APPENDIX 2: Data of EMI test

Conducted emission

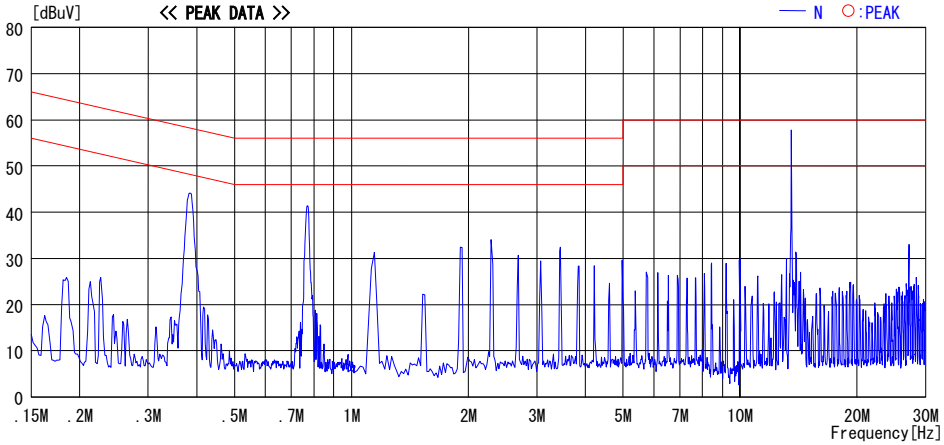
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2009/04/02

Company	: Hitachi High-Tech Materials Corporation	Report No.	: 29GE0155-HO-01
Kind of EUT	: IC Tag Reader/Writer Module	Power	: AC 120V / 60Hz
Model No.	: NRWA3	Temp./Humi.	: 21deg.C. / 39%
Serial No.	: 003	Engineer	: Satofumi Matsuyama

Mode / Remarks : Transmitting, with Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



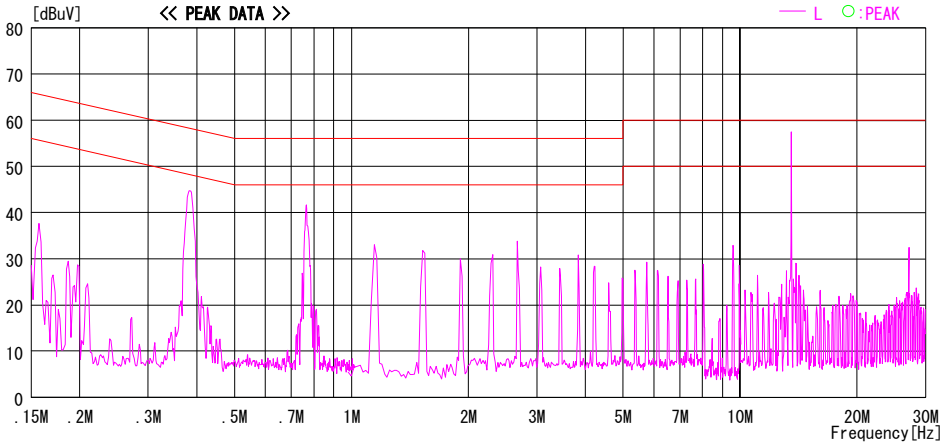


CHART:WITH FACTOR,Peak hold data. CALCURATION:RESULT[dBuV]=READING[dBuV]+C.F[dB](LISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted emission

DATA OF CONDUCTED EMISSION TEST

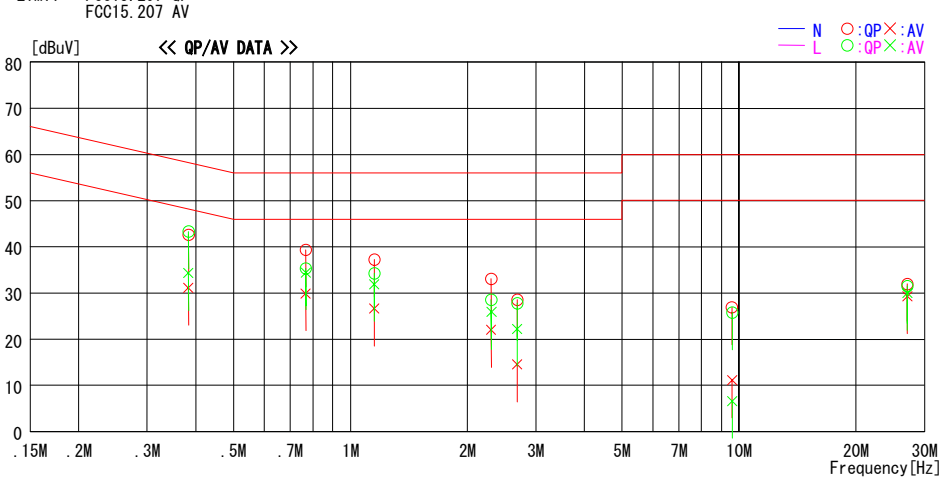
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2009/04/02

Company : Hitachi High-Tech Materials Corporation
Kind of EUT : IC Tag Reader/Writer Module
Model No. : NRWA3
Serial No. : 003

Report No. : 29GE0155-HO-01
Power : AC 120V / 60Hz
Temp./Humi. : 21deg.C. / 39%
Engineer : Satofumi Matsuyama

Mode / Remarks : Transmitting, with Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.38299	42.4	30.9	0.2	42.6	31.1	58.2	48.2	15.6	17.1	N	
0.76742	39.2	29.7	0.2	39.4	29.9	56.0	46.0	16.6	16.1	N	
1.15147	37.0	26.3	0.3	37.3	26.6	56.0	46.0	18.7	19.4	N	
2.30242	32.7	21.6	0.4	33.1	22.0	56.0	46.0	22.9	24.0	N	
2.68629	28.1	14.1	0.4	28.5	14.5	56.0	46.0	27.5	31.5	N	
9.59316	26.3	10.5	0.6	26.9	11.1	60.0	50.0	33.1	38.9	N	
27.12000	30.8	28.2	1.1	31.9	29.3	60.0	50.0	28.1	20.7	N	
0.38299	43.1	34.1	0.2	43.3	34.3	58.2	48.2	14.9	13.9	L	
0.76785	35.1	34.2	0.2	35.3	34.4	56.0	46.0	20.7	11.6	L	
1.15167	34.0	31.6	0.3	34.3	31.9	56.0	46.0	21.7	14.1	L	
2.30407	28.1	25.5	0.4	28.5	25.9	56.0	46.0	27.5	20.1	L	
2.68848	27.4	21.8	0.4	27.8	22.2	56.0	46.0	28.2	23.8	L	
9.59601	25.2	6.0	0.6	25.8	6.6	60.0	50.0	34.2	43.4	L	
27.12000	30.4	28.9	1.1	31.5	30.0	60.0	50.0	28.5	20.0	L	

CHART:WITH FACTOR,Peak hold data. CALCURATION:RESULT[dBuV]=READING[dBuV]+C.F[dB](LISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Conducted emission

