30.\ 6\\ 30.\ 6\\ 30.\ 6\\ 32.\ 9\\ 35.\ 0\\ 37.\ 8\\ 39.\ 0\\ 42.\ 3\\ 41.\ 7\\ 41.\ 7\\ 39.\ 0\\ 39.\ 3\\ 40.\ 4\end{array}$	$\begin{array}{c} 36.9\\ 36.9\\ 36.9\\ 36.1\\ 35.2\\ 36.8\\ 37.0\\ 36.1\\ 35.2\\ 34.9\\ 34.7\\ 33.6\\ 36.3\\ \end{array}$	3.9 4.0 4.1 5.5 5.6 6.6 7.2 8.1 7.7 8.7 9.5 10.2 10.8	$\begin{array}{c} 10.\ 0\\ 10.\ 0\\ 10.\ 0\\ 0.\ 7\\ 0.\ 6\\ 0.\ 5\\ 0.\ 6\\ 0.\ 4\\ 0.\ 3\\ 0.\ 5\\ 0.\ 0\\ 0.\ 0\\ 0.\ 0\\ 0.\ 0\end{array}$	$\begin{array}{c} 61.\ 7\\ 46.\ 0\\ 52.\ 7\\ 44.\ 4\\ 37.\ 6\\ 41.\ 1\\ 43.\ 0\\ 47.\ 2\\ 46.\ 8\\ 48.\ 8\\ 40.\ 2\\ 43.\ 8\\ 41.\ 4\end{array}$	64.5 47.0 48.1 40.1 37.7 41.9 43.3 47.3 47.0 48.8 40.3 43.7 41.3	$\begin{array}{c} 54.\ 0\\$	$\begin{array}{c} -7.7\\ 8.0\\ 1.3\\ 9.6\\ 16.4\\ 12.9\\ 11.0\\ 6.8\\ 7.2\\ 5.2\\ 13.8\\ 10.2\\ 12.6\end{array}$	$\begin{array}{c} -10.5\\ 7.0\\ 5.9\\ 13.9\\ 16.3\\ 12.1\\ 10.7\\ 6.7\\ 7.0\\ 5.2\\ 13.7\\ 10.3\\ 12.7\end{array}$

CALCULATION: READING [dB μ V] + ANT. FACTOR [dB/m] + CABLE LOSS [dB] - AMP. GAIN [dB] + ATTEN [dB].

■ ANTENNA: KHA-01 (SAS-200 571) 1-18GHz/KHA-03 (3160-09) 18-26GHz ■ CABLE: KCC-D3/D7 ■ PREAMP: KAF-02 (8449B) ■ EN1 RECEIVER: KTR-01 (ES140)

UL Apex Co., Ltd. Yamakita No.1 Open Test Site Report No. : 23KE0041-YK - 4

Kin Mod Ser Pow Mod Rem Dat Tes Tem Hum	le Iarks	ce		: Tel : ZB- : 910 : DC9 : Tra : 7/3 : 3 m : 24 : 68	V nsmitti ∕2003 ℃ %	Unit ing(24	62MHz)		inginee tion)	(r :	lchiro	Isoza	nzoki Ki
No.	FREQ.	ANT TYPE	REAL HOR		ANT FACTOR	AMP GAIN	CABLE LOSS	ATTEN.	RES HOR	ULT VER	LIMITS	MA HOR	RGIN VER
	[MHz]		[dB,		[dB/m]	[dB]	[dB]	[dB]			lBμV/m]		dB]
1.	2087.99	BB	62.7	58.8	30.6	36.9		10.0	70.3	66.4	74.0	3.7	7.6
2.	2351.99	BB	53.4	50.9	30.6	36.9		10.0	61.2	58.7	74.0	12.8	15.3
3.	2395.99	BB	56.6	52.0	30.6	36.9		10.0	64.4	59.8	74.0	9.6	14.2
4. 5.	2483, 50 2484, 08	BB BB	52.4 53.5	50.1 49.9	30. 6 30. 6	36.9 36.9		10.0	$\begin{array}{c} 60.2 \\ 61.3 \end{array}$	57.9 57.7	74.0	13.8	16.1
5. 6.	4175.97	BB	53.5 48.6	49.9	30.0	36.0		10.0 9.9	60. 9	60.3	74. 0 74. 0	12.7 13.1	16.3 13.7
7.	4924.00	BB	43.5	44.8	35.3	35.2			49.7	51.0	74.0	24.3	23.0
8.	7386.00	BB	45.0	44.3	37, 9	36, 9		0.5	53.1	52.4	74.0	20.9	21.6
9.	9848,00	BB	44.5	44.3	39.0	37.0		0.7	54.4	54.2	74.0	19.6	19.8
10.	12310.00	BB	44.2	44.4	42.5	35.9	8,1	0.4	59.3	59.5	74.0	14.7	14.5
11.	14772.00	BB	44.5	44.3	42.2	35.1	8.1	0.4	60.1	59.9	74.0	13.9	14.1
12.	17234.00	BB	44.4	44.4	42.3	34.8	8.5		61.0	61.0	74.0	13.0	13.0
13.	19696.00	BB	39.8	39.7	39.5	35.0	9.6	0.0	53.9	53.8	74.0	20.1	20.2
14.	22158.00	BB	40.1	40.3	39.2	33, 7		0.0	55.9	56.1	74.0	18.1	17.9
15.	24620.00	BB	40.0	40.1	40.4	36.0	10.9	0.0	55.3	55.4	74.0	18.7	18.6

