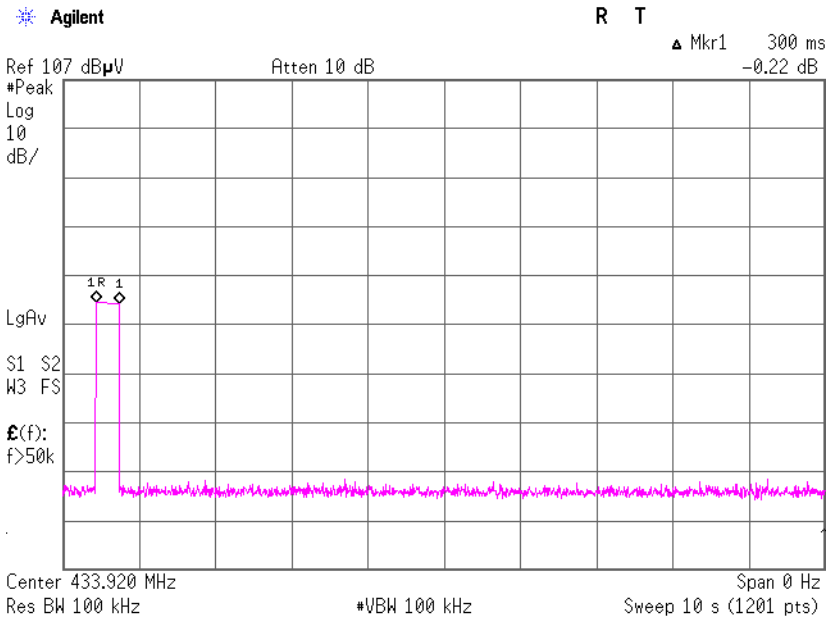
APPENDIX 2: Data of EMI test

Automatically deactivate

UL Japan, Inc.
Head Office EMC Lab. No.1 Semi Anechoic Chamber

COMPANY	: Alps Electric Co., Ltd.	REPORT NO	: 28IE0063-HO-01
EQUIPMENT	: Passive Entry System (Hand Unit)	REGULATION	: FCC15.231(a)(1)
MODEL	: TWB1U773	TEST DISTANCE	: -
S/N	: 002	DATE	: 11/16/2008
POWER	: DC 3.0V	TEMPERATURE	: 20 deg.C.
Mode	: Normal use mode	HUMIDITY	: 55%
Axis	: -	ENGINEER	: Tomohisa Nakagawa

Time of Transmitting [sec]	Limit [sec]	Result
0.30	5.00	Pass



Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission)

UL Japan, Inc.
Head Office EMC Lab. No.1 Semi Anechoic Chamber

COMPANY	: Alps Electric Co., Ltd.	REPORT NO	: 28IE0063-HO-01
EQUIPMENT	: Passive Entry System (Hand Unit)	REGULATION	: Fcc Part15 Subpart C 15.231(b) / 15.205 / 15.209
MODEL	: TWB1U773	TEST DISTANCE	: 3m
S/N	: 001	DATE	: 11/16/2008
POWER	: DC 3.0V	TEMPERATURE	: 20 deg.C.
Mode	: Transmitting mode	HUMIDITY	: 55%
Axis	: Hor.: X-axis , Ver.: Z-axis	ENGINEER	: Tomohisa Nakagawa

Peak with Duty factor

No.	FREQ	T/R READING		ANT	AMP	LOSS	Duty	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN		Factor	HOR	VER		HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	[dB]
1	433.92	73.6	73.4	17.2	24.8	11.4	-5.8	71.6	71.4	80.8	9.2	9.4
2	867.84	38.8	38.0	21.2	28.5	13.9	-5.8	39.6	38.8	60.8	21.2	22.0

PK DETECT (RBW: 1MHz , VBW: 1MHz) (Inside Restricted bands)

No.	FREQ	S/A READING		ANT	AMP	LOSS	Duty	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN		Factor	HOR	VER		HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	[dB]
3	1301.94	48.5	47.8	24.9	36.4	1.7	-	38.7	38.0	73.9	35.2	35.9
9	3905.68	45.0	44.6	29.3	35.5	2.9	-	41.7	41.3	73.9	32.2	32.6
10	4339.65	44.4	45.7	30.2	35.5	3.1	-	42.2	43.5	73.9	31.7	30.4

