

**APPENDIX 2: Data of EMI test**

**Conducted emission**

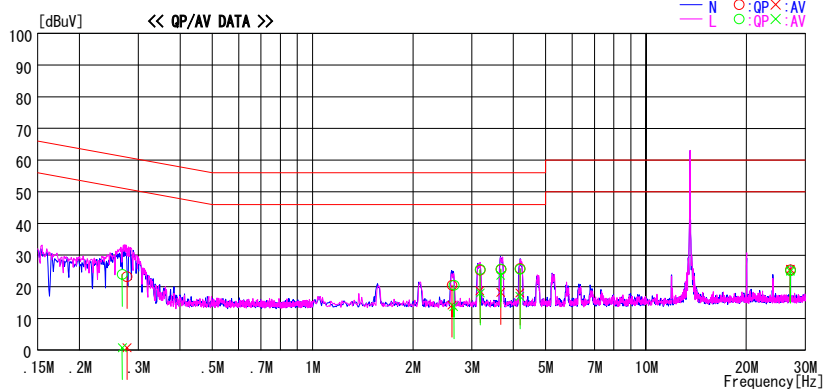
**DATA OF CONDUCTED EMISSION TEST**

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber  
Date : 2007/07/14

Company : OMRON Corporation  
 Kind of EUT : RFID system (Reader/Writer)  
 Model No. : V680-HAM42-FRT  
 Serial No. : 6  
 Report No. : 27KE0140-HO  
 Power : AC 120V / 60Hz (EUT DC24V)  
 Temp./Humi. : 24deg. C / 69%  
 Operator : Takumi Shimada

Mode / Remarks: Tx 13.56MHz with Tag (Antenna:V680-HS63-SP)

LIMIT : FCC15.207 QP  
FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
0.26876	23.7	0.5	0.3	24.0	0.8	61.2	51.2	37.2	50.4	L
0.27770	22.9	0.5	0.3	23.2	0.8	60.9	50.9	37.7	50.1	N
2.62030	20.0	13.7	0.5	20.5	14.2	56.0	46.0	35.5	31.8	N
2.65120	20.0	13.2	0.5	20.5	13.7	56.0	46.0	35.5	32.3	L
3.17936	24.7	18.1	0.6	25.3	18.7	56.0	46.0	30.7	27.3	N
3.17970	24.9	17.4	0.6	25.5	18.0	56.0	46.0	30.5	28.0	L
3.66627	25.0	23.0	0.6	25.6	23.6	56.0	46.0	30.4	22.4	L
3.66701	24.9	17.6	0.6	25.5	18.2	56.0	46.0	30.5	27.6	N
4.18890	24.9	16.2	0.7	25.6	16.9	56.0	46.0	30.4	29.1	L
4.18897	25.1	17.3	0.7	25.8	18.0	56.0	46.0	30.2	28.0	N
27.11919	23.1	22.9	2.0	25.1	24.9	60.0	50.0	34.9	25.1	L
27.11956	23.4	23.5	2.0	25.4	25.5	60.0	50.0	34.6	24.5	N

CHART: WITH FACTOR, Peak hold data. CALCULATION: 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 round off to one or two decimal places, so some differences might be observed.

**Conducted emission**

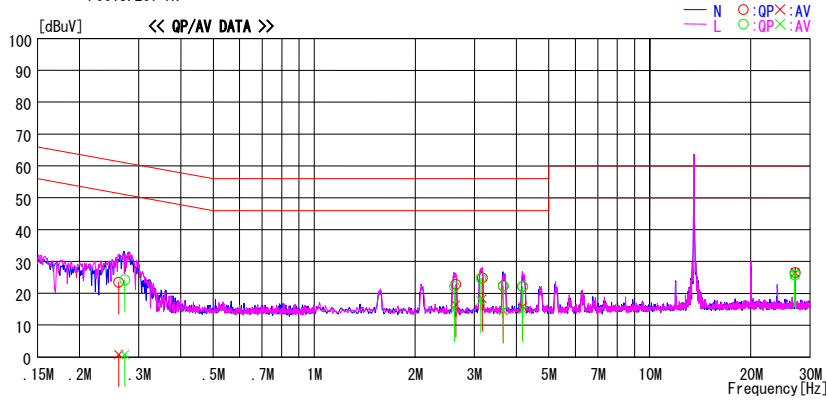
**DATA OF CONDUCTED EMISSION TEST**

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber  
 Date : 2007/07/14

Company : OMRON Corporation  
 Kind of EUT : RFID system (Reader/Writer)  
 Model No. : V680-HAM42-FRT  
 Serial No. : 6  
 Report No. : 27KE0140-HO  
 Power : AC 120V / 60Hz (EUT DC24V)  
 Temp./Humi. : 24deg.C / 69%  
 Operator : Takumi Shimada

Mode / Remarks: Tx 13.56MHz with Tag (Antenna:V680-HS63)

LIMIT : FCC15.207 QP  
 FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
0.26170	23.2	0.5	0.3	23.5	0.8	61.4	51.4	37.9	50.6	N
2.63874	22.3	15.9	0.5	22.8	16.4	56.0	46.0	33.2	29.6	N
3.16822	24.3	17.7	0.6	24.9	18.3	56.0	46.0	31.1	27.7	N
3.65409	21.7	14.0	0.6	22.3	14.6	56.0	46.0	33.7	31.4	N
4.17478	21.4	15.1	0.7	22.1	15.8	56.0	46.0	33.9	30.2	N
27.11948	24.6	24.5	2.0	26.6	26.5	60.0	50.0	33.4	23.5	N
0.27243	24.0	0.5	0.3	24.3	0.8	61.0	51.0	36.7	50.2	L
2.61544	21.6	14.5	0.5	22.1	15.0	56.0	46.0	33.9	31.0	L
3.13446	24.2	17.1	0.6	24.8	17.7	56.0	46.0	31.2	28.3	L
3.65866	21.6	14.2	0.6	22.2	14.8	56.0	46.0	33.8	31.2	L
4.17815	21.4	14.1	0.7	22.1	14.8	56.0	46.0	33.9	31.2	L
27.01209	23.8	24.0	2.0	25.8	26.0	60.0	50.0	34.2	24.0	L

CHART: WITH FACTOR, Peak hold data. CALCULATION: 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 round off to one or two decimal places, so some differences might be observed.

