APPENDIX 2: Data of EMI test

Conducted emission

DATA OF CONDUCTED EMISSION TEST

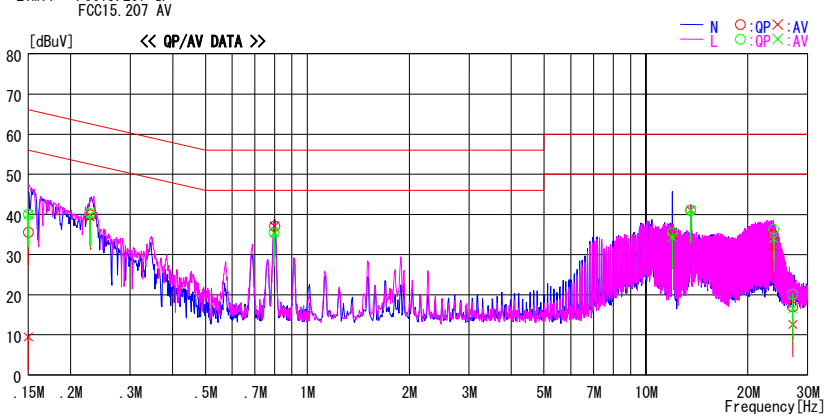
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2008/07/23

Company : NIDEC SANKYO CORPORATION
Kind of EUT : Magnetic and Contactless IC card reader writer
Model No. : ICT3Q8-5293
Serial No. : 8050006

Report No. : 28KE0126-HO-01
Power : AC 120V / 60Hz
Temp./Humi. : 22deg.C. / 54%
Engineer : Akio Hayashi

Mode / Remarks : Transmitting Mode 13.56MHz 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
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]	
0.15001	35.4	9.3	0.2	35.6	9.5	66.0	56.0	30.4	46.5	N
0.15001	39.8	39.8	0.2	40.0	40.0	66.0	56.0	26.0	16.0	L
0.22786	40.0	39.6	0.3	40.3	39.9	62.5	52.5	22.2	12.6	L
0.22832	39.6	39.1	0.3	39.9	39.4	62.5	52.5	22.6	13.1	N
0.79728	35.1	35.1	0.3	35.4	35.4	56.0	46.0	20.6	10.6	L
0.80003	36.8	36.8	0.3	37.1	37.1	56.0	46.0	18.9	8.9	N
11.96621	34.3	33.3	1.1	35.4	34.4	60.0	50.0	24.6	15.6	L
11.99037	34.3	33.7	1.1	35.4	34.8	60.0	50.0	24.6	15.2	N
13.56000	39.7	39.7	1.3	41.0	41.0	60.0	50.0	19.0	9.0	N
13.56000	39.8	39.8	1.3	41.1	41.1	60.0	50.0	18.9	8.9	L
23.74613	33.2	30.3	1.7	34.9	32.0	60.0	50.0	25.1	18.0	N
23.83373	34.7	32.2	1.7	36.4	33.9	60.0	50.0	23.6	16.1	L
27.12000	15.2	10.8	1.8	17.0	12.6	60.0	50.0	43.0	37.4	N
27.12000	18.3	14.7	1.8	20.1	16.5	60.0	50.0	39.9	33.5	L

CHART:WITH FACTOR,Peak hold data. CALCURATION:RESULT[dBuA]=READING[dBuV]+C.F[dB](Probe factor+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)

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DATA OF RADIATED EMISSION TEST

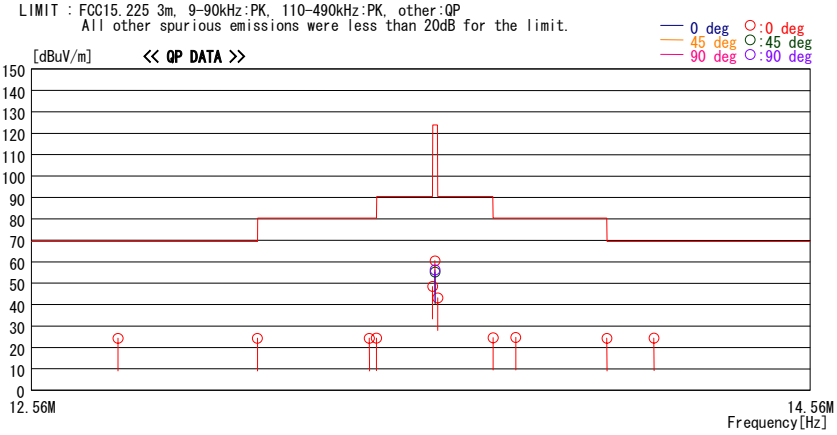
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2008/07/22