DATA OF CONDUCTED EMISSION TEST

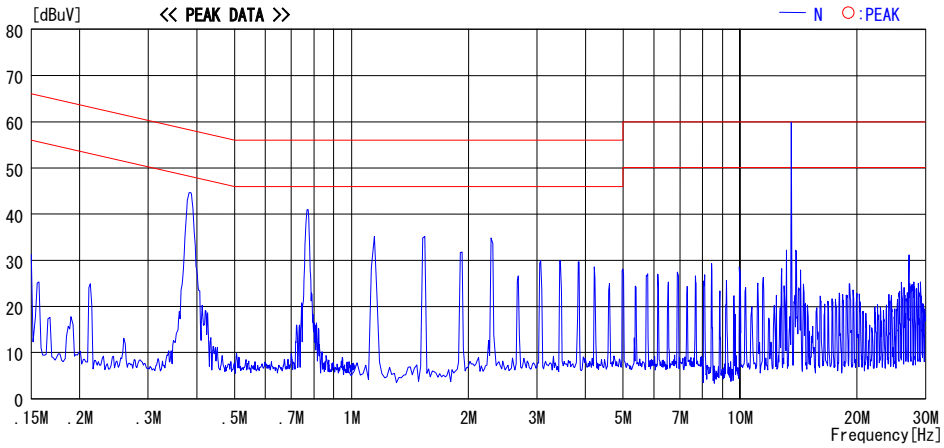
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2009/04/02

Company : Hitachi High-Tech Materials Corporation
Kind of EUT : IC Tag Reader/Writer Module
Model No. : NRWA3
Serial No. : 003

Report No. : 29GE0155-HO-01
Power : AC 120V / 60Hz
Temp./Humi. : 21deg.C. / 39%
Engineer : Satofumi Matsuyama

Mode / Remarks : Transmitting, without Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



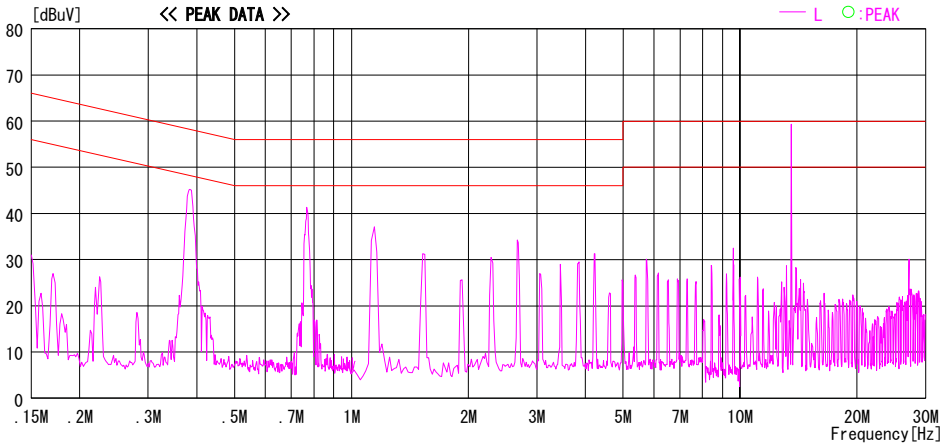


CHART:WITH FACTOR,Peak hold data. CALCURATION:RESULT[dBuV]=READING[dBuV]+C.F[dB](LISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted emission

DATA OF CONDUCTED EMISSION TEST

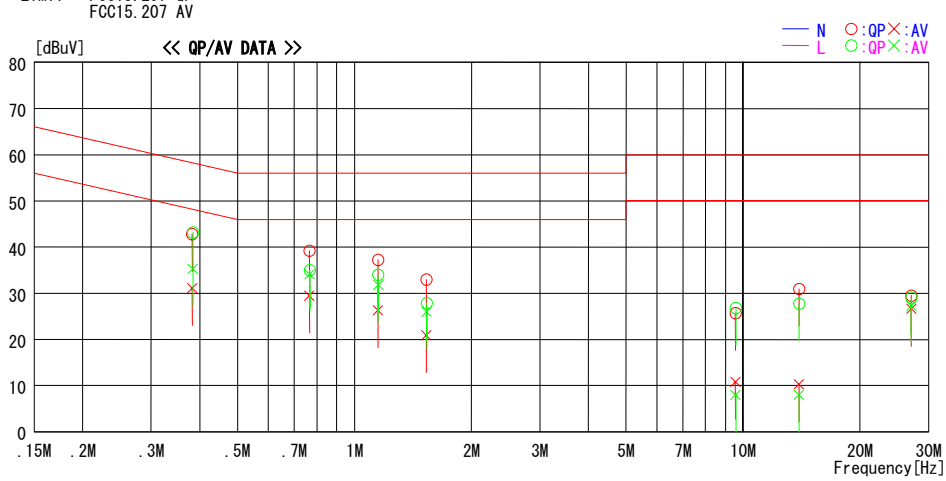
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2009/04/02

Company : Hitachi High-Tech Materials Corporation
Kind of EUT : IC Tag Reader/Writer Module
Model No. : NRWA3
Serial No. : 003

Report No. : 29GE0155-HO-01
Power : AC 120V / 60Hz
Temp./Humi. : 21deg.C. / 39%
Engineer : Satofumi Matsuyama

Mode / Remarks : Transmitting, without Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level QP	Reading Level AV	Corr. Factor	Results QP	Results AV	Limit QP	Limit AV	Margin QP	Margin AV	Phase	Comment
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.38258	42.6	30.9	0.2	42.8	31.1	58.2	48.2	15.4	17.1	N	
0.76528	39.0	29.3	0.2	39.2	29.5	56.0	46.0	16.8	16.5	N	
1.14849	37.0	26.0	0.3	37.3	26.3	56.0	46.0	18.7	19.7	N	
1.53057	32.7	20.6	0.3	33.0	20.9	56.0	46.0	23.0	25.1	N	
9.56513	25.1	10.2	0.6	25.7	10.8	60.0	50.0	34.3	39.2	N	
13.94268	30.2	9.5	0.8	31.0	10.3	60.0	50.0	29.0	39.7	N	
27.12000	28.4	25.5	1.1	29.5	26.6	60.0	50.0	30.5	23.4	N	
0.38373	43.0	35.1	0.2	43.2	35.3	58.2	48.2	15.0	12.9	L	
0.76735	34.8	33.9	0.2	35.0	34.1	56.0	46.0	21.0	11.9	L	
1.15079	33.7	31.5	0.3	34.0	31.8	56.0	46.0	22.0	14.2	L	
1.53469	27.6	25.7	0.3	27.9	26.0	56.0	46.0	28.1	20.0	L	
9.58036	26.2	7.4	0.6	26.8	8.0	60.0	50.0	33.2	42.0	L	
13.94314	26.9	7.2	0.8	27.7	8.0	60.0	50.0	32.3	42.0	L	
27.12000	27.9	26.2	1.1	29.0	27.3	60.0	50.0	31.0	22.7	L	

CHART:WITH FACTOR,Peak hold data. CALCURATION:RESULT[dBuV]=READING[dBuV]+C.F[dB](LISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

*The test result is rounded off to one or two decimal places, so some differences might be observed.