## Conducted emission

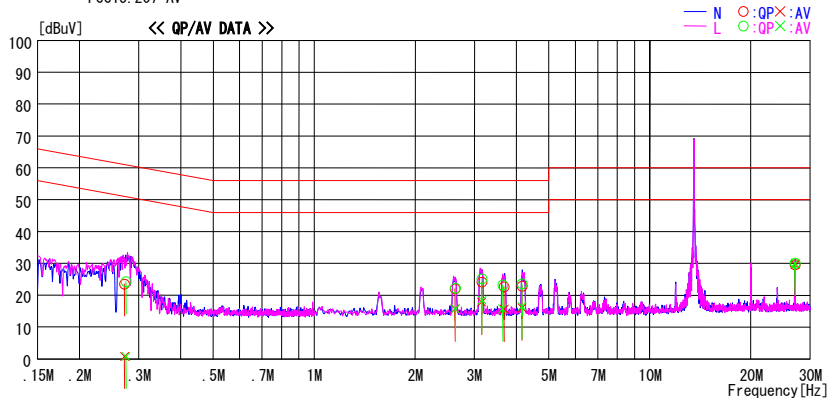
### DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber  
 Date : 2007/07/14

Company : OMRON Corporation                      Report No. : 27KE0140-HO  
 Kind of EUT : RFID system (Reader/Writer)      Power : AC 120V / 60Hz (EUT DC24V)  
 Model No. : V680-HAM42-FRT                      Temp./Humi. : 24deg. C / 69%  
 Serial No. : 6    Operator : Takumi Shimada

Mode / Remarks : Tx 13.56MHz with Tag (Antenna:V680-HS52)

LIMIT : FCC15.207 QP  
        FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
0.27222	23.2	0.5	0.3	23.5	0.8	61.0	51.0	37.5	50.2	N
2.62875	21.5	15.2	0.5	22.0	15.7	56.0	46.0	34.0	30.3	N
3.15720	23.6	17.2	0.6	24.2	17.8	56.0	46.0	31.8	28.2	N
3.68166	22.0	15.0	0.6	22.6	15.6	56.0	46.0	33.4	30.4	N
4.16211	22.1	15.3	0.7	22.8	16.0	56.0	46.0	33.2	30.0	N
27.12145	27.6	27.7	2.0	29.6	29.7	60.0	50.0	30.4	20.3	N
0.27500	24.0	0.5	0.3	24.3	0.8	61.0	51.0	36.7	50.2	L
2.63462	21.7	15.2	0.5	22.2	15.7	56.0	46.0	33.8	30.3	L
3.16098	24.6	17.8	0.6	25.2	18.4	56.0	46.0	30.8	27.6	L
3.64519	22.6	15.1	0.6	23.2	15.7	56.0	46.0	32.8	30.3	L
4.16535	22.9	15.8	0.7	23.6	16.5	56.0	46.0	32.4	29.5	L
27.12074	28.1	28.2	2.0	30.1	30.2	60.0	50.0	29.9	19.8	L

CHART: WITH FACTOR, Peak hold data. CALCULATION: 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 round off to one or two decimal places, so some differences might be observed.

## Conducted emission

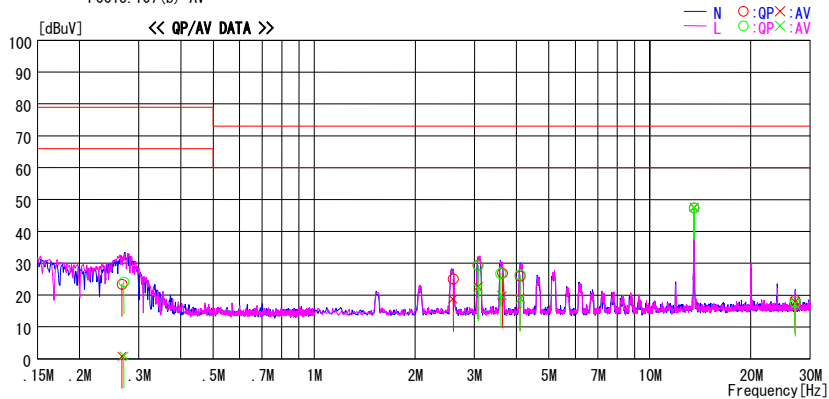
### DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber  
 Date : 2007/07/14

Company : OMRON Corporation  
 Kind of EUT : RFID system (Reader/Writer)  
 Model No. : V680-HAM42-FRT  
 Serial No. : 6  
 Report No. : 27KE0140-HO  
 Power : AC 120V / 60Hz (EUT DC24V)  
 Temp./Humi. : 24deg.C / 69%  
 Operator : Takumi Shimada

Mode / Remarks: Tx 13.56MHz (Antenna:50ohm terminated)

LIMIT : FCC15.107(b) QP  
 FCC15.107(b) AV



Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
0.27108	23.9	0.6	0.3	24.2	0.9	79.0	66.0	54.8	65.1	L
0.26737	23.1	0.5	0.3	23.4	0.8	79.0	66.0	55.6	65.2	N
2.59362	24.6	18.2	0.5	25.1	18.7	73.0	60.0	47.9	41.3	N
3.07910	28.9	22.2	0.5	29.4	22.7	73.0	60.0	43.6	37.3	N
3.08322	28.8	21.5	0.5	29.3	22.0	73.0	60.0	43.7	38.0	L
3.63366	26.3	19.2	0.6	26.9	19.8	73.0	60.0	46.1	40.2	N
3.59923	26.2	19.5	0.6	26.8	20.1	73.0	60.0	46.2	39.9	L
4.11077	25.8	18.1	0.7	26.5	18.8	73.0	60.0	46.5	41.2	L
4.10899	25.3	18.3	0.7	26.0	19.0	73.0	60.0	47.0	41.0	N
13.55945	46.0	46.1	1.4	47.4	47.5	73.0	60.0	25.6	12.5	N
13.55989	46.0	46.3	1.4	47.4	47.7	73.0	60.0	25.6	12.3	L
27.11974	16.4	15.9	2.0	18.4	17.9	73.0	60.0	54.6	42.1	N
27.11810	15.8	15.2	2.0	17.8	17.2	73.0	60.0	55.2	42.8	L

CHART: WITH FACTOR, Peak hold data. CALCULATION: 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 round off to one or two decimal places, so some differences might be observed.

## Radiated emission (Fundamental emission and Spectrum Mask)

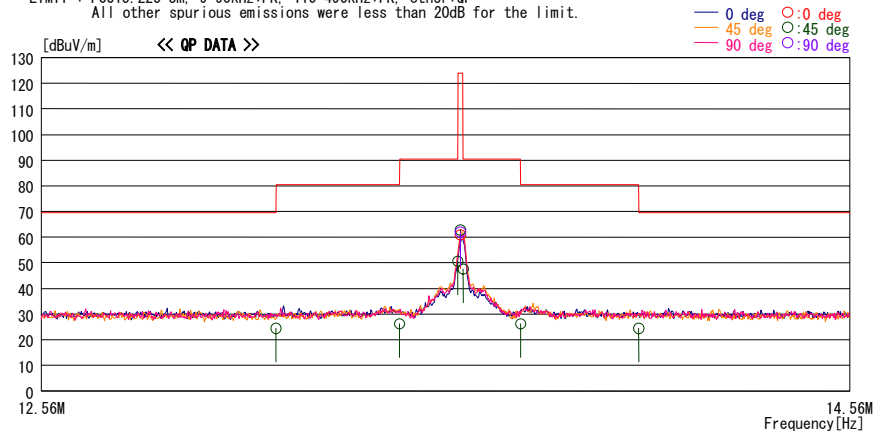
### DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber  
Date : 2007/06/14

Company : OMRON Corporation  
 Kind of EUT : RFID system (Reader/Writer)  
 Model No. : V680-HAM42-FRT  
 Serial No. : 6  
 Report No. : 27KE0140-HO  
 Power : AC 120V/60Hz (EUT DC 24.0V)  
 Temp./ Humi. : 24deg. C / 68%  
 Operator : Kenichi Adachi

Mode / Remarks : Tx 13.56MHz with Tag (Antenna: V680-HS63-SP)

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP  
 All other spurious emissions were less than 20dB for the limit.