Company : NIDEC SANKYO CORPPRATION
Kind of EUT : Magnetic and Contactless IC card reader writer
Model No. : ICI308-5293
Serial No. : 8050006

Report No. : 28KE0126-HO-01
Power : AC 120V / 60Hz
Temp./ Humi. : 22 deg.C. / 54 %
Engineer : Akio Hayashi

Mode / Remarks : Transmitting Mode 13.56MHz without Tag

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]	
12.76790	35.3	QP	20.5	0.7	32.2	24.3	69.5	45.2	0deg	135	
13.11000	35.2	QP	20.5	0.7	32.2	24.2	69.5	45.3	0deg	135	
13.39200	35.3	QP	20.5	0.7	32.2	24.3	80.5	56.2	0deg	135	
13.41000	35.4	QP	20.5	0.7	32.2	24.4	80.5	56.1	0deg	135	
13.55300	59.5	QP	20.5	0.7	32.2	48.5	90.4	41.9	0deg	135	
13.56000	67.3	QP	20.5	0.7	32.2	56.3	123.9	67.6	90deg	195	
13.56000	71.4	QP	20.5	0.7	32.2	60.4	123.9	63.5	0deg	135	Worst
13.56000	66.1	QP	20.5	0.7	32.2	55.1	123.9	68.8	45deg	127	
13.56700	54.2	QP	20.5	0.7	32.2	43.2	90.4	47.2	0deg	135	
13.71000	35.5	QP	20.5	0.7	32.2	24.5	80.5	56.0	0deg	135	
13.76940	35.7	QP	20.5	0.7	32.2	24.7	80.5	55.8	0deg	135	
14.01000	35.3	QP	20.5	0.7	32.2	24.3	69.5	45.2	0deg	135	
14.13540	35.3	QP	20.6	0.7	32.2	24.4	69.5	45.1	0deg	135	

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 round off to one or two decimal places, so some differences might be observed.

Radiated emission (Spurious emission : below 30MHz)

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DATA OF RADIATED EMISSION TEST

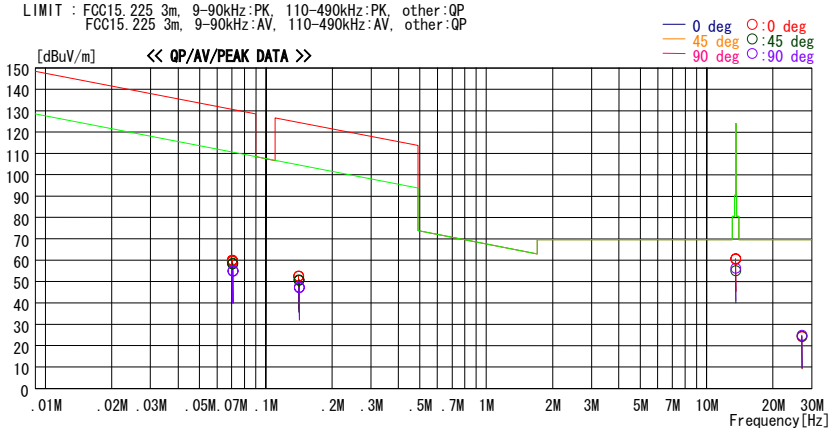
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2008/07/22

Company : NIDEC SANKYO CORPPRATION
Kind of EUT : Magnetic and Contactless IC card reader writer
Model No. : IC13Q8-5293
Serial No. : 8050006

Report No. : 28KE0126-HO-01
Power : AC 120V / 60Hz
Temp. / Humi. : 22 deg.C. / 54 %
Engineer : Akio Hayashi