UL Japan, Inc.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116
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Conducted emission

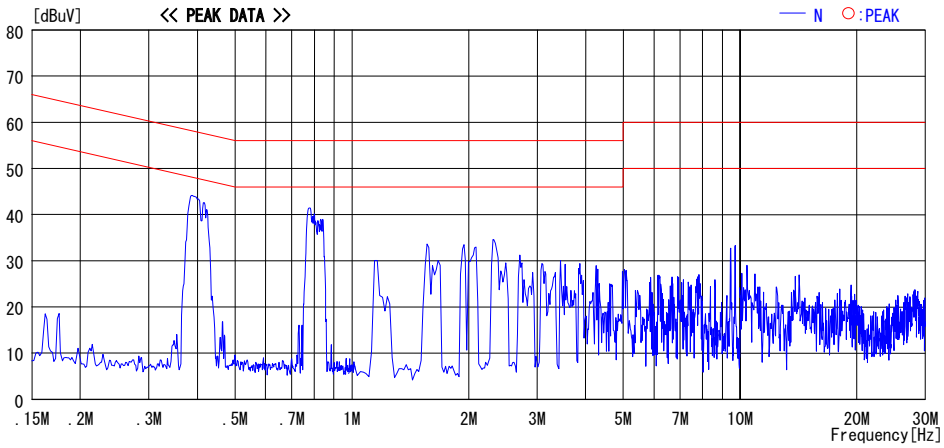
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2009/04/02

Company	: Hitachi High-Tech Materials Corporation	Report No.	: 29GE0155-HO-01
Kind of EUT	: IC Tag Reader/Writer Module	Power	: AC 120V / 60Hz
Model No.	: NRWA3	Temp./Humi.	: 21deg.C. / 39%
Serial No.	: 003	Engineer	: Satofumi Matsuyama

Mode / Remarks : Transmitting, without Tag (Antenna: 50 ohm terminated)

LIMIT : FCC15.207 QP
FCC15.207 AV



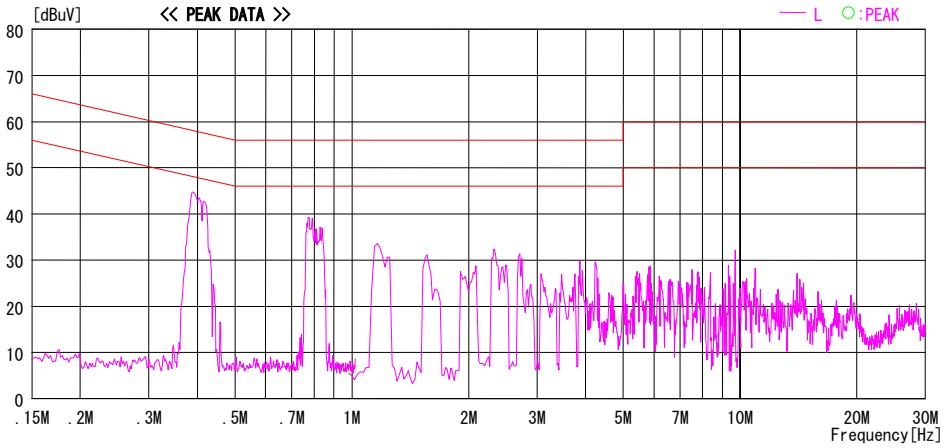


CHART:WITH FACTOR,Peak hold data. CALCURATION:RESULT[dBuV]=READING[dBuV]+C.F[dB](LISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

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Conducted emission

DATA OF CONDUCTED EMISSION TEST

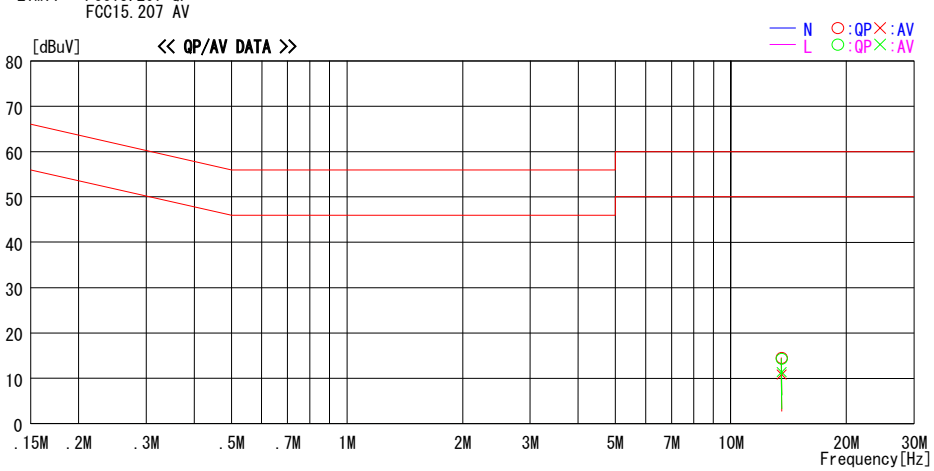
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2009/04/02

Company : Hitachi High-Tech Materials Corporation
Kind of EUT : IC Tag Reader/Writer Module
Model No. : NRWA3
Serial No. : 003

Report No. : 29GE0155-HO-01
Power : AC 120V / 60Hz
Temp./Humi. : 21deg.C. / 39%
Engineer : Satofumi Matsuyama

Mode / Remarks : Transmitting, without Tag (Antenna: 50 ohm terminated)

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
13.56000	13.8	10.1	0.7	14.5	10.8	60.0	50.0	45.5	39.2	N	
13.56000	13.6	10.7	0.7	14.3	11.4	60.0	50.0	45.7	38.6	L	

CHART:WITH FACTOR,Peak hold data. CALCURATION:RESULT[dBuV]=READING[dBuV]+C.F[dB](LISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

*The test result is rounded off to one or two decimal places, so some differences might be observed.