CALCULATION: READING $[dB \mu V]$ + ANT. FACTOR [dB/m] + CABLE LOSS [dB] - AMP. GAIN [dB] + ATTEN [dB].

■ANTENNA:KHA-01 (SAS-200 571) 1-18GHz/KHA-03 (3160-09) 18-26GHz ■CABLE:KCC-D3/D7■PREAMP:KAF-02 (8449B) ■EMI RECEIVER:KTR-01 (ESI40)

UL Apex Co., Ltd. Yamakita No.1 Open Test Site Report No.: 23KE0041-YK[∞] 4

Kir Moc Ser Pow Moc Ren Dat Tes Ten Hun	le narks	ce	it .	: Tel ZB- 910 DC9 Tra 7/3 3 m 24 68	V nsmitti ∕2003 ℃	Unit ing(24	62MHz)	i	Enginee ction)	(r :	lchird	No Isoza	oki ki
No.	FREQ.	ANT		DING	ANT	AMP	CABLE	ATTEN.	RESU		LIMITS		RGIN
	[MHz]	TYPE	HOR [dB	VER μ V]	FACTOR [dB/m]	GAIN [dB]	LOSS [dB]	[dB]	HOR [dBµ]	VER V/m] [d	lBμV/m]	HOR [VER dB]
1.	2087.99	BB	62.1	57.2	30.6	36.9	3.9	10.0	69.7	64.8			-10.8
2.	2351.99	BB	43.5	41.5	30.6	36.9	4.1	10.0	51.3	49.3	54.0	2, 7	4.7
3.	2395, 99	BB	44.7	43.2	30.6	36.9		10.0	52.5	51.0	54.0	1.5	3.0
4. 5.	2483.50 2484.08	BB BB	41.8	$\frac{38.1}{20.9}$	30.6	36.9		10.0	49.6	45.9	54.0	4.4	8.1
5. 6.	4175.97	BB	44. 0 43. 3	39.8 41.3	30, 6 32, 9	36. 9 36. 0		$\begin{array}{c} 10.0\\ 0.7\end{array}$	51.8	47.6	54.0	$\frac{2.2}{5}$	6.4
7.	4924.00	BB	32.1	33.2	35.3	35.2		0.7	46.4 38.3	44.4 39.4	54.0 54.0	7.6 15.7	9.6
8.	7386.00	BB	33.3	33.0	37,9	36.9		0.5	41.4	41. 1	54.0	12.6	14.6 12.9
9.	9848.00	BB	32.5	33.1	39.0	37.0		0.7	42.4	43.0	54.0	12.0 11.6	12. 5
10.	12310.00	BB	32.9	32.7	42.5	35.9		0.4	48.0	47.8	54. 0	6.0	6.2
11.	14772.00	BB	33.1	33.0	42.2	35.1	8.1	0.4	48.7	48.6	54.0	5.3	5.4
12.	17234.00	BB	32.9	32.8	42.3	34.8		0.6	49.5	49.4	54.0	4.5	4.6
13.	19696.00	BB	26.8	26.8	39.5	35.0	9.6	0.0	40.9	40.9	54.0	13.1	13.1
14.	22158.00	BB	27.9	27.7	39.2	33.7		0.0	43.7	43.5	54.0	10.3	10.5
15.	24620.00	BB	26.4	26.2	40.4	36.0	10.9	0.0	41.7	41.5	54.0	12.3	12.5