Freq. [MHz]	Reading [dBuV]	DET	Ant. Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna	Table [deg]	Comment
13.11000	35.6	QP	20.1	0.8	32.1	24.4	69.5	45.1	45deg	169	
13.41000	37.3	QP	20.1	0.8	32.1	26.1	80.5	54.4	45deg	169	
13.55300	61.8	QP	20.1	0.8	32.1	50.6	90.4	39.8	45deg	169	
13.55986	74.0	QP	20.1	0.8	32.1	62.8	123.9	61.1	45deg	169	Worst Angle
13.55986	73.2	QP	20.1	0.8	32.1	62.0	123.9	61.9	90deg	133	
13.55986	72.1	QP	20.1	0.8	32.1	60.9	123.9	63.0	0deg	187	
13.56700	58.8	QP	20.1	0.8	32.1	47.6	90.4	42.8	45deg	169	
13.71000	37.3	QP	20.1	0.8	32.1	26.1	80.5	54.4	45deg	169	
14.01000	35.7	QP	20.1	0.8	32.1	24.5	69.5	45.0	45deg	169	

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

\*The limit is rounded down to one decimal place.

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

**Radiated emission(Fundamental emission and Spectrum Mask)**

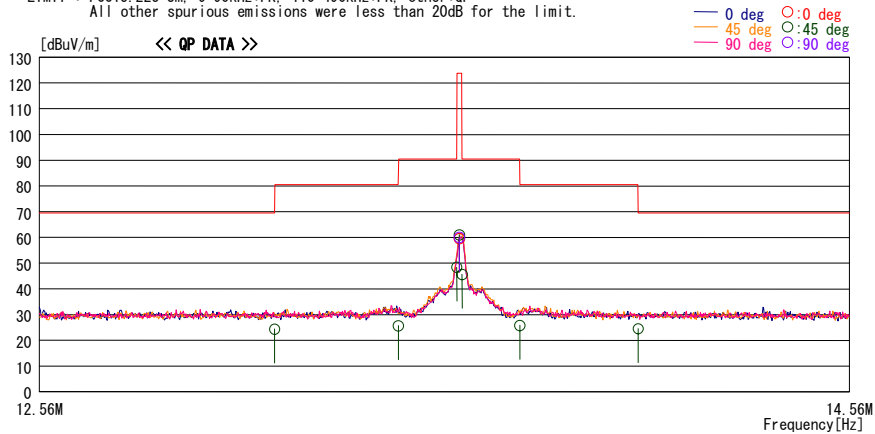
**DATA OF RADIATED EMISSION TEST**

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber  
Date : 2007/06/20

Company : OMRON Corporation  
 Kind of EUT : RFID system (Reader/Writer)  
 Model No. : V680-HAM42-FRT  
 Serial No. : 6  
 Report No. : 27KE0140-HO  
 Power : AC 120V/60Hz (EUT DC 24.0V)  
 Temp./ Humi. : 25deg. C / 65%  
 Operator : Kenichi Adachi

Mode / Remarks : Tx 13.56MHz with Tag (Antenna: V680-HS63)

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP  
 All other spurious emissions were less than 20dB for the limit.



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]	
13.11000	35.5	QP	20.1	0.8	32.1	24.3	69.5	45.2	45deg	163	
13.41000	36.8	QP	20.1	0.8	32.1	25.6	80.5	54.9	45deg	163	
13.55300	59.6	QP	20.1	0.8	32.1	48.4	90.4	42.0	45deg	163	
13.55995	72.1	QP	20.1	0.8	32.1	60.9	123.9	63.0	45deg	163	Worst Angle
13.55995	71.2	QP	20.1	0.8	32.1	60.0	123.9	63.9	90deg	80	
13.55995	70.7	QP	20.1	0.8	32.1	59.5	123.9	64.4	0deg	179	
13.56700	56.8	QP	20.1	0.8	32.1	45.6	90.4	44.8	45deg	163	
13.71000	36.9	QP	20.1	0.8	32.1	25.7	80.5	54.8	45deg	163	
14.01000	35.7	QP	20.1	0.8	32.1	24.5	69.5	45.0	45deg	163	

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

\*The limit is rounded down to one decimal place.

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

**Radiated emission(Fundamental emission and Spectrum Mask)**

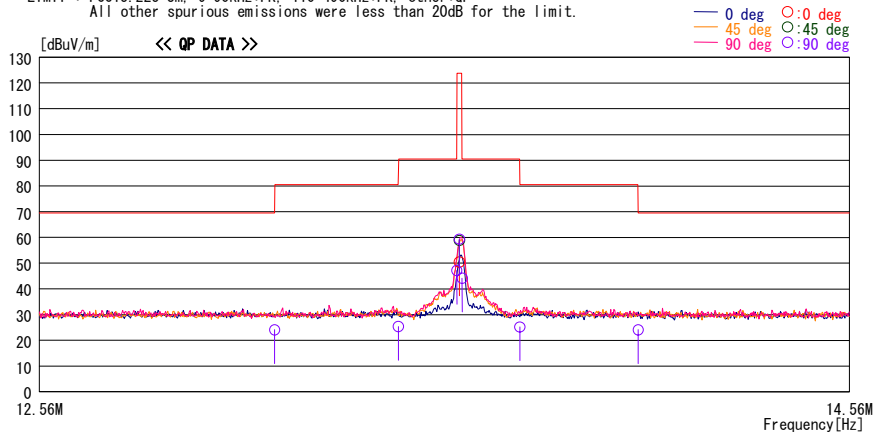
**DATA OF RADIATED EMISSION TEST**

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber  
 Date : 2007/06/20

Company : OMRON Corporation  
 Kind of EUT : RFID system (Reader/Writer)  
 Model No. : V680-HAM42-FRT  
 Serial No. : 6  
 Report No. : 27KE0140-HO  
 Power : AC 120V/60Hz (EUT DC 24.0V)  
 Temp./ Humi. : 25deg. C / 65%  
 Operator : Kenichi Adachi

Mode / Remarks : Tx 13.56MHz with Tag (Antenna: V680-HS52)

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP  
 All other spurious emissions were less than 20dB for the limit.



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]	
13.11000	35.3	QP	20.1	0.8	32.1	24.1	69.5	45.4	90deg	285	
13.41000	36.5	QP	20.1	0.8	32.1	25.3	80.5	55.2	90deg	285	
13.55300	58.3	QP	20.1	0.8	32.1	47.1	90.4	43.3	90deg	285	
13.55993	70.0	QP	20.1	0.8	32.1	58.8	123.9	65.1	45deg	326	
13.55993	70.6	QP	20.1	0.8	32.1	59.4	123.9	64.5	90deg	285	Worst Angle
13.55993	61.6	QP	20.1	0.8	32.1	50.4	123.9	73.5	0deg	324	
13.56700	55.4	QP	20.1	0.8	32.1	44.2	90.4	46.2	90deg	285	
13.71000	36.4	QP	20.1	0.8	32.1	25.2	80.5	55.3	90deg	285	
14.01000	35.3	QP	20.1	0.8	32.1	24.1	69.5	45.4	90deg	285	

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

\*The limit is rounded down to one decimal place.