Mode / Remarks : Transmitting Mode 13.56MHz without Tag

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]	
0.07047	71.9	PEAK	20.3	0.1	32.3	60.0	130.6	70.6	0deg	86	
0.07047	71.5	QP	20.3	0.1	32.3	59.6	130.6	71.0	0deg	86	
0.07047	71.7	AV	20.3	0.1	32.3	59.8	110.6	50.8	0deg	86	
0.07076	70.5	PEAK	20.3	0.1	32.3	58.6	130.6	72.0	45deg	62	
0.07076	70.2	AV	20.3	0.1	32.3	58.3	110.6	52.3	45deg	62	
0.07095	67.0	PEAK	20.3	0.1	32.3	55.1	130.6	75.5	90deg	9	
0.07095	66.7	AV	20.3	0.1	32.3	54.8	110.6	55.8	90deg	9	
0.14085	64.5	PEAK	20.3	0.1	32.3	52.6	124.6	72.0	0deg	84	
0.14085	64.3	AV	20.3	0.1	32.3	52.4	104.6	52.2	0deg	84	
0.14139	62.6	AV	20.3	0.1	32.3	50.7	104.6	53.9	45deg	71	
0.14139	62.9	PEAK	20.3	0.1	32.3	51.0	124.5	73.5	45deg	71	
0.14186	59.4	PEAK	20.3	0.1	32.3	47.5	124.5	77.0	90deg	12	
0.14186	59.1	AV	20.3	0.1	32.3	47.2	104.6	57.4	90deg	12	
13.56000	71.8	PEAK	20.5	0.7	32.2	60.8	123.9	63.1	0deg	135	
13.56000	71.4	QP	20.5	0.7	32.2	60.4	123.9	63.5	0deg	135	
13.56000	66.1	QP	20.5	0.7	32.2	55.1	123.9	68.8	45deg	127	
13.56000	67.3	QP	20.5	0.7	32.2	56.3	123.9	67.6	90deg	195	
27.12000	35.0	QP	21.0	1.0	32.2	24.8	69.5	44.7	90deg	359	
27.12000	34.7	QP	21.0	1.0	32.2	24.5	69.5	45.0	45deg	318	
27.12000	34.4	QP	21.0	1.0	32.2	24.2	69.5	45.3	0deg	214	

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 round 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
Facsimile : +81 596 24 8124

Radiated emission (Spurious emission: above 30MHz)

DATA OF RADIATED EMISSION TEST

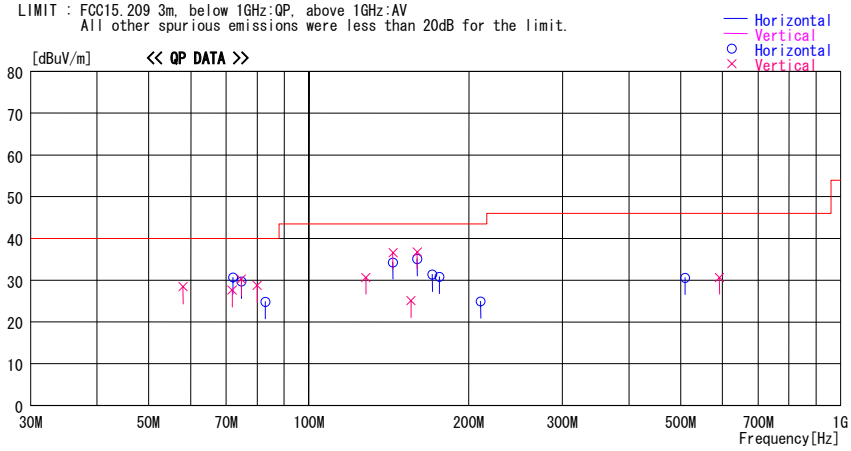
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2008/07/22

Company : NIDEC SANKYO CORPORATION
Kind of EUT : Magnetic and Contactless IC card reader writer
Model No. : ICI3Q8-5293
Serial No. : 8050006

Report No. : 28KE0126-HO-01
Power : AC 120V / 60Hz
Temp./Humi. : 22deg.C. / 54%
Operator : Akio Hayashi