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Conducted emission

DATA OF CONDUCTED EMISSION TEST

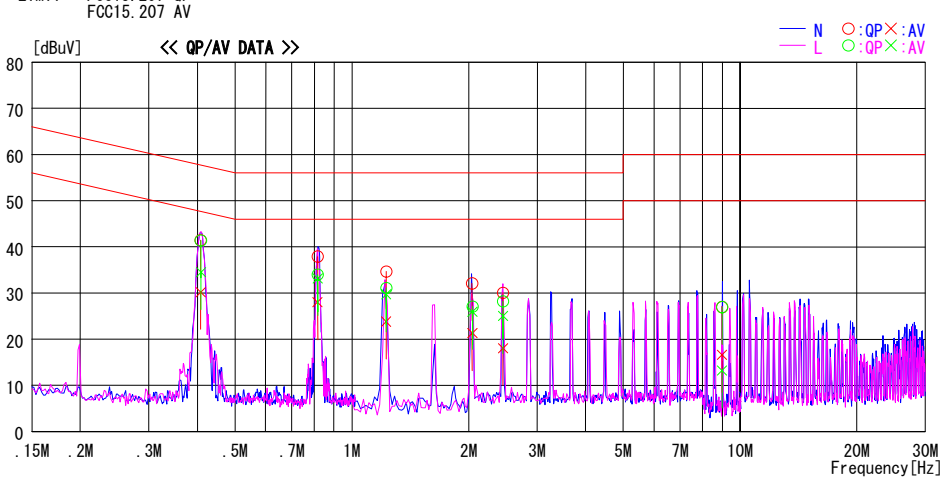
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2009/04/02

Company : Hitachi High-Tech Materials Corporation
Kind of EUT : IC Tag Reader/Writer Module
Model No. : NRWA3
Serial No. : 003

Report No. : 29GE0155-HO-01
Power : AC 120V / 60Hz
Temp./Humi. : 21deg.C. / 39%
Engineer : Satofumi Matsuyama

Mode / Remarks : Standby mode

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.40768	41.3	30.0	0.2	41.5	30.2	57.7	47.7	16.2	17.5	N	
0.81636	37.7	27.8	0.2	37.9	28.0	56.0	46.0	18.1	18.0	N	
1.22477	34.4	23.5	0.3	34.7	23.8	56.0	46.0	21.3	22.2	N	
2.04183	31.8	21.0	0.3	32.1	21.3	56.0	46.0	23.9	24.7	N	
2.45095	29.7	17.7	0.4	30.1	18.1	56.0	46.0	25.9	27.9	N	
8.98738	26.4	16.0	0.6	27.0	16.6	60.0	50.0	33.0	33.4	N	
0.40844	41.2	34.3	0.2	41.4	34.5	57.7	47.7	16.3	13.2	L	
0.81716	33.8	33.0	0.2	34.0	33.2	56.0	46.0	22.0	12.8	L	
1.22589	30.8	29.4	0.3	31.1	29.7	56.0	46.0	24.9	16.3	L	
2.04387	26.8	25.6	0.3	27.1	25.9	56.0	46.0	28.9	20.1	L	
2.45192	27.8	24.6	0.4	28.2	25.0	56.0	46.0	27.8	21.0	L	
8.98698	26.4	12.6	0.6	27.0	13.2	60.0	50.0	33.0	36.8	L	

CHART:WITH FACTOR,Peak hold data. CALCURATION:RESULT[dBuV]=READING[dBuV]+C.F[dB](LISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

*The test result is rounded off to one or two decimal places, so some differences might be observed.

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Radiated emission (Fundamental emission and Spectrum Mask)

DATA OF RADIATED EMISSION TEST

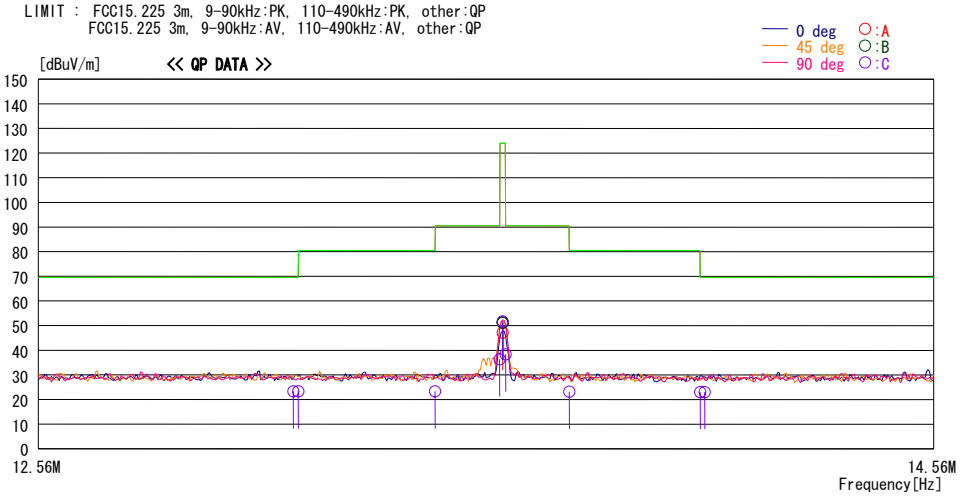
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2009/04/01

Company : Hitachi High-Tech Materials Corporation
Kind of EUT : IC Tag Reader/Writer Module
Model No. : NRWA3
Serial No. : 003

Report No. : 29GE0155-HO-01
Power : AC120 V / 60 Hz
Temp. / Humi. : 20deg.C. / 49%
Engineer : Satofumi Matsuyama

Mode / Remarks : Transmitting, with Tag, Worst-axis :Y-axis

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.225 3m, 9-90kHz:AV, 110-490kHz:AV, other:QP



Freq. [MHz]	Reading [dBuV]	DET	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna [deg]		Table [deg]	Comment
13.10000	34.8	QP	19.8	0.8	32.1	23.3	69.5	46.2	90	C	238	
13.11000	34.8	QP	19.8	0.8	32.1	23.3	69.5	46.2	90	C	238	
13.41000	34.9	QP	19.7	0.8	32.1	23.3	80.5	57.2	90	C	238	
13.55300	48.0	QP	19.7	0.8	32.1	36.4	90.4	54.0	90	C	238	
13.56000	62.9	QP	19.7	0.8	32.1	51.3	123.9	72.6	45	B	327	
13.56000	63.3	QP	19.7	0.8	32.1	51.7	123.9	72.2	90	C	238	Worst angle
13.56000	58.7	QP	19.7	0.8	32.1	47.1	123.9	76.8	0	A	0	
13.56000	62.8	QP	19.7	0.8	32.1	51.2	123.9	72.7	135	B	191	
13.56700	49.9	QP	19.7	0.8	32.1	38.3	90.4	52.1	90	C	238	
13.71000	34.8	QP	19.7	0.8	32.1	23.2	80.5	57.3	90	C	238	
14.01000	34.8	QP	19.6	0.8	32.1	23.1	69.5	46.4	90	C	238	
14.02000	34.8	QP	19.6	0.8	32.1	23.1	69.5	46.4	90	C	238	

CHART: WITH FACTOR , ANT TYPE: LOOP , Except for the data below : adequate margin data below the limits.
CALCULATION : RESULT[dBuV] = READING[dBuV] + ANT FACTOR[dB] + LOSS[dB](CABLE + ATTEN.- AMP.)

*The test result is rounded off to one or two decimal places, so some differences might be observed.