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

**Radiated emission (Spurious emission : below 30MHz)**

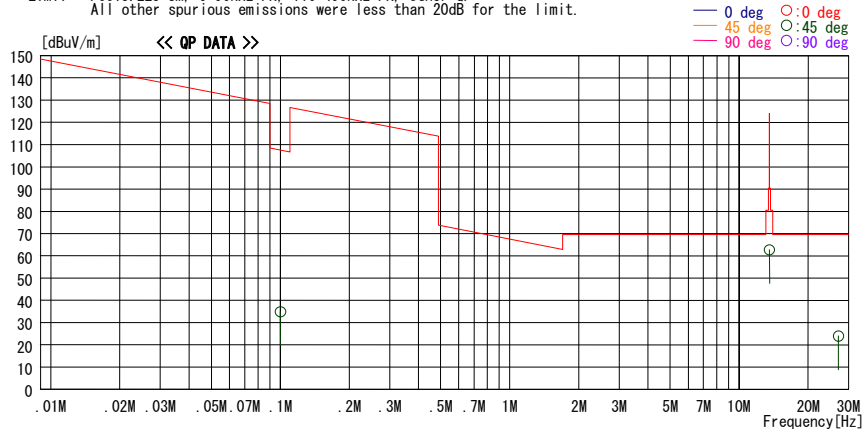
**DATA OF RADIATED EMISSION TEST**

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber  
Date : 2007/06/14

Company : OMRON Corporation  
 Kind of EUT : RFID system (ReaderWriter)  
 Model No. : V680-HAM42-FRT  
 Serial No. : 6  
 Report No. : 27KE0140-HO  
 Power : AC 120V/60Hz (EUT DC 24.0V)  
 Temp. / Humi. : 24deg.C / 68%  
 Operator : Kenichi Adachi

Mode / Remarks : Tx 13.56MHz with Tag (Antenna: V680-HS63-SP)

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP  
 All other spurious emissions were less than 20dB for the limit.



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]	
0.10003	46.7	QP	19.9	0.3	32.1	34.8	107.6	72.8	45deg	210	
13.55986	74.0	QP	20.1	0.8	32.1	62.8	123.9	61.1	45deg	169	
27.12000	34.4	QP	20.5	1.2	32.1	24.0	69.5	45.5	45deg	359	

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

\*The limit is rounded down to one decimal place.

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



## Radiated emission (Spurious emission : below 30MHz)

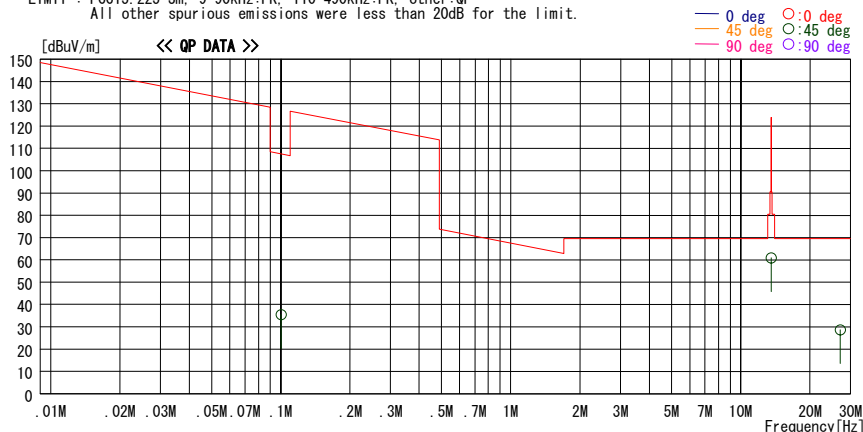
### DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber  
Date : 2007/06/20

Company : OMRON Corporation  
 Kind of EUT : RFID system (Reader/Writer)  
 Model No. : V680-HAM42-FRT  
 Serial No. : 6  
 Report No. : 27KE0140-H0  
 Power : AC 120V/60Hz (EUT DC 24.0V)  
 Temp./ Humi. : 25deg. C / 65%  
 Operator : Kenichi Adachi

Mode / Remarks : Tx 13.56MHz with Tag (Antenna: V680-HS63)

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP  
 All other spurious emissions were less than 20dB for the limit.



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]	
0.10051	47.4	QP	19.9	0.3	32.1	35.5	107.5	72.0	45deg	359	
13.55995	72.1	QP	20.1	0.8	32.1	60.9	123.9	63.0	45deg	163	
27.12000	39.1	QP	20.5	1.2	32.1	28.7	69.5	40.8	45deg	213	

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

\*The limit is rounded down to one decimal place.

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

## Radiated emission (Spurious emission : below 30MHz)

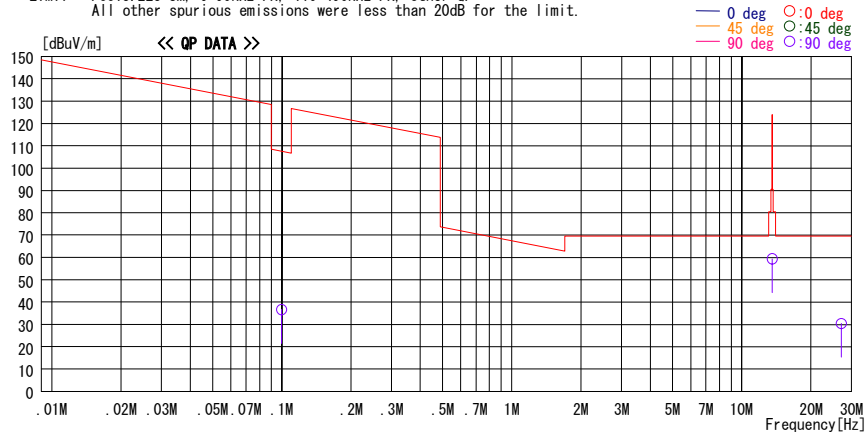
### DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber  
 Date : 2007/06/20

Company : OMRON Corporation  
 Kind of EUT : RFID system (Reader/Writer)  
 Model No. : V680-HAM42-FRT  
 Serial No. : 6  
 Report No. : 27KE0140-HO  
 Power : AC 120V/60Hz (EUT DC 24.0V)  
 Temp./ Humi. : 25deg C / 65%  
 Operator : Kenichi Adachi

Mode / Remarks : Tx 13.56MHz with Tag (Antenna: V680-HS52)

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP  
 All other spurious emissions were less than 20dB for the limit.



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]	
0.09968	48.6	QP	19.9	0.3	32.1	36.7	107.6	70.9	90deg	160	
13.55993	70.6	QP	20.1	0.8	32.1	59.4	123.9	64.5	90deg	285	
27.12000	40.9	QP	20.5	1.2	32.1	30.5	69.5	39.0	90deg	221	

CHART : WITH FACTOR ANT TYPE : LOOP Except for the data below : adequate margin data below the limits.  
 CALCULATION : READING + ANT FACTOR + LOSS (CABLE + ATTEN. -AMP.)

\*The limit is rounded down to one decimal place.