Mode / Remarks : Transmitting Mode 13.56MHz without Tag

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:AV
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
58.051	44.7	QP	8.2	-24.5	28.4	92	100	Vert.	40.0	11.6	
71.810	45.3	QP	6.6	-24.3	27.6	277	100	Vert.	40.0	12.4	
72.002	48.3	QP	6.6	-24.3	30.6	8	263	Hori.	40.0	9.4	
74.674	48.0	QP	6.5	-24.2	30.3	265	100	Vert.	40.0	9.7	
74.676	47.4	QP	6.5	-24.2	29.7	1	267	Hori.	40.0	10.3	
80.006	46.5	QP	6.4	-24.2	28.7	327	100	Vert.	40.0	11.3	
82.862	42.0	QP	6.9	-24.1	24.8	302	234	Hori.	40.0	15.2	
128.014	40.9	QP	13.3	-23.6	30.6	60	100	Vert.	43.5	12.9	
144.008	45.4	QP	14.6	-23.4	36.6	102	100	Vert.	43.5	6.9	
144.014	43.1	QP	14.6	-23.4	34.3	36	262	Hori.	43.5	9.2	
155.738	33.2	QP	15.2	-23.3	25.1	136	100	Vert.	43.5	18.4	
160.015	43.0	QP	15.4	-23.3	35.1	47	218	Hori.	43.5	8.4	
160.016	44.6	QP	15.4	-23.3	36.7	188	100	Vert.	43.5	6.8	
170.682	38.6	QP	16.0	-23.2	31.4	75	182	Hori.	43.5	12.1	
176.015	37.7	QP	16.2	-23.1	30.8	56	181	Hori.	43.5	12.7	
210.393	31.5	QP	16.3	-22.9	24.9	90	144	Hori.	43.5	18.6	
510.009	33.2	QP	18.2	-20.8	30.6	359	100	Hori.	46.0	15.4	
592.057	31.7	QP	19.2	-20.3	30.6	86	100	Vert.	46.0	15.4	

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)

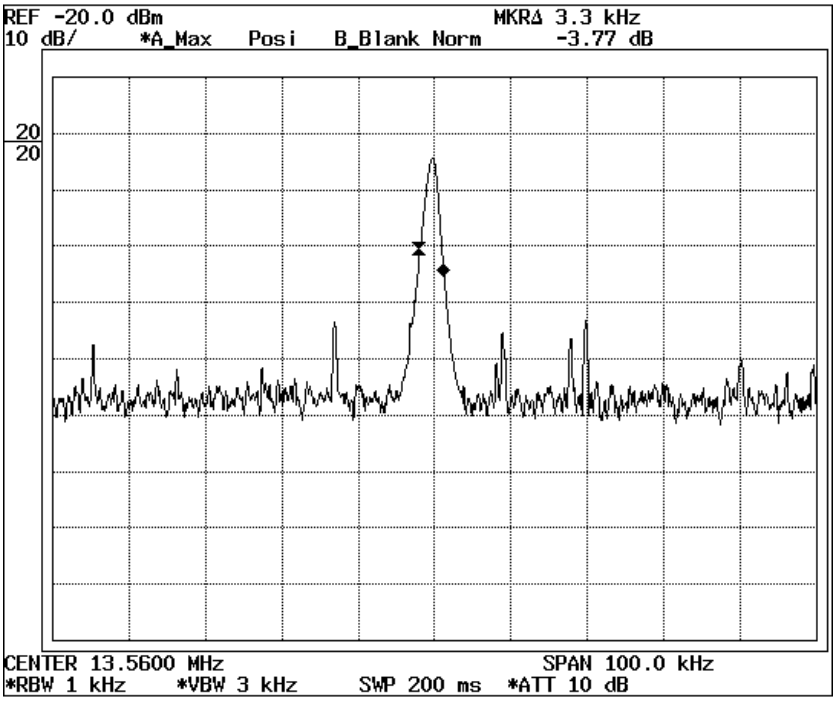
*The test result is rounded off to one or two decimal places, so some differences might be observed.