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Radiated emission (Fundamental emission and Spectrum Mask)

DATA OF RADIATED EMISSION TEST

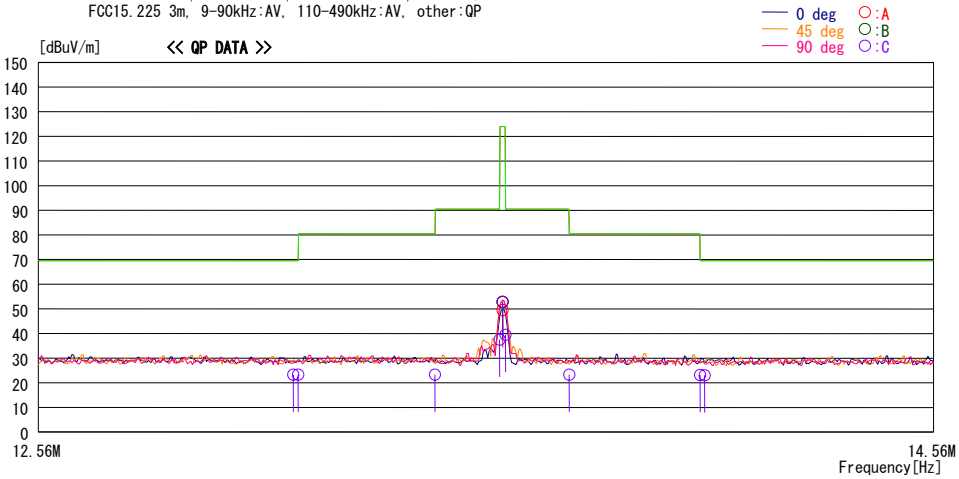
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2009/04/01

Company : Hitachi High-Tech Materials Corporation
Kind of EUT : IC Tag Reader/Writer Module
Model No. : NRWA3
Serial No. : 003

Report No. : 29GE0155-HO-01
Power : AC120 V / 60 Hz
Temp./ Humi. : 20deg.C. / 49%
Engineer : Satofumi Matsuyama

Mode / Remarks : Transmitting, without Tag, Worst-axis :Y-axis

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.225 3m, 9-90kHz:AV, 110-490kHz:AV, other:QP



Freq.	Reading	DET	Ant.Fac	Loss	Gain	Result	Limit	Margin	Antenna		Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]		[deg]	
13.10000	34.8	QP	19.8	0.8	32.1	23.3	69.5	46.2	90	C	270	
13.11000	34.8	QP	19.8	0.8	32.1	23.3	69.5	46.2	90	C	270	
13.41000	34.9	QP	19.7	0.8	32.1	23.3	80.5	57.2	90	C	270	
13.55300	49.2	QP	19.7	0.8	32.1	37.6	90.4	52.8	90	C	270	
13.56000	64.4	QP	19.7	0.8	32.1	52.8	123.9	71.1	45	B	330	
13.56000	64.5	QP	19.7	0.8	32.1	52.9	123.9	71.0	90	C	270	Worst angle
13.56000	61.1	QP	19.7	0.8	32.1	49.5	123.9	74.4	0	A	359	
13.56000	64.4	QP	19.7	0.8	32.1	52.8	123.9	71.1	135	A	196	
13.56700	51.1	QP	19.7	0.8	32.1	39.5	90.4	50.9	90	C	270	
13.71000	34.9	QP	19.7	0.8	32.1	23.3	80.5	57.2	90	C	270	
14.01000	34.9	QP	19.6	0.8	32.1	23.2	69.5	46.3	90	C	270	
14.02000	34.8	QP	19.6	0.8	32.1	23.1	69.5	46.4	90	C	270	

CHART: WITH FACTOR , ANT TYPE: LOOP , Except for the data below : adequate margin data below the limits.
CALCULATION : RESULT[dBuV] = READING[dBuV] + ANT FACTOR[dB] + LOSS[dB](CABLE + ATTEN.- AMP.)

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated emission (Spurious emission: below 30MHz)

DATA OF RADIATED EMISSION TEST

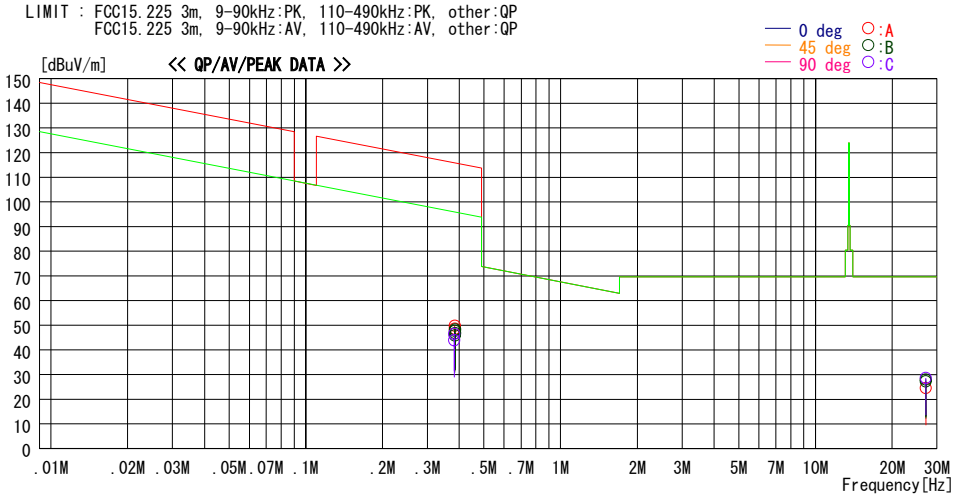
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2009/04/01

Company : Hitachi High-Tech Materials Corporation
Kind of EUT : IC Tag Reader/Writer Module
Model No. : NRWA3
Serial No. : 003

Report No. : 29GE0155-HO-01
Power : AC120 V / 60 Hz
Temp./ Humi. : 20deg.C. / 49%
Engineer : Satofumi Matsuyama

Mode / Remarks : Transmitting, with Tag, Worst-axis :Y-axis, Worst-angle :90deg.

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.225 3m, 9-90kHz:AV, 110-490kHz:AV, other:QP



Freq. [MHz]	Reading [dBuV]	DET	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna [deg]		Table [deg]	Comment
0.38288	58.9	PEAK	19.5	0.2	32.1	46.5	115.9	69.4	90	C	252	
0.38288	56.4	AV	19.5	0.2	32.1	44.0	95.9	51.9	90	C	252	
0.38358	62.3	PEAK	19.5	0.2	32.1	49.9	115.9	66.0	0	A	189	
0.38358	61.1	AV	19.5	0.2	32.1	48.7	95.9	47.2	0	A	189	
0.38378	60.2	PEAK	19.5	0.2	32.1	47.8	115.9	68.1	45	B	315	
0.38378	58.4	AV	19.5	0.2	32.1	46.0	95.9	49.9	45	B	315	
0.38510	60.7	PEAK	19.5	0.2	32.1	48.3	115.9	67.6	135	B	190	
0.38510	59.2	AV	19.5	0.2	32.1	46.8	95.9	49.1	135	B	190	
27.12000	39.9	QP	19.7	1.2	32.1	28.7	69.5	40.8	90	C	359	
27.12000	35.7	QP	19.7	1.2	32.1	24.5	69.5	45.0	0	A	340	
27.12000	39.3	QP	19.7	1.2	32.1	28.1	69.5	41.4	45	B	359	
27.12000	38.5	QP	19.7	1.2	32.1	27.3	69.5	42.2	135	B	359	

CHART: WITH FACTOR , ANT TYPE: LOOP , Except for the data below : adequate margin data below the limits.
CALCULATION : RESULT[dBuV] = READING[dBuV] + ANT FACTOR[dB] + LOSS[dB](CABLE + ATTEN.- AMP.)