CALCULATION: READING [dB μ V] + ANT. FACTOR [dB/m] + CABLE LOSS [dB] - AMP. GAIN [dB] + ATTEN [dB].

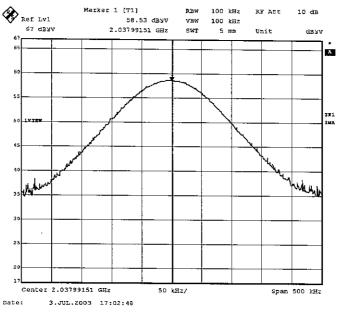
■ANTENNA: KHA-01 (SAS-200 571) 1-18GHz/KHA-03 (3160-09) 18-26GHz ■CABLE: KCC-D3/D7■PREAMP: KAF-02 (8449B) ■EMI RECEIVER: KTR-01 (ESI40)

Ch 1:2412MHz

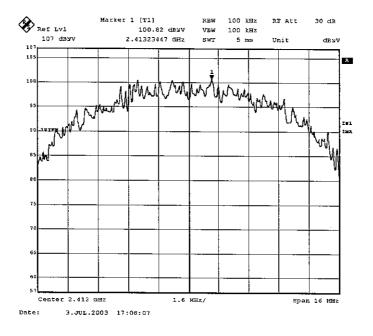
1. Spurious emission(2038MHz-Horizontal)

U. Inzaki

FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4



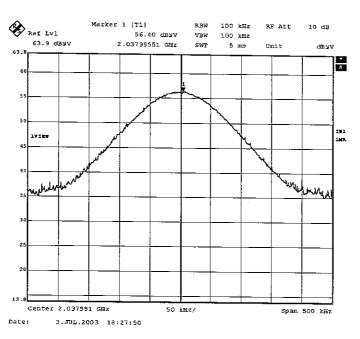
2. Fundamental(2412MHz-Horizontal)



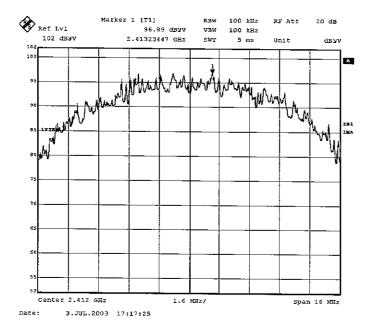
FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4

marki

3. Spurious emission(2038MHz-Vertical)



4. Fundamental(2412MHz-Vertical)

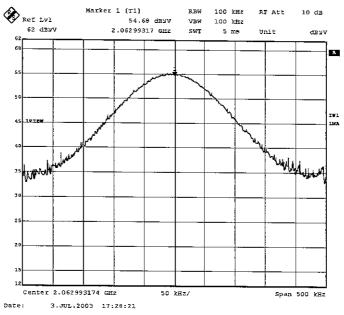


Ch 6:2437MHz

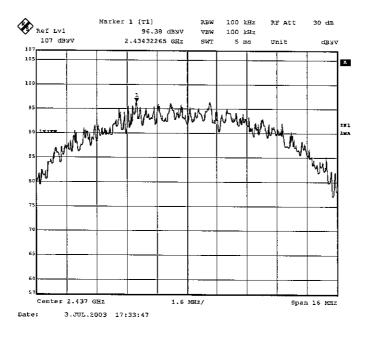
1. Spurious emission(2063MHz-Horizontal)