20dB Bandwidth

UL Japan, Inc.
Head Office EMC Lab. No.3 Semi Anechoic Chamber

COMPANY	: NIDEC SANKYO CORPORATION	REGULATION	: FCC 15.225
EQUIPMENT	: Magnetic and Contactless IC card reader writer	TEST DISTANCE	: 3m
MODEL	: ICI3Q8-5293	DATE	: 07/22/2008
S/ N	: 8050006	TEMPERATURE	: 22 deg.C.
POWER	: AC120V/60Hz	HUMIDITY	: 54 %
MODE	: Transmitting Mode 13.56MHz without Tag	ENGINEER	: Akio Hayashi

FREQ [MHz]	20dB Bandwidth [kHz]
13.56	3.30

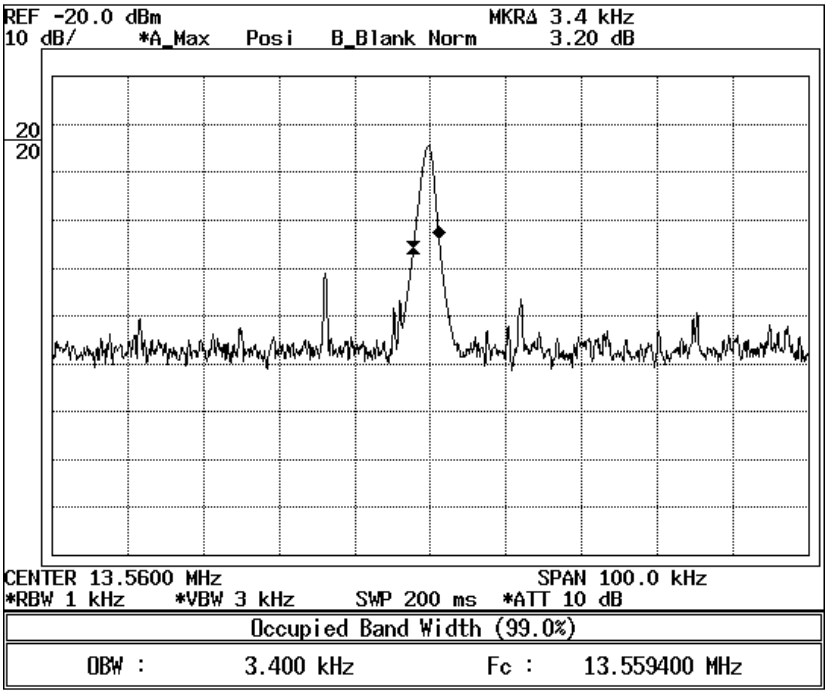


99% Occupied Bandwidth

UL Japan, Inc.
Head Office EMC Lab. No.3 Semi Anechoic Chamber

COMPANY	: NIDEC SANKYO CORPORATION	REGULATION	: RSS-Gen 4.6.1
EQUIPMENT	: Magnetic and Contactless IC card reader writer	TEST DISTANCE	: 3m
MODEL	: ICI3Q8-5293	DATE	: 07/22/2008
S/ N	: 8050006	TEMPERATURE	: 22 deg.C.
POWER	: AC120V/60Hz	HUMIDITY	: 54 %
MODE	: Transmitting Mode 13.56MHz without Tag	ENGINEER	: Akio Hayashi

FREQ [MHz]	99% Occupied Bandwidth [kHz]
13.56	3.40



UL Japan, Inc.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116
Facsimile : +81 596 24 8124

Frequency Tolerance

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

Company	NIDEC SANKYO CORPORATION	Regulation	FCC15.225 (e) / RSS-210 A2.6
Equipment	Magnetic and Contactless IC Card Reader Writer	Test Distance	-
Model	ICI3Q8-5293	Date	07/23/2008
S/N	8050006	Temperature	26deg.C.
Power	AC120V / 60Hz	Humidity	56 %
Mode	Transmitting Mode 13.56MHz (No Modulation)	Engineer	Satofumi Matsuyama