Peak with Duty factor Result = Reading (RBW: 1MHz , VBW: 1MHz) + Duty Factor (Inside Restricted bands)

No.	FREQ	S/A READING		ANT	AMP	LOSS	Duty	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN		Factor	HOR	VER		HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	[dB]
3	1301.94	48.5	47.8	24.9	36.4	1.7	-5.8	27.1	26.4	53.9	26.8	27.5
9	3905.68	45.0	44.6	29.3	35.5	2.9	-5.8	30.1	29.7	53.9	23.8	24.2
10	4339.65	44.4	45.7	30.2	35.5	3.1	-5.8	30.6	31.9	53.9	23.3	22.0

PK DETECT Result = Reading (RBW: 1MHz , VBW: 1MHz) (Outside Restricted bands)

No.	FREQ	S/A READING		ANT	AMP	LOSS	Duty	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN		Factor	HOR	VER		HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	[dB]
4	1735.90	49.5	51.9	25.5	36.1	2.0	-	40.9	43.3	80.8	39.9	37.5
5	2169.89	49.2	46.8	26.3	35.9	2.2	-	41.8	39.4	80.8	39.0	41.4
6	2603.80	47.1	47.5	27.3	36.1	2.4	-	40.7	41.1	80.8	40.1	39.7
7	3037.79	46.2	46.2	28.1	36.2	2.6	-	40.7	40.7	80.8	40.1	40.1
8	3471.80	46.8	45.8	28.7	35.8	2.8	-	42.5	41.5	80.8	38.3	39.3

Peak with Duty factor Result = Reading (RBW: 1MHz , VBW: 1MHz) + Duty Factor (Outside Restricted bands)

No.	FREQ	S/A READING		ANT	AMP	LOSS	Duty	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN		Factor	HOR	VER		HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	[dB]
4	1735.90	49.5	51.9	25.5	36.1	2.0	-5.8	35.1	37.5	60.8	25.7	23.3
5	2169.89	49.2	46.8	26.3	35.9	2.2	-5.8	36.0	33.6	60.8	24.8	27.2
6	2603.80	47.1	47.5	27.3	36.1	2.4	-5.8	34.9	35.3	60.8	25.9	25.5
7	3037.79	46.2	46.2	28.1	36.2	2.6	-5.8	34.9	34.9	60.8	25.9	25.9
8	3471.80	46.8	45.8	28.7	35.8	2.8	-5.8	36.7	35.7	60.8	24.1	25.1

REMARKS ANTENNA TYPE:30-300MHz Biconical / 300-1000MHz Logperiodic / 1-4.5GHz Horn

CALCULATION RESULT=Reading + ANT Factor - Amp Gain + LOSS (Cable+ ATTEN.)+Duty factor

Duty cycle Factor Measurement : -5.8 dB

* The test below and above 1GHz was performed with PK DETECT. Average emission measurements were calculated with PK DETECT and Duty factor.
* Duty Factor was calculated with the assumption of the worst condition in 100msec.
* All the measured noise was pulse emission.
* The result is rounded off to the second decimal place, so some differences might be observed.
*The limit was converted from V to dBuV, and it is rounded off to the second decimal place.
*Except for the above table : All other spurious emissions were less than 20dB for the limit.
The carrier level (or, noise levels) was (or were) measured at each position of all three axes X, Y and Z,
and the position that has the maximum noise was determined. With the position, the noise levels of all the frequencies was measured.
The axes were decided by measuring at each position of all these axes X, Y and Z of the EUT with and without mechanical key.