U. Inzolai

FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4

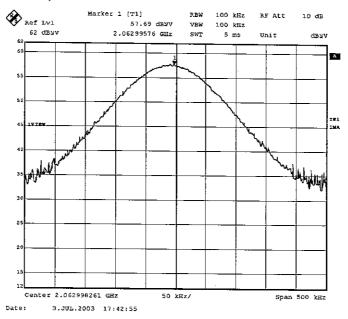


2. Fundamental(2437MHz-Horizontal)

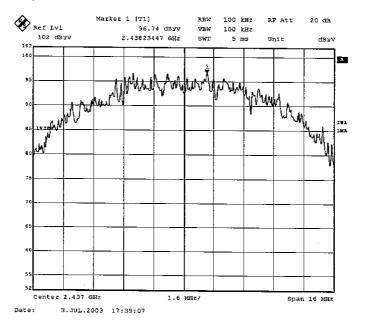


FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4

3. Spurious emission(2063MHz-Vertical)



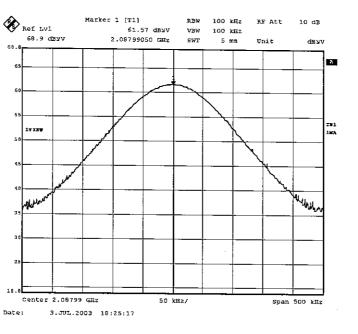
4. Fundamental(2437MHz-Vertical)



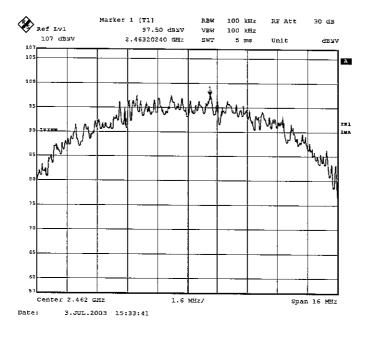
. Inzaki

Ch 11:2462MHz

1. Spurious emission(2088MHz-Horizontal)



2. Fundamental(2462MHz-Horizontal)



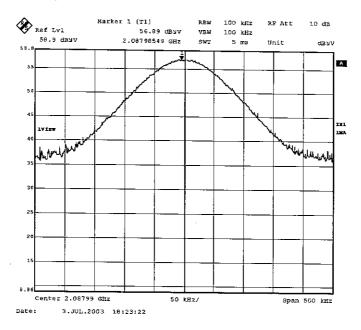
FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4

I Inzaki

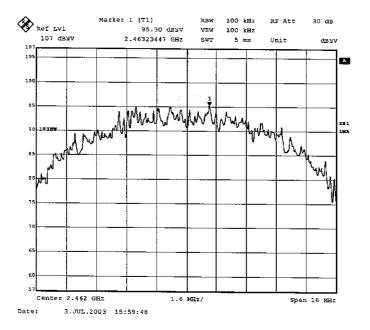
FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4

1. Inzaki

3. Spurious emission(2088MHz-Vertical)



4. Fundamental(2462MHz-Vertical)



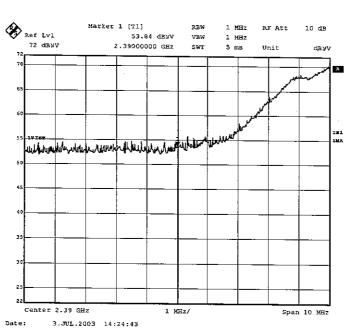
29

2.39GHz (Ch 1:2412MHz)