Test Condition	Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (+/- 0.01%) [+/- ppm]	Margin [ppm]
T nom 20deg.C Vmax AC138V (115%)	Power on	13.55944933	-0.00055067	-40.61	100.00	59.39
	on 2min.	13.55942450	-0.00057550	-42.44	100.00	57.56
	on 5min.	13.55940140	-0.00059860	-44.14	100.00	55.86
	on 10min.	13.55938852	-0.00061148	-45.09	100.00	54.91
T nom 20deg.C Vnom AC120V (100%)	Power on	13.55945649	-0.00054351	-40.08	100.00	59.92
	on 2min.	13.55941896	-0.00058104	-42.85	100.00	57.15
	on 5min.	13.55940037	-0.00059963	-44.22	100.00	55.78
	on 10min.	13.55938751	-0.00061249	-45.17	100.00	54.83
T nom 20deg.C Vmin AC102V (85%)	Power on	13.55941615	-0.00058385	-43.06	100.00	56.94
	on 2min.	13.55940310	-0.00059690	-44.02	100.00	55.98
	on 5min.	13.55939078	-0.00060922	-44.93	100.00	55.07
	on 10min.	13.55938485	-0.00061515	-45.37	100.00	54.63
T max 50deg.C. Vnom AC120V (100%)	Power on	13.55941047	-0.00058953	-43.48	100.00	56.52
	on 2min.	13.55937478	-0.00062522	-46.11	100.00	53.89
	on 5min.	13.55935048	-0.00064952	-47.90	100.00	52.10
	on 10min.	13.55934244	-0.00065756	-48.49	100.00	51.51
40deg.C. Vnom AC120V (100%)	Power on	13.55945043	-0.00054957	-40.53	100.00	59.47
	on 2min.	13.55939933	-0.00060067	-44.30	100.00	55.70
	on 5min.	13.55937268	-0.00062732	-46.26	100.00	53.74
	on 10min.	13.55935597	-0.00064403	-47.49	100.00	52.51
30deg.C. Vnom AC120V (100%)	Power on	13.55947944	-0.00052056	-38.39	100.00	61.61
	on 2min.	13.55943885	-0.00056115	-41.38	100.00	58.62
	on 5min.	13.55941516	-0.00058484	-43.13	100.00	56.87
	on 10min.	13.55937802	-0.00062198	-45.87	100.00	54.13
20deg.C. Vnom AC120V (100%)	Power on	13.55945649	-0.00054351	-40.08	100.00	59.92
	on 2min.	13.55941896	-0.00058104	-42.85	100.00	57.15
	on 5min.	13.55940037	-0.00059963	-44.22	100.00	55.78
	on 10min.	13.55938751	-0.00061249	-45.17	100.00	54.83
10deg.C. Vnom AC120V (100%)	Power on	13.55951747	-0.00048253	-35.58	100.00	64.42
	on 2min.	13.55946660	-0.00053340	-39.34	100.00	60.66
	on 5min.	13.55943697	-0.00056303	-41.52	100.00	58.48
	on 10min.	13.55941830	-0.00058170	-42.90	100.00	57.10
0deg.C. Vnom AC120V (100%)	Power on	13.55956442	-0.00043558	-32.12	100.00	67.88
	on 2min.	13.55951945	-0.00048055	-35.44	100.00	64.56
	on 5min.	13.55949044	-0.00050956	-37.58	100.00	62.42
	on 10min.	13.55946694	-0.00053306	-39.31	100.00	60.69
-10deg.C. Vnom AC120V (100%)	Power on	13.55958353	-0.00041647	-30.71	100.00	69.29
	on 2min.	13.55954344	-0.00045656	-33.67	100.00	66.33
	on 5min.	13.55951766	-0.00048234	-35.57	100.00	64.43
	on 10min.	13.55949974	-0.00050026	-36.89	100.00	63.11
-20deg.C Vnom AC120V (100%)	Power on	13.55959576	-0.00040424	-29.81	100.00	70.19
	on 2min.	13.55956860	-0.00043140	-31.81	100.00	68.19
	on 5min.	13.55954906	-0.00045094	-33.26	100.00	66.74
	on 10min.	13.55953430	-0.00046570	-34.34	100.00	65.66
* T min -30deg.C Vnom AC120V (100%)	Power on	13.55959886	-0.00040114	-29.58	100.00	70.42
	on 2min.	13.55959252	-0.00040748	-30.05	100.00	69.95
	on 5min.	13.55958063	-0.00041937	-30.93	100.00	69.07
	on 10min.	13.55956686	-0.00043314	-31.94	100.00	68.06

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

UL Japan, Inc.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116
Facsimile : +81 596 24 8124