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated emission (Spurious emission: below 30MHz)

DATA OF RADIATED EMISSION TEST

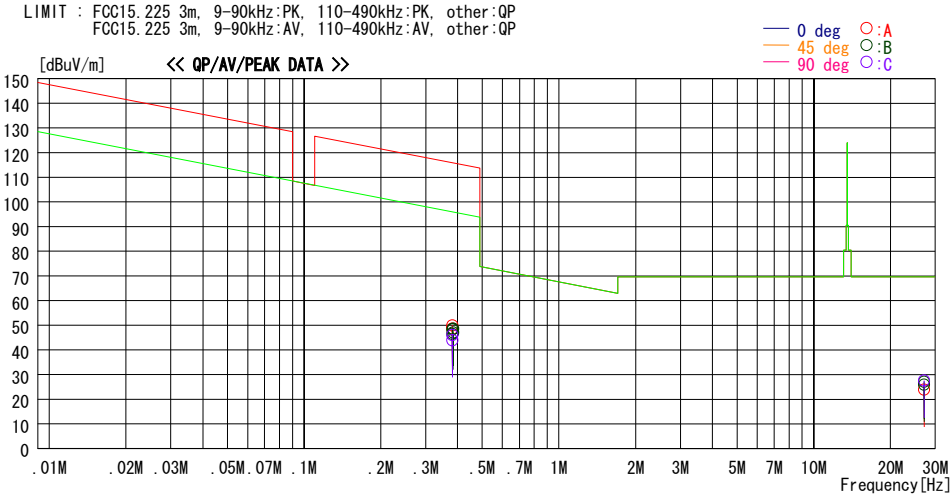
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2009/04/01

Company : Hitachi High-Tech Materials Corporation
Kind of EUT : IC Tag Reader/Writer Module
Model No. : NRWA3
Serial No. : 003

Report No. : 29GE0155-HO-01
Power : AC120 V / 60 Hz
Temp./ Humi. : 20deg.C. / 49%
Engineer : Satofumi Matsuyama

Mode / Remarks : Transmitting, without Tag, Worst-axis :Y-axis, Worst-angle :90deg.

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.225 3m, 9-90kHz:AV, 110-490kHz:AV, other:QP



Freq. [MHz]	Reading [dBuV]	DET	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna [deg]		Table [deg]	Comment
0.38115	58.5	PEAK	19.5	0.2	32.1	46.1	116.0	69.9	90	C	269	
0.38115	56.3	AV	19.5	0.2	32.1	43.9	96.0	52.1	90	C	269	
0.38171	62.4	PEAK	19.5	0.2	32.1	50.0	116.0	66.0	0	A	181	
0.38171	61.1	AV	19.5	0.2	32.1	48.7	96.0	47.3	0	A	181	
0.38171	58.9	AV	19.5	0.2	32.1	46.5	96.0	49.5	45	B	154	
0.38171	60.7	PEAK	19.5	0.2	32.1	48.3	116.0	67.7	45	B	154	
0.38375	59.6	AV	19.5	0.2	32.1	47.2	95.9	48.7	135	B	213	
0.38375	61.0	PEAK	19.5	0.2	32.1	48.6	115.9	67.3	135	B	213	
27.12000	38.8	QP	19.7	1.2	32.1	27.6	69.5	41.9	90	C	62	
27.12000	35.2	QP	19.7	1.2	32.1	24.0	69.5	45.5	0	A	10	
27.12000	38.3	QP	19.7	1.2	32.1	27.1	69.5	42.4	45	B	356	
27.12000	37.2	QP	19.7	1.2	32.1	26.0	69.5	43.5	135	B	150	

CHART: WITH FACTOR , ANT TYPE: LOOP , Except for the data below : adequate margin data below the limits.
CALCULATION : RESULT[dBuV] = READING[dBuV] + ANT FACTOR[dB] + LOSS[dB](CABLE + ATTEN.- AMP.)

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated emission (Spurious emission: above 30MHz)

DATA OF RADIATED EMISSION TEST

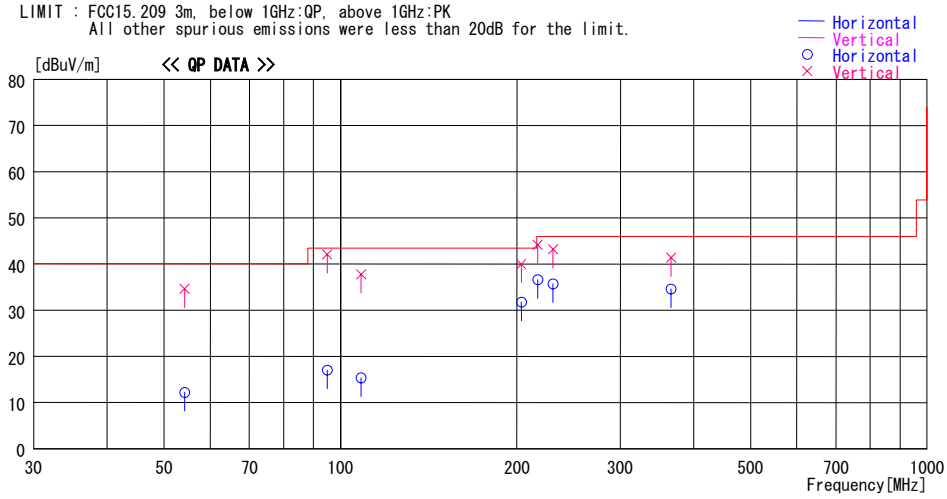
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2009/04/01

Company : Hitachi High-Tech Materials Corporation
Kind of EUT : IC Tag Reader/Writer Module
Model No. : NRWA3
Serial No. : 003

Report No. : 29GE0155-HO-01
Power : AC 120V / 60Hz
Temp./Humi. : 20deg.C. / 49%
Engineer : Satofumi Matsuyama

Mode / Remarks : Transmitting, with Tag, Worst-axis :Y-axis

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK
All other spurious emissions were less than 20dB for the limit.