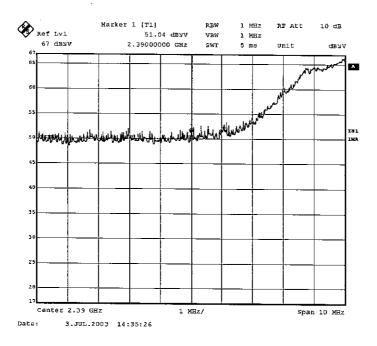
1. Horizontal/PK

FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4

. Inzaki

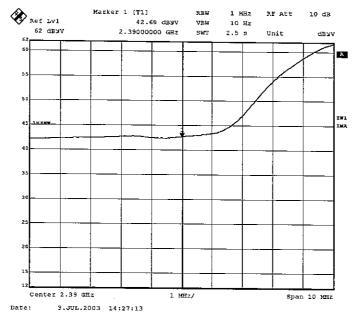


2. Vertical/PK



FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4

3. Horizontal/AV



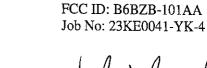
4. Vertical/ AV

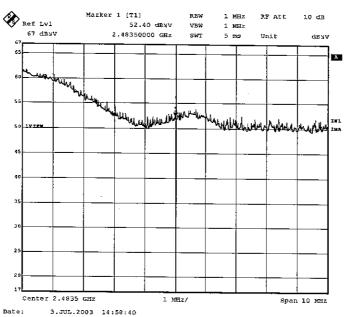
Ref Lvl	Marker	1 [T1] 39.3	34 dBuV	rbw Vbw	1 1 10	AHZ HZ	RF Att	10 dB
62 dBuV	:	2.39000	000 GHz	SWT	2.5	3	Unit	GB≯A
60								
55	_							
50	i							
45 1772	_					-/		
					/	Y		
4°			╞──╡		_			
35								
30						-		
25								
20								
15.	_							
12		L					!	
Center 2.39	GHZ		1 10	lz/			sp	an 10 MHz

Inozaki

2.4835GHz (Ch 11:2462MHz)

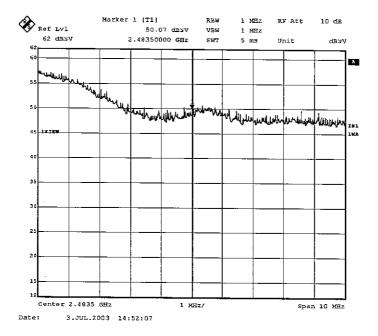
1. Horizontal/PK





U. Inzaka

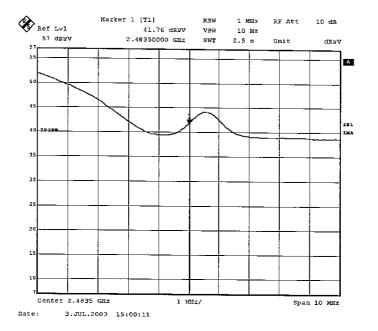
2. Vertical/ PK



FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4

I. Isozaki

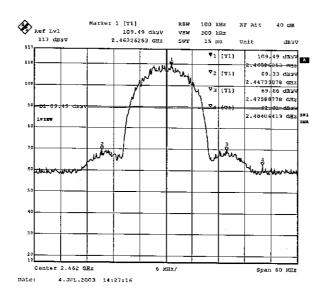
3. Horizontal/AV

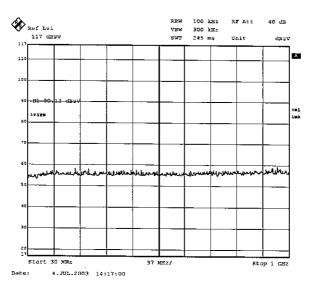


4. Vertical/AV

Ref Lvl 52 dByv	Marker l [T1] 38.13 dByV 2.48350000 GHz	RBW VBW SWT	1 MHz 10 Hz 2.5 s	RF Att	10 dB
52					
50					λ.
45					
40		\sim		_	
					TWL
35 19789					183
30					
25					
20					
15					
10					
s					
2 Center 2.483	5 GEZ 1 M	liz/		Spai	n 10 MHz
Date: 3.JUL.	.2003 14:54:56				

<u>Ch 1: 2412MHz</u> 1.





Ref Lvl 117 dBuv Marker 1 [T1] 109,32 dBNV 2.41482966 GHz RBW 100 kHz RF ALL 40 dB VBW SWT 300 kEz 500 m3 Unit dBaV 11 109.32 dBVV ▼1 [T1] 11 -41402966 GHz 68.72 לנשט .03807615 GHz ₹2 [T1] 10 1371 1863 173**27** 60 utheles work and 2D 17 Start 1 GHz 200 MHz/ Stop 3 GHz Date: 4.JUL.2003 14:17:47

FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4

I. Inzoki

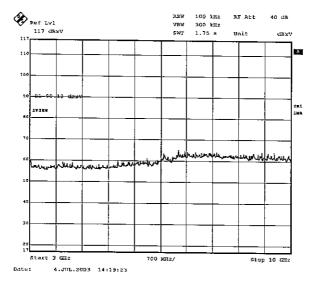
3.