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

**Radiated emission (Spurious emission: 30MHz – 1GHz)**

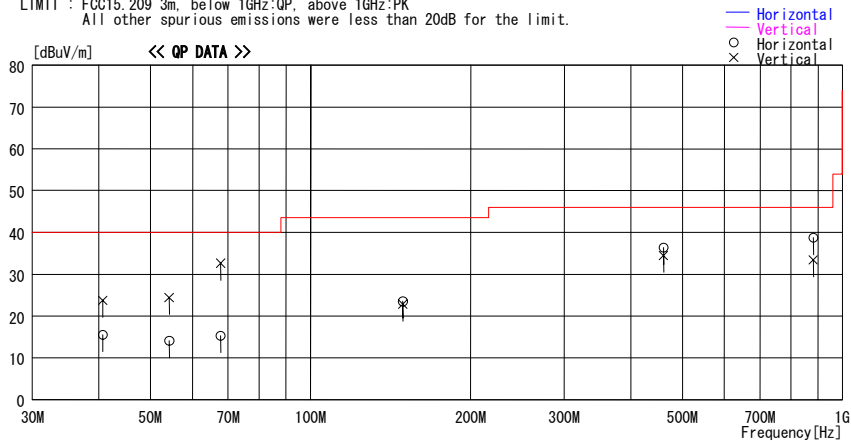
**DATA OF RADIATED EMISSION TEST**

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber  
Date : 2007/06/20

Company : OMRON Corporation  
 Kind of EUT : RFID system (Reader/Writer)  
 Model No. : V680-HAM42-FRT  
 Serial No. : 6  
 Report No. : 27KE0140-HO  
 Power : AC120V / 60Hz (EUT DC24.0V)  
 Temp./Humi. : 25deg. C. / 65%  
 Operator : Kenichi Adachi

Mode / Remarks : Tx 13.56MHz with Tag (Antenna: V680-HS63-SP)

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		Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Loss& Gain [dB]							
40.683	34.7	QP	13.7	-24.7	23.7	240	100	Vert.	40.0	16.3	
40.686	26.5	QP	13.7	-24.7	15.5	135	362	Hori.	40.0	24.5	
54.245	39.0	QP	9.9	-24.5	24.4	77	100	Vert.	40.0	15.6	
54.247	28.7	QP	9.9	-24.5	14.1	341	400	Hori.	40.0	25.9	
67.802	32.1	QP	7.5	-24.3	15.3	333	270	Hori.	40.0	24.7	
67.803	49.4	QP	7.5	-24.3	32.6	239	100	Vert.	40.0	7.4	
149.156	31.8	QP	15.1	-23.4	23.5	201	251	Hori.	43.5	20.0	
149.157	31.1	QP	15.1	-23.4	22.8	324	100	Vert.	43.5	20.7	
461.031	38.6	QP	18.8	-21.0	36.4	78	100	Hori.	46.0	9.6	
461.034	36.7	QP	18.8	-21.0	34.5	198	100	Vert.	46.0	11.5	
881.383	33.7	QP	23.3	-18.3	38.7	87	100	Hori.	46.0	7.3	
881.385	28.4	QP	23.3	-18.3	33.4	127	100	Vert.	46.0	12.6	

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 limit is rounded down to one decimal place.

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

**Radiated emission (Spurious emission: 30MHz – 1GHz)**

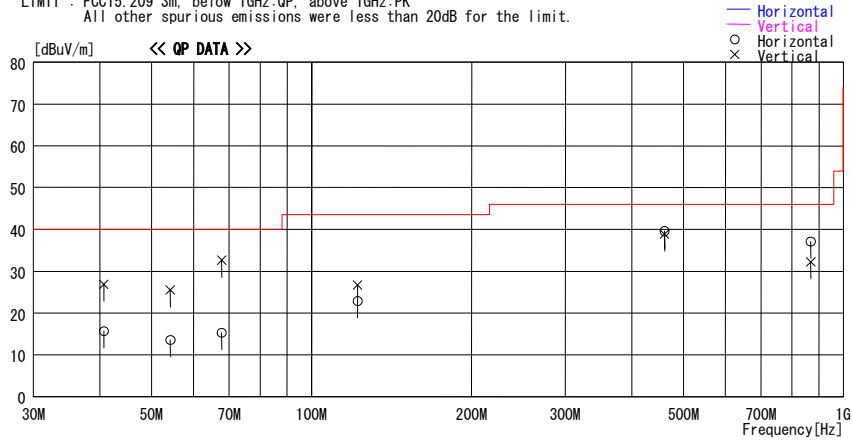
**DATA OF RADIATED EMISSION TEST**

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber  
Date : 2007/06/20

Company : OMRON Corporation  
 Kind of EUT : RFID system (Reader/Writer)  
 Model No. : V680-HAM42-FRT  
 Serial No. : 6  
 Report No. : 27KE0140-H0  
 Power : AC120V / 60Hz (EUT DC24.0V)  
 Temp./Humi. : 25deg. C. / 65%  
 Operator : Kenichi Adachi

Mode / Remarks : Tx 13.56MHz with Tag (Antenna: V680-HS63)

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
40.678	26.7	QP	13.7	-24.7	15.7	132	400	Hori.	40.0	24.3	
40.681	37.9	QP	13.7	-24.7	26.9	54	100	Vert.	40.0	13.1	
54.244	28.2	QP	9.9	-24.5	13.6	322	400	Hori.	40.0	26.4	
54.239	40.1	QP	9.9	-24.5	25.5	71	100	Vert.	40.0	14.5	
67.805	32.1	QP	7.5	-24.3	15.3	307	275	Hori.	40.0	24.7	
67.795	49.4	QP	7.5	-24.3	32.6	254	100	Vert.	40.0	7.4	
122.042	33.3	QP	13.3	-23.7	22.9	40	254	Hori.	43.5	20.6	
122.037	37.1	QP	13.3	-23.7	26.7	95	100	Vert.	43.5	16.8	
461.032	41.8	QP	18.8	-21.0	39.6	357	100	Hori.	46.0	6.4	
461.033	41.0	QP	18.8	-21.0	38.8	194	100	Vert.	46.0	7.2	
867.829	32.2	QP	23.3	-18.4	37.1	107	100	Hori.	46.0	8.9	
867.825	27.3	QP	23.3	-18.4	32.2	119	100	Vert.	46.0	13.8	

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

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

**Radiated emission (Spurious emission: 30MHz – 1GHz)**

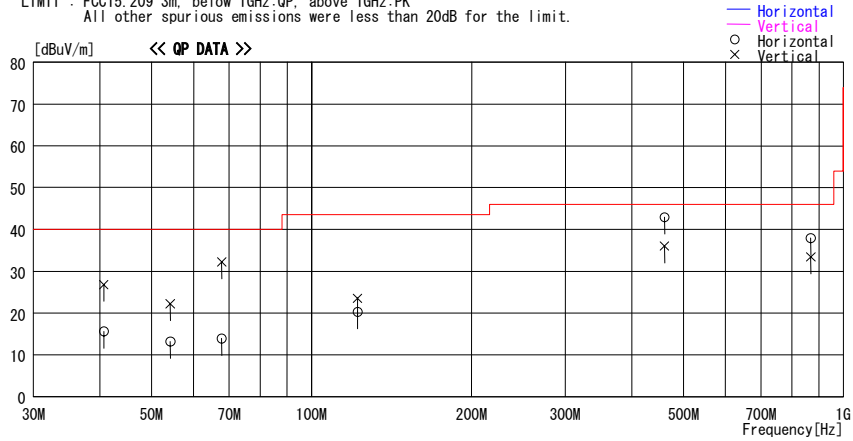
**DATA OF RADIATED EMISSION TEST**

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber  
Date : 2007/06/20

Company : OMRON Corporation  
 Kind of EUT : RFID system (Reader/Writer)  
 Model No. : V680-HAM42-FRT  
 Serial No. : 6  
 Report No. : 27KE0140-H0  
 Power : AC120V / 60Hz (EUT DC24.0V)  
 Temp./Humi. : 25deg. C. / 65%  
 Operator : Kenichi Adachi

Mode / Remarks : Tx 13.56MHz with Tag (Antenna: V680-HS52)