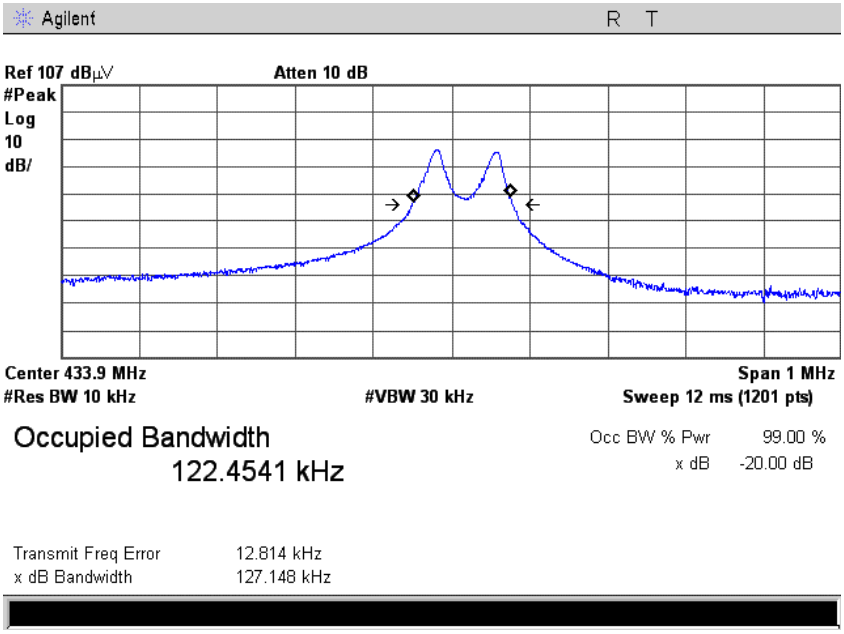
-20dB Bandwidth

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

COMPANY	: Alps Electric Co., Ltd.	REPORT NO	: 28IE0063-HO-01
EQUIPMENT	: Passive Entry System (Hand Unit)	REGULATION	: FCC15.231(c)
MODEL	: TWB1U773	TEST DISTANCE	: -
S/N	: 001	DATE	: 11/21/2008
POWER	: DC 3.0V	TEMPERATURE	: 25 deg.C.
Mode	: Transmitting mode	HUMIDITY	: 36%
Axis	: -	ENGINEER	: Tomohisa Nakagawa

Bandwidth Limit : Fundamental Frequency 433.92 MHz X 0.25% = 1084.80 kHz

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
127.15	1084.80	Pass



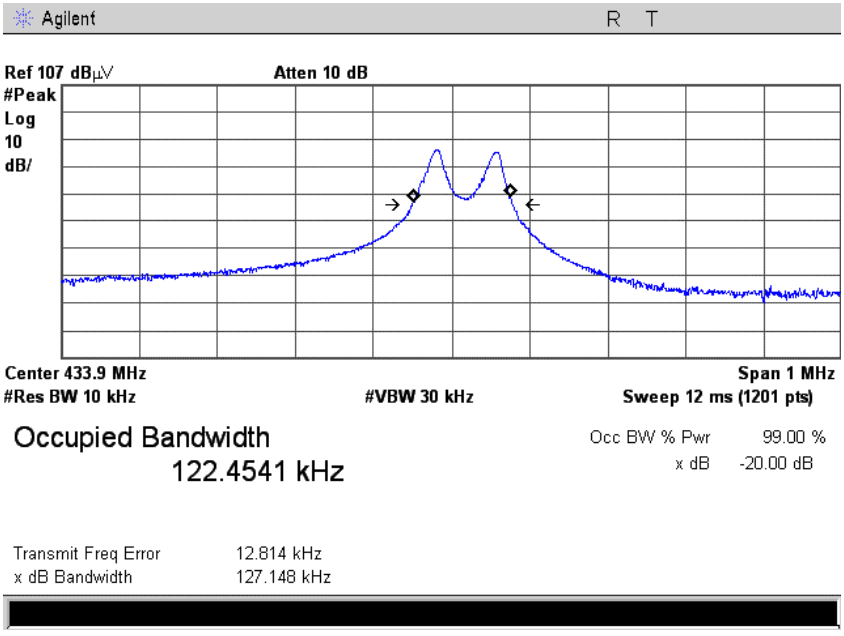
99% Occupied Bandwidth

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

COMPANY	: Alps Electric Co., Ltd.	REPORT NO	: 28IE0063-HO-01
EQUIPMENT	: Passive Entry System (Hand Unit)	REGULATION	: RSS-210 A1.1.3
MODEL	: TWB1U773	TEST DISTANCE	: -
S/N	: 001	DATE	: 11/21/2008
POWER	: DC 3.0V	TEMPERATURE	: 25 deg.C.
Mode	: Transmitting mode	HUMIDITY	: 36%
Axis	: -	ENGINEER	: Tomohisa Nakagawa