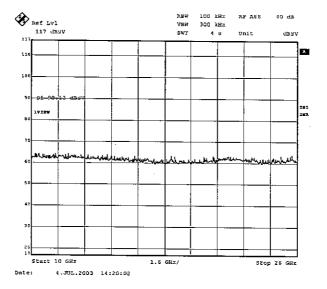
2.

34

FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4

1. Inzaki





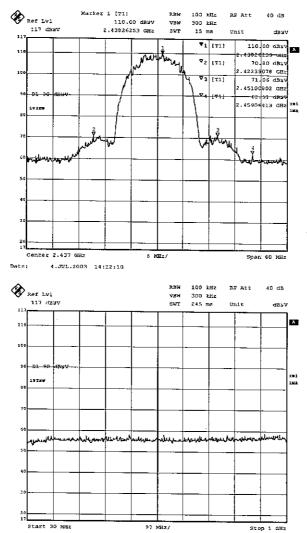
5.

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Ch 6: 2437MHz

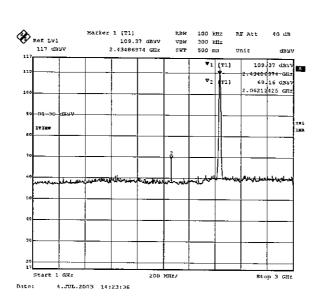
1.

2.



Date: 4.JUL.2003 14:22:51

3.

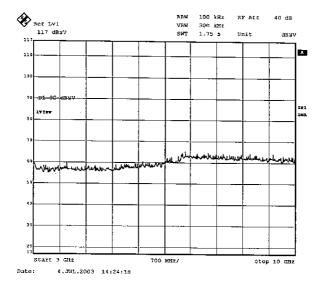


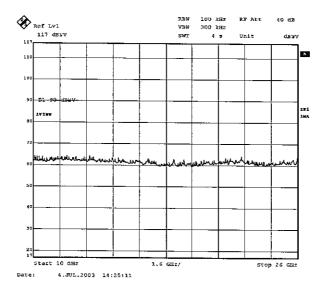
FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4

I. Inzaki

FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4

I. Inzaki



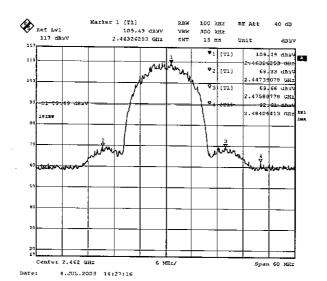


.

5.

Out of Band Emissions (Conducted): FCC 15.247(c)

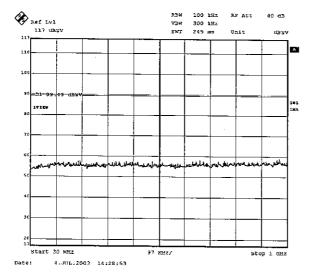
<u>Ch 11: 2462MHz</u> 1.

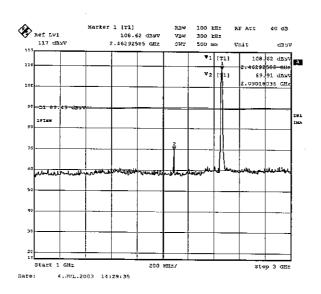


FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4

I. Inzaki

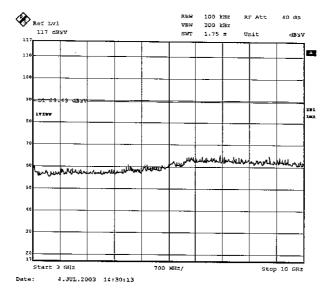
2.





FCC ID: B6BZB-101AA Job No: 23KE0041-YK-4





Ref Lvl 117 dByV rbw Vew Swt 100 kHz 300 kHz 4 5 Unit qnav 110 100 Dl 781 188 1 V I Z W m) ٨A 20 17 start 10 GHz 1.6 GHz/ Stop 26 CHz Date: 4.JUL.2003 14:30:50

RF Att

40 dB

5.