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
40.676	37.8	QP	13.7	-24.7	26.8	225	100	Vert.	40.0	13.2	
40.685	26.6	QP	13.7	-24.7	15.6	139	350	Hori.	40.0	24.4	
54.239	36.8	QP	9.9	-24.5	22.2	75	100	Vert.	40.0	17.8	
54.245	27.8	QP	9.9	-24.5	13.2	330	369	Hori.	40.0	26.8	
67.795	30.7	QP	7.5	-24.3	13.9	315	272	Hori.	40.0	26.1	
67.798	49.0	QP	7.5	-24.3	32.2	283	100	Vert.	40.0	7.8	
122.040	30.7	QP	13.3	-23.7	20.3	203	289	Hori.	43.5	23.2	
122.044	33.9	QP	13.3	-23.7	23.5	97	100	Vert.	43.5	20.0	
461.035	45.1	QP	18.8	-21.0	42.9	178	100	Hori.	46.0	3.1	
461.037	38.2	QP	18.8	-21.0	36.0	195	100	Vert.	46.0	10.0	
867.827	33.0	QP	23.3	-18.4	37.9	243	100	Hori.	46.0	8.1	
867.829	28.5	QP	23.3	-18.4	33.4	131	100	Vert.	46.0	12.6	

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

**Radiated emission (Spurious emission: above 1GHz)**

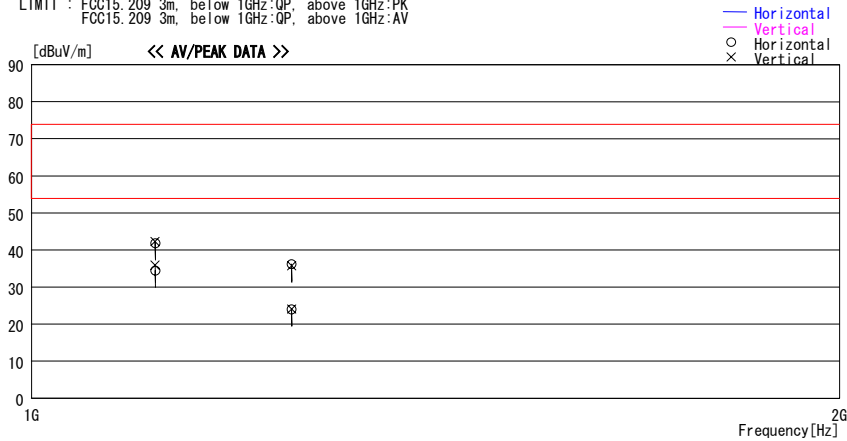
**DATA OF RADIATED EMISSION TEST**

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber  
Date : 2007/06/20

Company : OMRON Corporation Report No. : 27KE0140-HO  
 Kind of EUT : RFID system (Reader/Writer) Power : AC120V / 60Hz (EUT DC24.0V)  
 Model No. : V680-HAM42-FRT Temp./Humi. : 25deg.C. / 65%  
 Serial No. : 6 Operator : Takumi Shimada

Mode / Remarks : Tx 13.56MHz with Tag (Antenna: V680-HS63-SP)

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK  
 FCC15.209 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level	Angle	Height	Polar.	Limit	Margin	Comment
			Factor	Gain					[dBuV/m]	[dB]	
			[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
1111.895	50.7	PK	23.7	-32.6	41.8	261	100	Hori.	73.9	32.1	
1111.898	51.2	PK	23.7	-32.6	42.3	121	107	Vert.	73.9	31.6	
1111.895	43.3	AV	23.7	-32.6	34.4	261	100	Hori.	53.9	19.5	
1111.898	44.8	AV	23.7	-32.6	35.9	121	107	Vert.	53.9	18.0	
1250.000	43.7	PK	24.2	-32.1	35.8	359	100	Vert.	73.9	38.1	
1250.000	32.0	AV	24.2	-32.1	24.1	359	100	Vert.	53.9	29.8	
1250.000	44.1	PK	24.2	-32.1	36.2	359	100	Hori.	73.9	37.7	
1250.000	31.9	AV	24.2	-32.1	24.0	359	100	Hori.	53.9	29.9	

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

**Radiated emission (Spurious emission: above 1GHz)**

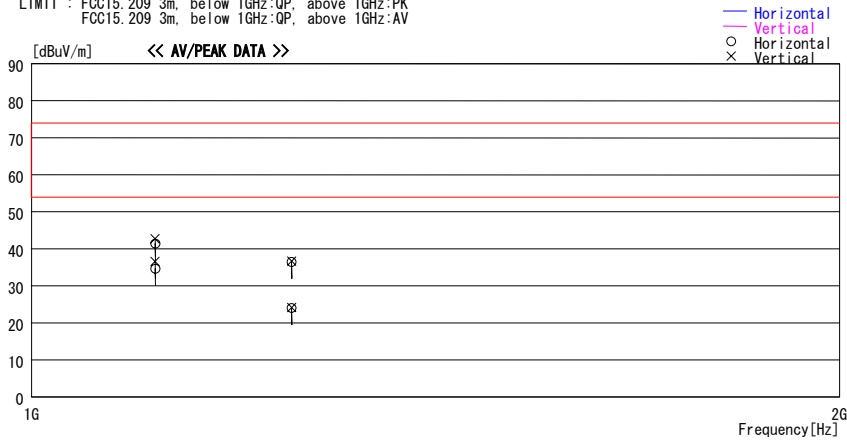
**DATA OF RADIATED EMISSION TEST**

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber  
Date : 2007/06/20

Company : OMRON Corporation Report No. : 27KE0140-HO  
Kind of EUT : RFID system (Reader/Writer) Power : AC120V / 60Hz (EUT DC24.0V)  
Model No. : V680-HAM42-FRT Temp./Humi. : 25deg.C / 65%  
Serial No. : 6 Operator : Takumi Shimada

Mode / Remarks : Tx 13.56MHz with Tag (Antenna: V680-HS63)

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK  
FCC15.209 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level	Angle	Height	Polar.	Limit	Margin	Comment
			Factor	Gain					[dBuV/m]	[dB]	
1111.902	50.4	PK	23.7	-32.6	41.5	259	100	Hori.	73.9	32.4	
1111.906	51.6	PK	23.7	-32.6	42.7	122	100	Vert.	73.9	31.2	
1111.902	43.6	AV	23.7	-32.6	34.7	259	100	Hori.	53.9	19.2	
1111.906	45.5	AV	23.7	-32.6	36.6	122	100	Vert.	53.9	17.3	
1250.000	44.6	PK	24.2	-32.1	36.7	359	100	Vert.	73.9	37.2	
1250.000	32.0	AV	24.2	-32.1	24.1	359	100	Vert.	53.9	29.8	
1250.000	44.4	PK	24.2	-32.1	36.5	359	100	Hori.	73.9	37.4	
1250.000	31.9	AV	24.2	-32.1	24.0	359	100	Hori.	53.9	29.9	

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 limit is rounded down to one decimal place.