Bandwidth Limit : Fundamental Frequency 433.92 MHz X 0.25% = 1084.8 kHz

99% Occupied Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
122.45	1084.80	Pass



Duty Cycle

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

COMPANY	: Alps Electric Co., Ltd.	REPORT NO	: 28IE0063-HO-01
EQUIPMENT	: Passive Entry System (Hand Unit)	REGULATION	: FCC 15.231(b) / 15.35(c)
MODEL	: TWB1U773	TEST DISTANCE	: -
S/N	: 002	DATE	: 11/21/2008
POWER	: DC 3.0V	TEMPERATURE	: 25 deg.C.
Mode	: Normal use mode	HUMIDITY	: 36%
Axis	: -	ENGINEER	: Tomohisa Nakagawa

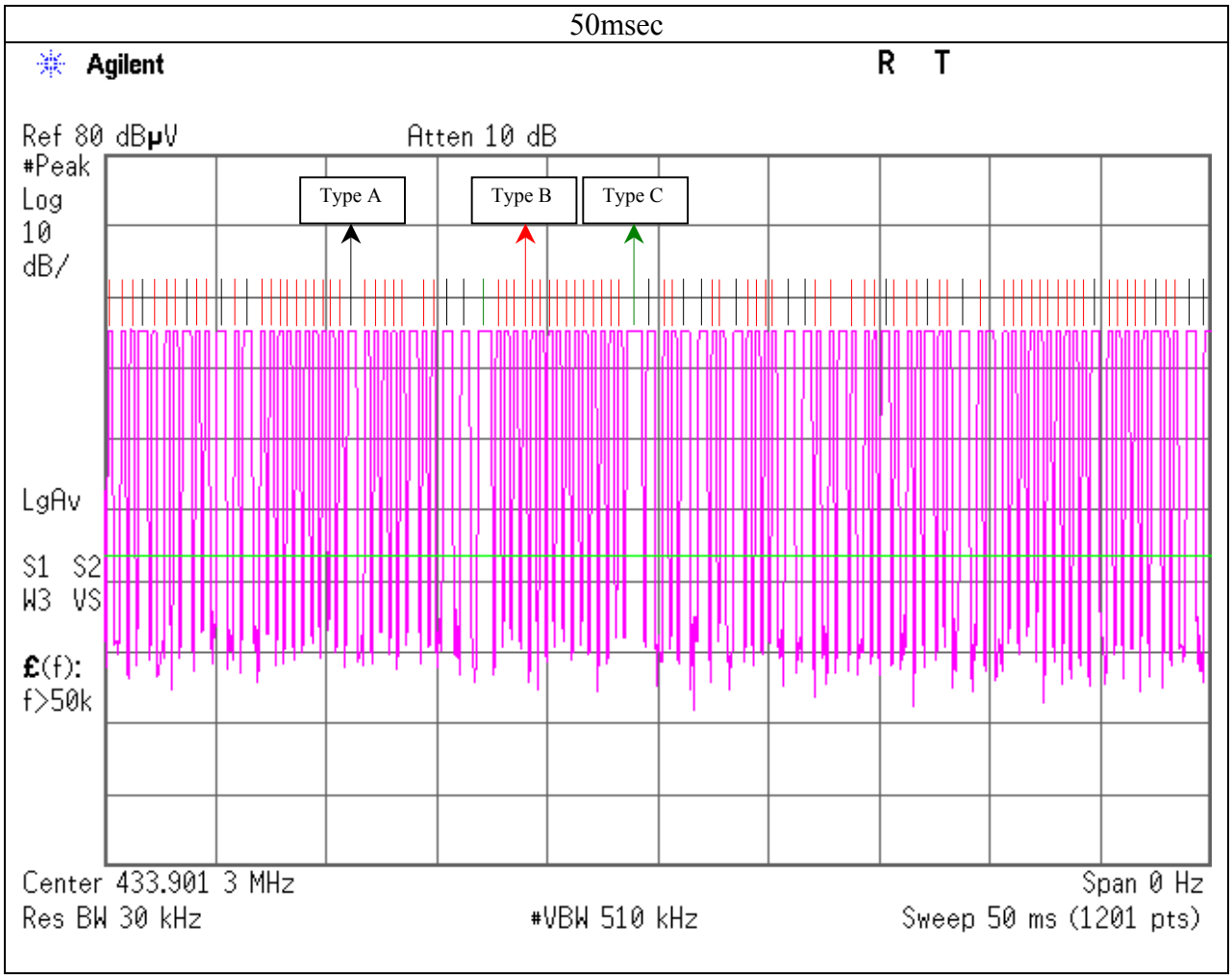
Type	Times in 50 msec	Times in 100 msec	ON time(One pulse) [ms]	ON time(in 100ms) [ms]
A	20	40	0.408	16.33
B	77	154	0.208	32.08
C	2	4	0.700	2.80