Power Density(Conducted)

UL Apex Co., Ltd. YAMAKITA EMC NO.1 OPEN SITE

COMPANY : NIHON KOHDEN CORPORATION EQUIPMENT : Telemetry Unit MODEL : ZB-101AA FCC ID :B6BZB-101AA POWER : DC9V Mode : Transmitting

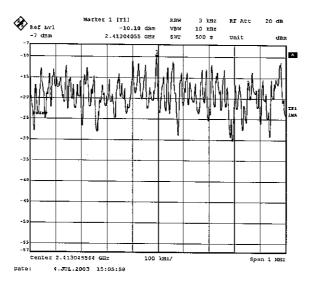
REPORT NO : 23KE0041-YK-4 REGULATION : Fcc Part15SubpartC 247(d) DATE : 2003/ 07/04 Temp./Humi. : 24°C/59%

ENGINEER

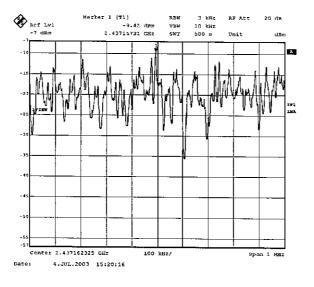
: Ichiro Isozaki

СН	FREQ	S/A Reading	Cable Loss	Results	Limit	MARGIN
	[GHz]	[dBm]	[dB]	[dBm]	[dBm]	[dB]
Low	2.413041	-10.18	0.85	-9.33	8.0	17.3
Mid	2.437157	-9.42	0.85	-8.57	8.0	16.6
High	2.462157	-9.85	0.85	-9.00	8.0	17.0

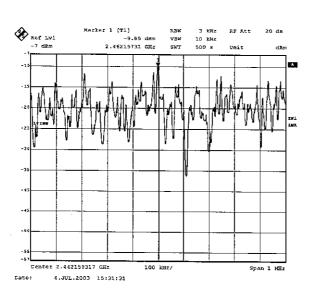
1. ch 1: 2412MHz



2. ch 6: 2437MHz



3. ch 11: 2462MHz



FCC ID: B6BZB-101AA Job No: 23JE0041-YK-4

V. Inzoki

Test Report No : 23KE0041-YK-4

APPENDIX 3

Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date *
KTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE/AT	2002/07/22 * 12
KCC-D7	Coaxial Cable	Advantest	A01002	AT	2003/04/18 * 12
KPM-05	Power meter	Agilent	E4417A	AT	2003/02/17 * 12
KP\$\$-01	Power sensor	Agilent	E9327A	AT	2003/02/21 * 12
KAF-01	Pre Amplifier	Hewlett Packard	8447D	RE	2002/08/03 * 12
KAF-02	Pre Amplifier	Hewlett Packard	8449B	RE	2003/05/08 * 12
KAT10-S1	Attenuator	Agilent	8449D 010	RE	2003/04/18 * 12
KAT6-01	Attenuator	INMET	18N-6dB	RE	2003/05/12 * 12
KBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/02/06 * 12
KTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2002/11/25 * 12
KFL-01	Highpass Filter	Hewlett Packard	84300 80038	RE	2003/04/18 * 12
KCC-10/11/12/1	Coaxial Cable	Fujikura/Suhner	8D-2W/12D-SF	RE	2002/08/17 * 12
3/18		-	A/S04272B/S0		
			4272B/S04272B		
KCC-D3/D7	Coaxial Cable	Rosenberger/Advantest	2201/JUN-08-0 1-061	RE	2003/04/18 * 12
KHA-01	Horn Antenna	A.H.Systems	SAS-200/571	RE	2002/07/14 * 12
KLA-01	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/02/19 * 12
KOTS-01	Open Test Site	JSE	30m	RE	2002/08/18 * 12
KSA-01	Spectrum Analyzer	Advantest	R3365	RE	2003/06/09 * 12
••••••••••••••••••••••••••••••••••••••					

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

Test Item:

RE: Radiated emission test

AT: Antenna terminal conducted test