Frequency [MHz]	Reading [dBuV]	DET	Antenna Factor [dB/m]	Loss& Gain [dB]	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
54.253	27.2	QP	9.4	-24.4	12.2	0	300	Hori.	40.0	27.8	
54.235	49.6	QP	9.4	-24.4	34.6	65	100	Vert.	40.0	5.4	
94.936	32.3	QP	8.8	-24.0	17.1	104	300	Hori.	43.5	26.4	
94.923	57.3	QP	8.8	-24.0	42.1	202	100	Vert.	43.5	1.4	
108.476	28.1	QP	11.1	-23.8	15.4	50	300	Hori.	43.5	28.1	
108.483	50.5	QP	11.1	-23.8	37.8	359	100	Vert.	43.5	5.7	
203.404	38.0	QP	16.6	-22.8	31.8	289	163	Hori.	43.5	11.7	
203.404	46.2	QP	16.6	-22.8	40.0	21	100	Vert.	43.5	3.5	
216.961	42.3	QP	16.9	-22.6	36.6	120	130	Hori.	46.0	9.4	
216.963	49.9	QP	16.9	-22.6	44.2	194	100	Vert.	46.0	1.8	
230.519	41.0	QP	17.2	-22.5	35.7	100	145	Hori.	46.0	10.3	
230.523	48.5	QP	17.2	-22.5	43.2	184	100	Vert.	46.0	2.8	
366.127	38.9	QP	17.3	-21.6	34.6	155	100	Hori.	46.0	11.4	
366.132	45.7	QP	17.3	-21.6	41.4	69	156	Vert.	46.0	4.6	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated emission (Spurious emission: above 30MHz)

DATA OF RADIATED EMISSION TEST

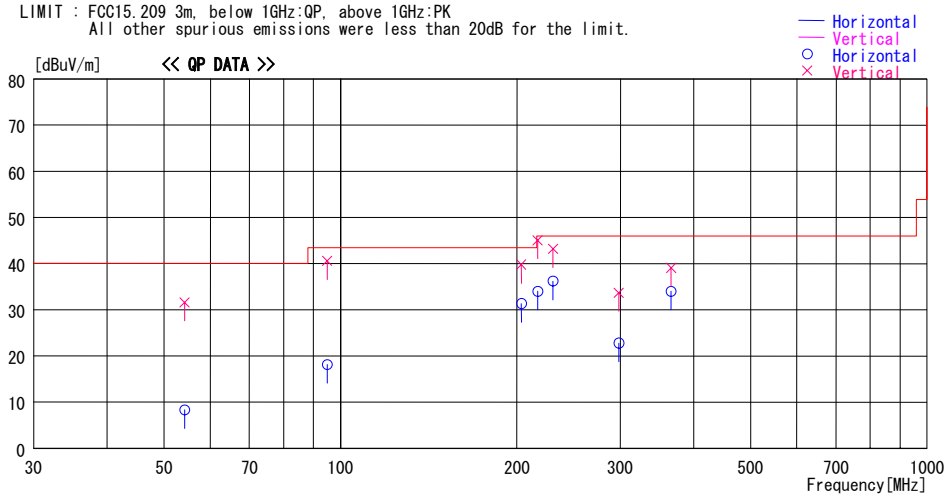
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2009/04/01

Company : Hitachi High-Tech Materials Corporation
Kind of EUT : IC Tag Reader/Writer Module
Model No. : NRWA3
Serial No. : 003

Report No. : 29GE0155-HO-01
Power : AC 120V / 60Hz
Temp./Humi. : 20deg.C. / 49%
Engineer : Satofumi Matsuyama

Mode / Remarks : Transmitting, without Tag, Worst-axis :Y-axis

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK
All other spurious emissions were less than 20dB for the limit.



Frequency [MHz]	Reading [dBuV]	DET	Antenna Factor [dB/m]	Loss& Gain [dB]	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
54.258	46.6	QP	9.4	-24.4	31.6	189	100	Vert.	40.0	8.4	
54.261	23.3	QP	9.4	-24.4	8.3	359	300	Hori.	40.0	31.7	
94.928	33.4	QP	8.8	-24.0	18.2	97	300	Hori.	43.5	25.3	
94.924	55.8	QP	8.8	-24.0	40.6	161	100	Vert.	43.5	2.9	
203.403	37.6	QP	16.6	-22.8	31.4	294	156	Hori.	43.5	12.1	
203.411	46.0	QP	16.6	-22.8	39.8	12	100	Vert.	43.5	3.7	
216.965	39.7	QP	16.9	-22.6	34.0	97	142	Hori.	46.0	12.0	
216.965	50.8	QP	16.9	-22.6	45.1	173	100	Vert.	46.0	0.9	
230.521	41.5	QP	17.2	-22.5	36.2	114	145	Hori.	46.0	9.8	
230.522	48.5	QP	17.2	-22.5	43.2	211	100	Vert.	46.0	2.8	
298.327	35.7	QP	20.0	-22.0	33.7	105	299	Vert.	46.0	12.3	
298.200	24.8	QP	20.0	-22.0	22.8	0	300	Hori.	46.0	23.2	
366.122	38.3	QP	17.3	-21.6	34.0	167	100	Hori.	46.0	12.0	
366.118	43.4	QP	17.3	-21.6	39.1	68	146	Vert.	46.0	6.9	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

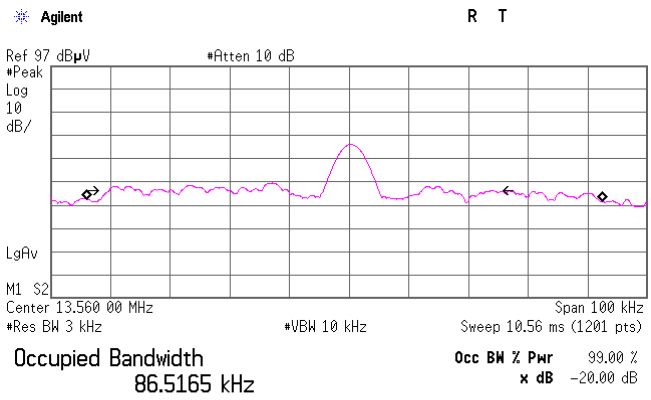
20dB Bandwidth & 99% Occupied Bandwidth

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

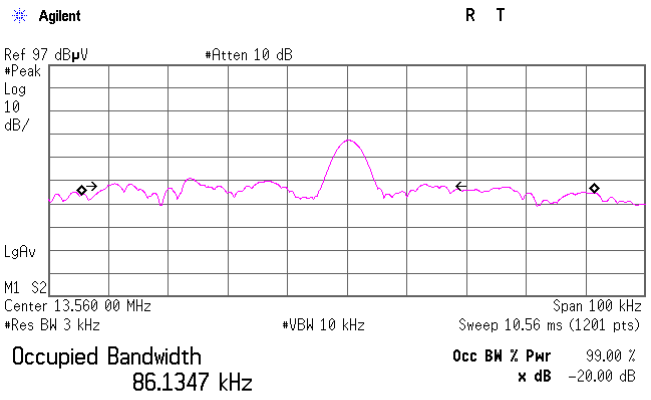
COMPANY	: Hitachi High-Tech Materials Corporation	REPORT NO	: 29GE0155-HO-01
EQUIPMENT	: IC Tag Reader/Writer Module	REGULATION	: FCC 15.225/-
MODEL	: NRWA3	TEST DISTANCE	: -
S/ N	: 003	DATE	: 04/01/2009
POWER	: AC120V/60Hz (DC Power Supply)	TEMPERATURE	: 20 deg.C.
MODE	: Transmitting mode	HUMIDITY	: 49 %
		ENGINEER	: Satofumi Matsuyama