*1)ON time(in 100ms) = Times * ON time(One pulse)
*2)The train of pulses was exceeding 100msec, and that sampled 100msec was the worst case against the pulse train.

ON time [ms]	Cycle [ms]	Duty Rate (On time/Cycle)	Duty Factor [dB]
51.21	100.00	0.51	-5.8

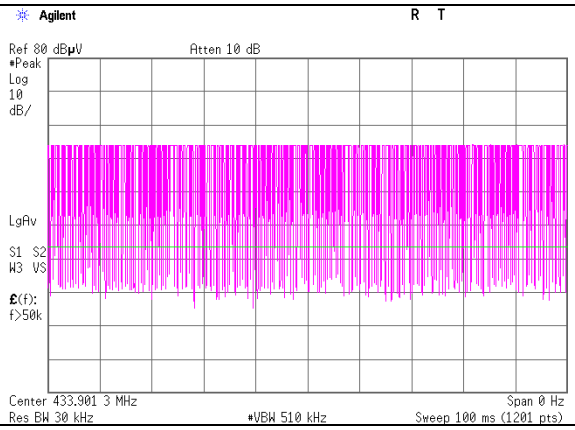
*3)Duty = $20\log_{10}$(ON time/Cycle)

Duty Cycle

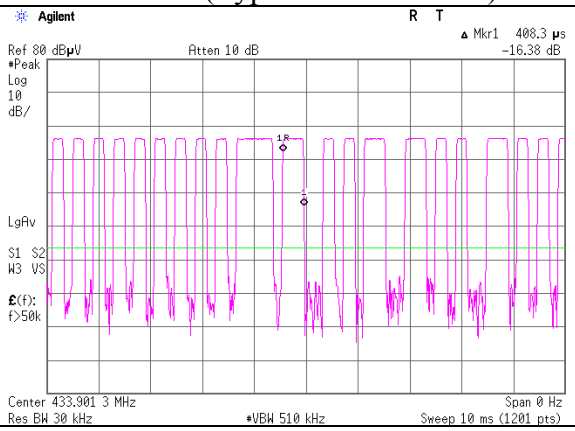

50msec
Agilent
R T
Ref 80 dBµV
Atten 10 dB
#Peak
Log
10
dB/
Type A
Type B
Type C
LgAv
S1 S2
W3 VS
£(f):
f>50k
Center 433.901 3 MHz
Span 0 Hz
Res BW 30 kHz
#VBW 510 kHz
Sweep 50 ms (1201 pts)