APPENDIX 3: Test instruments

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-03	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	CE/RE	2008/03/25 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	CE/RE	2008/01/10 * 12
MJM-06	Measure	PROMART	SEN1955	CE/RE	-
MSTW-14	EMI measurement program	TSJ	TEPTO-DV	CE/RE	-
MSA-09	Spectrum Analyzer	Advantest	R3273	CE/RE	2007/12/21 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	CE/RE	2008/06/12 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	CE(EUT)	2008/02/19 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	CE(AE)	2008/02/20 * 12
MTA-07	Terminator	MCL	BTRM-50	CE	2008/02/04 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/ TSJ	-	RE/CE	2008/07/03 * 12
MCC-51	Coaxial cable	UL Japan	-	RE	2008/07/18 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2008/01/12 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2008/01/12 * 12
MAT-30	Attenuator(6dB)	TME	UFA-01	RE	2008/03/10 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	RE	2008/03/06 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	RE	2007/11/06 * 12
MCC-31	Coaxial cable	UL Japan	-	RE	2008/06/20 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-180	FT	2008/01/10 * 12
MUC-01	Universal Counter	Agilent	53132A	FT	2008/06/09 * 12
MCH-04	Temperature and Humidity Chamber	Espec	PL-2KP	FT	2007/08/30 * 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

APPENDIX 4: Transmission Data Specification

RF transmission data

Table 1 – RF transmission data (ICI3Q8-5293 → PICC)

Command	Bit coding	Bit rate	Frame	Data bytes (Hex)								
WUPA	Modified	106kbit/s	Short	52								
ANTICOLLISION	Miller with		Standard	93	20							
SELECT	ASK 100%			93	70	uid0*	uid1*	uid2*	uid3*	bcc*	crc0*	crc1*

* These data bytes are unique by the Proximity IC card.

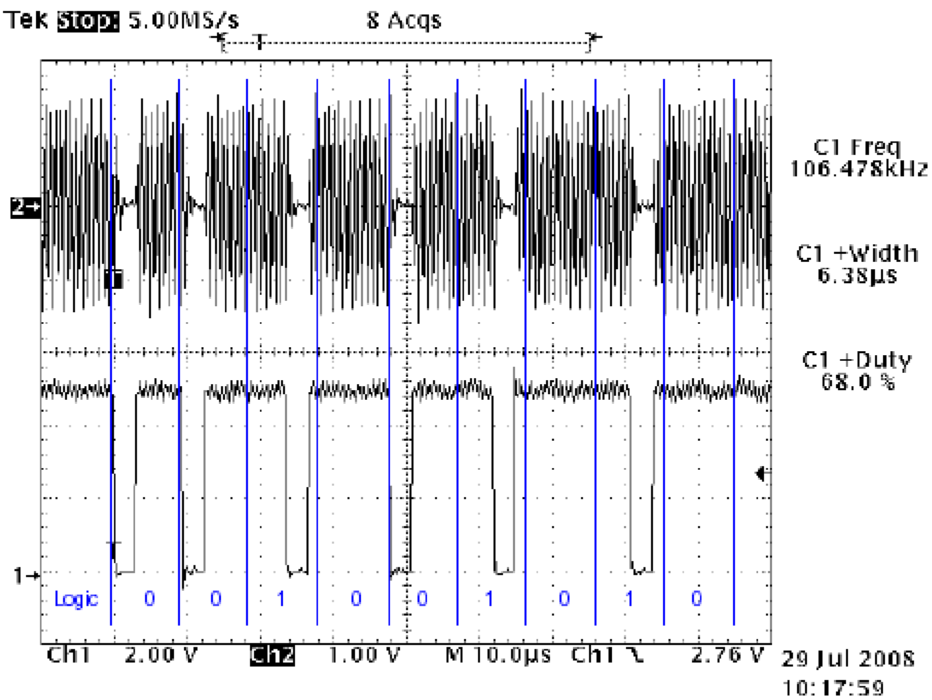
Table 2 – RF frame bits (ICI3Q8-5293 → PICC)

Command	Frame bits																				
WUPA	S	52h							E												
	0	0	1	0	0	1	0	1	0												
ANTICOLLISION	S	93h								P	20h								P	E	
	0	1	1	0	0	1	0	0	1	1	0	0	0	0	0	1	0	0	0	0	
SELECT	S	93h								P	70h								P	uid0~3, bcc, crc0~1	E
	0	1	1	0	0	1	0	0	1	1	0	0	0	0	1	1	1	0	0	...	0

S: Start of Frame, E: End of Frame, P: Parity

Bit coding example

Figure 2 – Bit coding example : WUPA (52h)



UL Japan, Inc.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116
Facsimile : +81 596 24 8124