	FREQ [MHz]	20dB Bandwidth [kHz]
with Tag	13.56	64.55
without Tag	13.56	56.79

	FREQ [MHz]	99% Occupied Bandwidth [kHz]
with Tag	13.56	86.52
without Tag	13.56	86.13



with Tag



without Tag

Frequency Tolerance

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

Company	Hitachi High-Tech Materials Corporation	Regulation	FCC15.225 (e) / RSS-210 A2.6
Equipment	IC Tag Reader/Writer Module	Test Distance	-
Model	NRWA3	Date	04/01/2009
S/N	003	Temperature	21 deg. C.
Power	DC 5.0V	Humidity	41 %
Mode	Continuous Transmitting (No Modulation)	Engineer	Hironobu Ohnishi

Test Condition	Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (+/- 0.01%) [+/- ppm]	Margin [ppm]	
T nom 20deg.C	Power on	13.56027633	0.00027633	20.38	100.00	79.62	
Vmax DC5.75V	on 2min.	13.56027278	0.00027278	20.12	100.00	79.88	
(115%)	on 5min.	13.56027097	0.00027097	19.98	100.00	80.02	
	on 10min.	13.56027022	0.00027022	19.93	100.00	80.07	
T nom 20deg.C	Power on	13.56027960	0.00027960	20.62	100.00	79.38	
Vnom DC5.00V	on 2min.	13.56027349	0.00027349	20.17	100.00	79.83	
(100%)	on 5min.	13.56027141	0.00027141	20.02	100.00	79.98	
	on 10min.	13.56027088	0.00027088	19.98	100.00	80.02	
T nom 20deg.C	Power on	13.56027649	0.00027649	20.39	100.00	79.61	
Vmin DC4.25V	on 2min.	13.56027436	0.00027436	20.23	100.00	79.77	
(85%)	on 5min.	13.56027216	0.00027216	20.07	100.00	79.93	
	on 10min.	13.56027154	0.00027154	20.03	100.00	79.97	
T max 50deg.C.	Power on	13.56022137	0.00022137	16.33	100.00	83.67	
Vnom DC5.00V	on 2min.	13.56022037	0.00022037	16.25	100.00	83.75	
(100%)	on 5min.	13.56022054	0.00022054	16.26	100.00	83.74	
	on 10min.	13.56022059	0.00022059	16.27	100.00	83.73	
40deg.C.	Power on	13.56023254	0.00023254	17.15	100.00	82.85	
Vnom DC5.00V	on 2min.	13.56022894	0.00022894	16.88	100.00	83.12	
(100%)	on 5min.	13.56022742	0.00022742	16.77	100.00	83.23	
	on 10min.	13.56022702	0.00022702	16.74	100.00	83.26	
30deg.C.	Power on	13.56025803	0.00025803	19.03	100.00	80.97	
Vnom DC5.00V	on 2min.	13.56025004	0.00025004	18.44	100.00	81.56	
(100%)	on 5min.	13.56024732	0.00024732	18.24	100.00	81.76	
	on 10min.	13.56024668	0.00024668	18.19	100.00	81.81	
20deg.C.	Power on	13.56027960	0.00027960	20.62	100.00	79.38	
Vnom DC5.00V	on 2min.	13.56027349	0.00027349	20.17	100.00	79.83	
(100%)	on 5min.	13.56027141	0.00027141	20.02	100.00	79.98	
	on 10min.	13.56027088	0.00027088	19.98	100.00	80.02	
10deg.C.	Power on	13.56028997	0.00028997	21.38	100.00	78.62	
Vnom DC5.00V	on 2min.	13.56028746	0.00028746	21.20	100.00	78.80	
(100%)	on 5min.	13.56028634	0.00028634	21.12	100.00	78.88	
	on 10min.	13.56028639	0.00028639	21.12	100.00	78.88	
0deg.C.	Power on	13.56028610	0.00028610	21.10	100.00	78.90	
Vnom DC5.00V	on 2min.	13.56029017	0.00029017	21.40	100.00	78.60	
(100%)	on 5min.	13.56029052	0.00029052	21.42	100.00	78.58	
	on 10min.	13.56029055	0.00029055	21.43	100.00	78.57	
-10deg.C.	Power on	13.56026442	0.00026442	19.50	100.00	80.50	
Vnom DC5.00V	on 2min.	13.56027400	0.00027400	20.21	100.00	79.79	
(100%)	on 5min.	13.56027585	0.00027585	20.34	100.00	79.66	
	on 10min.	13.56027627	0.00027627	20.37	100.00	79.63	
-20deg.C	Power on	13.56021333	0.00021333	15.73	100.00	84.27	
Vnom DC5.00V	on 2min.	13.56023148	0.00023148	17.07	100.00	82.93	
(100%)	on 5min.	13.56023606	0.00023606	17.41	100.00	82.59	
	on 10min.	13.56023685	0.00023685	17.47	100.00	82.53	
T min -30deg.C	Power on	13.56011373	0.00011373	8.39	100.00	91.61	*
Vnom DC5.00V	on 2min.	13.56014686	0.00014686	10.83	100.00	89.17	*
(100%)	on 5min.	13.56015390	0.00015390	11.35	100.00	88.65	*
	on 10min.	13.56015504	0.00015504	11.43	100.00	88.57	*

Limit : 13.56 MHz +/-0.01 % (+/- 100ppm) = +/- 0.001356 MHz
* for IC application (RSS-Gen 4.7 requirement)

APPENDIX 3: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-04	Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2009/02/03 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE	2009/02/06 * 12
MJM-07	Measure	PROMART	SEN1955	-	RE/CE	-
CUST-MSTW-14	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE/CE	2008/11/07 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE/CE	2008/10/03 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2009/01/10 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2009/01/10 * 12
MCC-50	Coaxial cable	UL Japan	-	-	RE	2009/03/18 * 12
MAT-31	Attenuator(6dB)	TME	UFA-01	-	RE	2009/03/03 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2009/03/18 * 12
MLPA-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	836553/009	RE	2008/11/14 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	-	-	RE/CE	2008/07/03 * 12
MCC-31	Coaxial cable	UL Japan	-	-	RE	2008/06/20 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-180	-	FT	2009/02/04 * 12
MCH-04	Temperature and Humidity Chamber	Espec	PL-2KP	14015723	FT	2008/08/27 * 12
MSW-07	Stopwatch	RS	694	4409574	FT	Pre Check
MMM-11	Digital HiTESTER	Hioki	3805	060100600	FT	2008/04/09 * 12
MUC-01	Universal Counter	Agilent	53132A	MY40008906	FT	2008/06/09 * 12
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	CE	2008/06/25 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(EUT)	2009/02/18 * 12

The expiration date of the calibration is the end of the expired month.
All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item:

CE: Conducted Emission
RE: Radiated Emission
FT: Frequency Tolerance