Duty Cycle

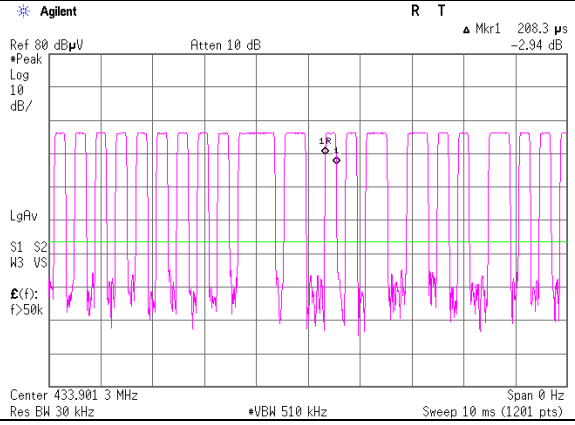
100msec



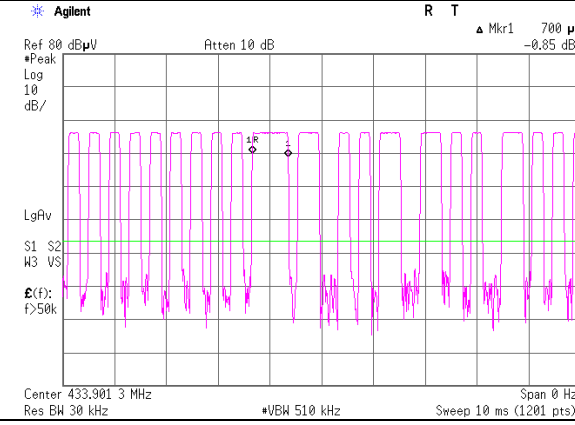
10msec(Type A : 0.408 mSec)



10msec(Type B : 0.208 mSec)



10msec(Type C : 0.700 mSec)



Receiver Spurious Emission

DATA OF RADIATED EMISSION TEST

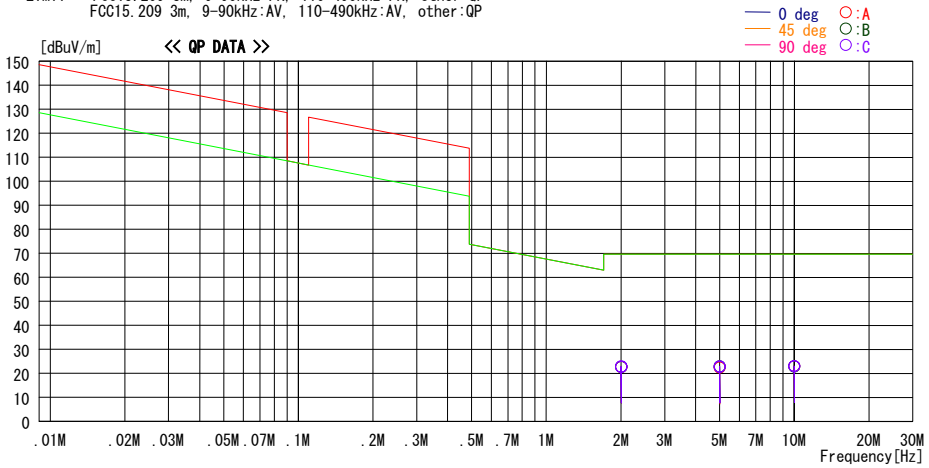
UL Japan, Inc. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2008/11/17

Company : Alps Electric Co., Ltd.
Kind of EUT : Passive Entry System(Hand Unit)
Model No. : TWB1U773
Serial No. : 001

Report No. : 28IE0063-HO-01
Power : DC 3.0V
Temp./Humi. : 20deg.C. / 55%
Engineer : Tomohisa Nakagawa

Mode / Remarks : LF Receiving Mode

LIMIT : FCC15.209 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.209 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
2.00000	41.1	QP	19.5	0.4	38.3	22.7	69.5	46.8	0	A	0	
2.00000	41.2	QP	19.5	0.4	38.3	22.8	69.5	46.7	45	B	0	
2.00000	41.3	QP	19.5	0.4	38.3	22.9	69.5	46.6	90	C	0	
2.00000	41.2	QP	19.5	0.4	38.3	22.8	69.5	46.7	135	C	0	
5.00000	40.2	QP	19.8	0.7	38.2	22.5	69.5	47.0	0	A	0	
5.00000	40.6	QP	19.8	0.7	38.2	22.9	69.5	46.6	45	B	0	
5.00000	40.6	QP	19.8	0.7	38.2	22.9	69.5	46.6	90	C	0	
5.00000	40.4	QP	19.8	0.7	38.2	22.7	69.5	46.8	135	C	0	
10.00000	40.3	QP	19.8	1.1	38.2	23.0	69.5	46.5	0	A	0	
10.00000	40.2	QP	19.8	1.1	38.2	22.9	69.5	46.6	45	B	0	
10.00000	40.3	QP	19.8	1.1	38.2	23.0	69.5	46.5	90	C	0	
10.00000	40.3	QP	19.8	1.1	38.2	23.0	69.5	46.5	135	C	0	

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.