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

**Radiated emission (Spurious emission: above 1GHz)**

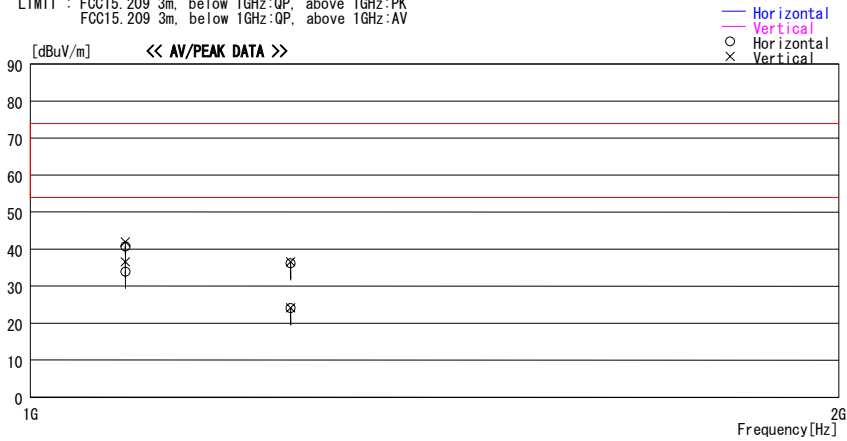
**DATA OF RADIATED EMISSION TEST**

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber  
Date : 2007/06/20

Company : OMRON Corporation  
 Kind of EUT : RFID system (Reader/Writer)  
 Model No. : V680-HAM42-FRT  
 Serial No. : 6  
 Report No. : 27KE0140-HO  
 Power : AC120V / 60Hz (EUT DC24.0V)  
 Temp./Humi. : 25deg. C. / 65%  
 Operator : Takumi Shimada

Mode / Remarks : Tx 13.56MHz with Tag (Antenna: V680-HS52)

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK  
 FCC15.209 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level	Angle	Height	Polar.	Limit	Margin	Comment
			Factor	Gain							
			[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
1084.784	49.8	PK	23.6	-32.7	40.7	152	100	Hori.	73.9	33.2	
1084.779	51.1	PK	23.6	-32.7	42.0	182	100	Vert.	73.9	31.9	
1084.784	43.0	AV	23.6	-32.7	33.9	152	100	Hori.	53.9	20.0	
1084.779	45.7	AV	23.6	-32.7	36.6	182	100	Vert.	53.9	17.3	
1250.000	44.5	PK	24.2	-32.1	36.6	359	100	Vert.	73.9	37.3	
1250.000	32.0	AV	24.2	-32.1	24.1	359	100	Vert.	53.9	29.8	
1250.000	44.1	PK	24.2	-32.1	36.2	359	100	Hori.	73.9	37.7	
1250.000	32.0	AV	24.2	-32.1	24.1	359	100	Hori.	53.9	29.8	

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

\*The limit is rounded down to one decimal place.

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

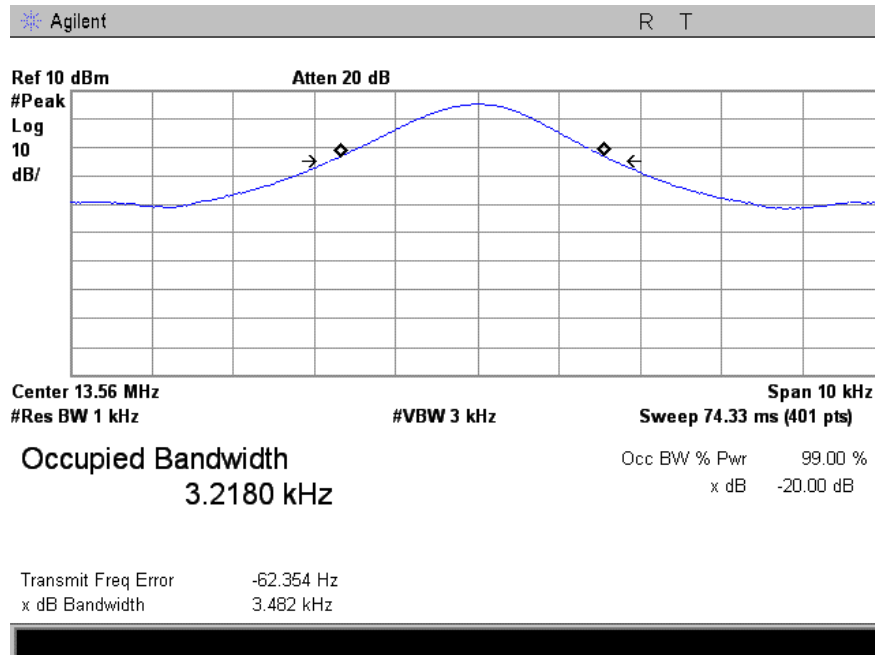


## 20dB Bandwidth

UL Japan, Inc.  
 Head Office EMC Lab. No.7 Measurement Room

COMPANY : OMRON Corporation EQUIPMENT : RFID system (ReaderWriter) MODEL : V680-HAM42-FRT S/ N : 6 POWER : AC120V/60Hz (DC Power Supply 24V) MODE : Tx 13.56MHz	REPORT NO : 27KE0140-HO REGULATION : FCC 15.225/- TEST DISTANCE : - DATE : 06/25/2007 TEMPERATURE : 24 deg.C. HUMIDITY : 60 % ENGINEER : Hidekazu Tanaka
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FREQ [MHz]	20dB Bandwidth [kHz]
13.56	3.48



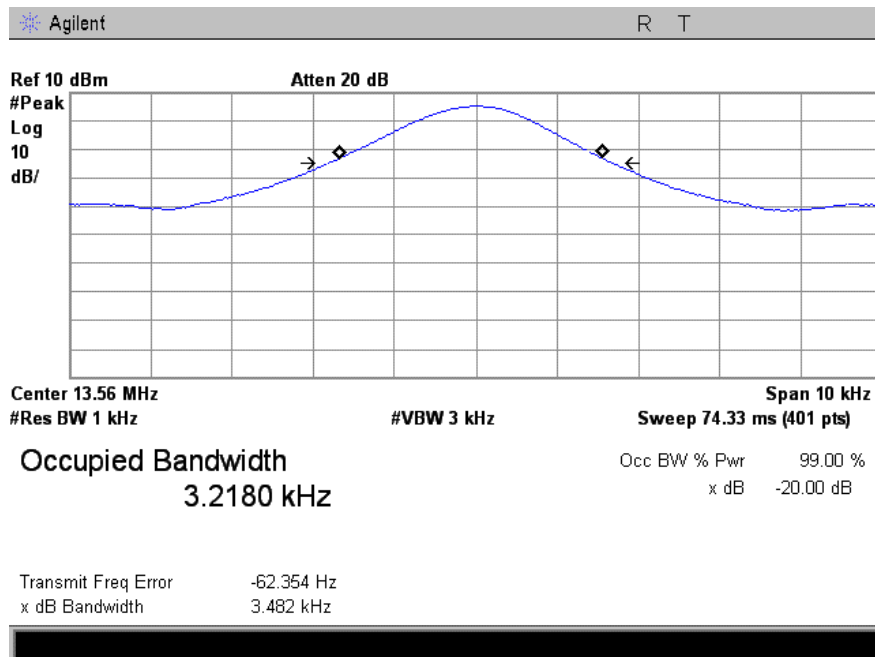
### 99% Occupied Bandwidth

UL Japan, Inc.  
 Head Office EMC Lab. No.7 Measurement Room

COMPANY : OMRON Corporation  
 EQUIPMENT : RFID system (Reader/Writer)  
 MODEL : V680-HAM42-FRT  
 S/ N : 6  
 POWER : AC120V/60Hz (DC Power Supply 24V)  
 MODE : Tx 13.56MHz

REPORT NO : 27KE0140-HO  
 REGULATION : RSS-Gen 4.6.1  
 TEST DISTANCE : -  
 DATE : 06/25/2007  
 TEMPERATURE : 24 deg.C.  
 HUMIDITY : 60 %  
 ENGINEER : Hidekazu Tanaka

FREQ [MHz]	99% Occupied Bandwidth [kHz]
13.56	3.22



### Frequency Tolerance

Company : OMRON Corporation  
Equipment : RFID system (ReaderWriter)  
Model : V680-HAM42-FRT  
S/N : 6  
Power : AC120V/60Hz (DC Power Supply 24V)  
Mode : Tx 13.56MHz

UL Japan, Inc.  
Head Office EMC Lab. No.7 Measurement Room  
Regulation : FCC15.225 (e)/RSS-210A2.6  
Test Distance : -  
Date : 07/20/2007  
Temperature : 25 deg.C.  
Humidity : 66 %  
Engineer : Takumi Shimada

Test Condition	Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (+/- 0.01%) [ppm]	Margin [ppm]
T nom 20deg.C Vmax DC27.6V (115%)	Power on	13.55978800	-0.00021200	-15.63	100.00	84.37
	on 2min.	13.55978800	-0.00021200	-15.63	100.00	84.37
	on 5min.	13.55978800	-0.00021200	-15.63	100.00	84.37
	on 10min.	13.55978800	-0.00021200	-15.63	100.00	84.37
T nom 20deg.C Vnom DC24V (100%)	Power on	13.55978900	-0.00021100	-15.56	100.00	84.44
	on 2min.	13.55978900	-0.00021100	-15.56	100.00	84.44
	on 5min.	13.55978800	-0.00021200	-15.63	100.00	84.37
	on 10min.	13.55978800	-0.00021200	-15.63	100.00	84.37
T nom 20deg.C Vmin DC20.4V (85%)	Power on	13.55978900	-0.00021100	-15.56	100.00	84.44
	on 2min.	13.55978800	-0.00021200	-15.63	100.00	84.37
	on 5min.	13.55978800	-0.00021200	-15.63	100.00	84.37
	on 10min.	13.55978800	-0.00021200	-15.63	100.00	84.37
T max 50deg.C. Vnom DC24V (100%)	Power on	13.55974100	-0.00025900	-19.10	100.00	80.90
	on 2min.	13.55974100	-0.00025900	-19.10	100.00	80.90
	on 5min.	13.55974000	-0.00026000	-19.17	100.00	80.83
	on 10min.	13.55974000	-0.00026000	-19.17	100.00	80.83
40deg.C. Vnom DC24V (100%)	Power on	13.55975000	-0.00025000	-18.44	100.00	81.56
	on 2min.	13.55975000	-0.00025000	-18.44	100.00	81.56
	on 5min.	13.55974900	-0.00025100	-18.51	100.00	81.49
	on 10min.	13.55974800	-0.00025200	-18.58	100.00	81.42
30deg.C. Vnom DC24V (100%)	Power on	13.55977600	-0.00022400	-16.52	100.00	83.48
	on 2min.	13.55977200	-0.00022800	-16.81	100.00	83.19
	on 5min.	13.55977000	-0.00023000	-16.96	100.00	83.04
	on 10min.	13.55976800	-0.00023200	-17.11	100.00	82.89
10deg.C. Vnom DC24V (100%)	Power on	13.55983000	-0.00017000	-12.54	100.00	87.46
	on 2min.	13.55982900	-0.00017100	-12.61	100.00	87.39
	on 5min.	13.55982600	-0.00017400	-12.83	100.00	87.17
	on 10min.	13.55982400	-0.00017600	-12.98	100.00	87.02
0deg.C. Vnom DC24V (100%)	Power on	13.55982400	-0.00017600	-12.98	100.00	87.02
	on 2min.	13.55982700	-0.00017300	-12.76	100.00	87.24
	on 5min.	13.55982700	-0.00017300	-12.76	100.00	87.24
	on 10min.	13.55982600	-0.00017400	-12.83	100.00	87.17
-10deg.C. Vnom DC24V (100%)	Power on	13.55980500	-0.00019500	-14.38	100.00	85.62
	on 2min.	13.55981100	-0.00018900	-13.94	100.00	86.06
	on 5min.	13.55981500	-0.00018500	-13.64	100.00	86.36
	on 10min.	13.55981500	-0.00018500	-13.64	100.00	86.36
-20deg.C Vnom DC24V (100%)	Power on	13.55977700	-0.00022300	-16.45	100.00	83.55
	on 2min.	13.55978000	-0.00022000	-16.22	100.00	83.78
	on 5min.	13.55978100	-0.00021900	-16.15	100.00	83.85
	on 10min.	13.55978700	-0.00021300	-15.71	100.00	84.29
T min, -30deg.C Vnom DC24V (100%)	Power on	13.55973900	-0.00026100	-19.25	100.00	80.75
	on 2min.	13.55973900	-0.00026100	-19.25	100.00	80.75
	on 5min.	13.55973500	-0.00026500	-19.54	100.00	80.46
	on 10min.	13.55973400	-0.00026600	-19.62	100.00	80.38

Limit : 13.56 MHz +/-0.01 % (+/- 100ppm) = +/- .001356 MHz

## APPENDIX 3: Test instruments

### EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-04	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE,ME,CE	2007/03/03 * 12
MLPA-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	ME	2006/12/19 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	RE,ME	2007/03/12 * 12
MCC-31	coaxial cable	UL Japan	-	ME	2007/06/04 * 12
MCC-50	Coaxial cable	UL Japan	-	RE,ME,CE	2007/03/06 * 12
MSA-05	Spectrum Analyzer	Advantest	R3273	RE,ME,CE	2007/06/01 * 12
MTR-06	Test Receiver	Rohde & Schwarz	ESCS30	RE,ME,CE	2006/09/12 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	RE	2007/01/19 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	RE	2007/01/19 * 12
MAT-31	Attenuator(6dB)	TME	UFA-01	RE	2007/03/05 * 12
MSTW-14	EMI measurement program	TSJ	TEPTO-DV	RE,ME,CE	-
MOS-15	Thermo-Hygrometer	Custom	CTH-180	RE,ME,CE	2006/01/19 * 24
MJM-07	Measure	PROMART	SEN1955	RE,ME,CE	-
MCC-57	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	RE	2007/03/30 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	RE	2007/03/12 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	RE	2006/08/17 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	CE (EUT)	2007/02/22 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	CE (AE)	2007/02/22 * 12
MTA-31	Terminator	TME	CT-01	CE	2007/01/17 * 12
MTA-30	Terminator	TME	CT-01	CE	2007/01/17 * 12
MSA-06	Spectrum Analyzer	Agilent	E4407B	FT	2007/04/10 * 12
MCC-64	Coaxial Cable	TOYO Technica Corporation	-	FT	2007/03/30 * 12
MAT-17	Attenuator(20dB)_DC-1GHz_N	Weinschel Corp	MODEL 1	FT	2007/01/11 * 12
MCH-01	Temperature and Humidity Chamber	Tabai Espec	PL-2KP	FT	2006/12/21 * 12
MOS-04	Digital Humidity Indicator	N.T.	NT-1800	FT	2006/11/27 * 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.

Test Item:

CE: Conducted emission

ME: Magnetic Radiated emission

RE: Radiated emission

FT: Frequency Tolerance and Bandwidth

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