Receiver Spurious Emission

DATA OF RADIATED EMISSION TEST

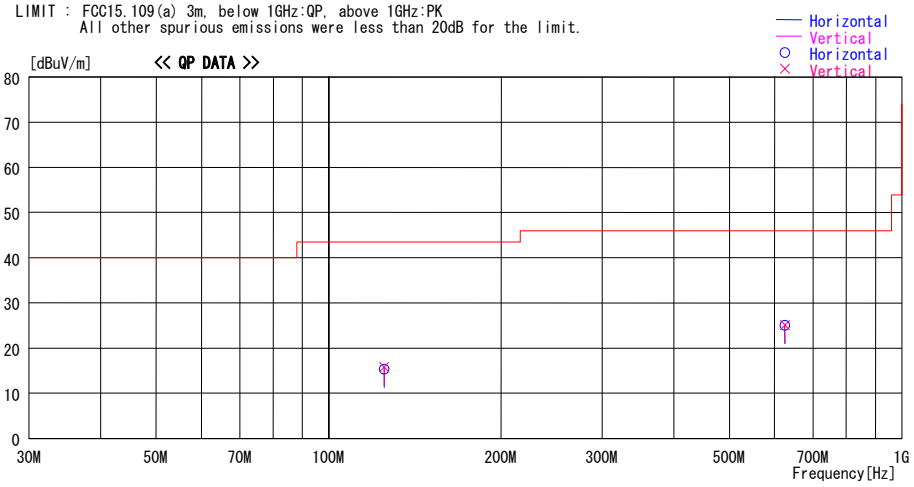
UL Japan, Inc. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2008/11/17

Company : Alps Electric Co., Ltd.
Kind of EUT : Passive Entry System(Hand Unit)
Model No. : TWB1U773
Serial No. : 001

Report No. : 28IE0063-HO-01
Power : DC 3.0V
Temp./Humi. : 20deg.C. / 55%
Engineer : Tomohisa Nakagawa

Mode / Remarks : LF Receiving Mode

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
All other spurious emissions were less than 20dB for the limit.



Frequency	Reading	DET	Antenna Factor	Loss& Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]
125.000	22.3	QP	13.2	-19.7	15.8	0	100	Vert.	43.5	27.7
125.000	21.9	QP	13.2	-19.7	15.4	0	100	Hori.	43.5	28.1
625.000	21.8	QP	19.7	-16.4	25.1	100	100	Vert.	46.0	20.9
625.000	21.8	QP	19.7	-16.4	25.1	186	100	Hori.	46.0	20.9

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.

UL Japan, Inc.
Head Office EMC Lab.
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APPENDIX 3: Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-01	Anechoic Chamber	TDK	Semi Anechoic Chamber 10m	DA-06881	RE	2008/10/29 * 12
MBA-01	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032007	RE	2008/11/12 * 12
MLA-09	Logperiodic Antenna	Schwarzbeck	USLP9143B	9143B006	RE	2008/11/12 * 12
MAT-06	Attenuator(6dB)	Weinschel Corp	2	BL1069	RE	2008/11/14 * 12
MCC-01	Coaxial Cable 0.1-3000MHz	Suhner/storm /Agilent/TSJ	-	-	RE	2008/10/02 * 12
MPA-04	Pre Amplifier	Agilent	8447D	2944A09965	RE	2008/07/23 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE	2008/06/12 * 12
MSTW-14	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MOS-01	Digital Humidity Indicator	N.T	NT-1800	MOS01	RE	2007/11/12 * 12
MJM-01	Measure	KDS	ES19-55	-	RE	-
MHA-05	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	253	RE	2008/01/19 * 12
MPA-01	Pre Amplifier	Agilent	8449B	3008A01671	RE	2008/02/12 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2008/08/18 * 12
MCC-18	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX 104	233010(1m) / 292410(5m)	RE	2008/09/09 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2008/10/31 * 12
MCC-30	Coaxial cable	UL Japan	-	-	RE	2008/06/20 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner /Agilent/TSJ	-	-	RE	2007/12/27 * 12
MPA-19	Pre Amplifier	MITEQ	MLA-10K01-B01 -35	1237616	RE	2008/02/13 * 12
MSA-06	Spectrum Analyzer	Agilent	E4407B	MY45107638	RE	2008/04/21 * 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:

RE: Radiated emission, 99% Occupied Bandwidth, -20dB bandwidth , Automatically deactivate and Duty cycle tests