

APPENDIX 2: Data of EMI test

Radiated Emission below 30MHz (Fundamental and Spurious Emission) (Minimum Power)

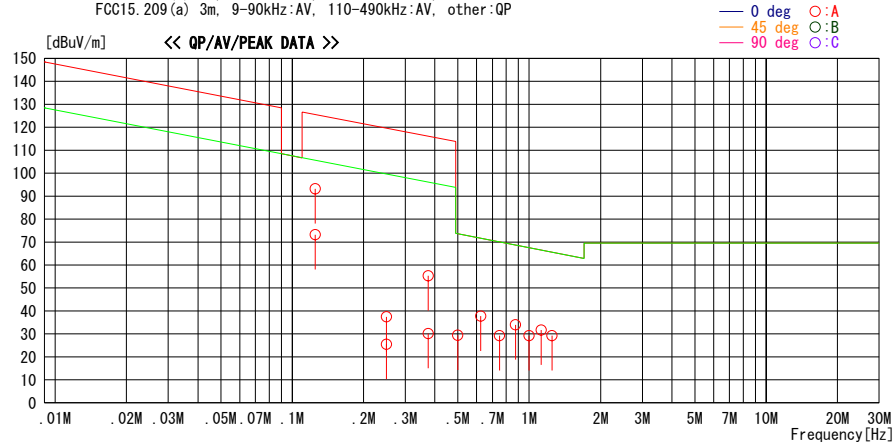
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2009/03/17

Company : Alps Electric Co., Ltd. Report No. : 29FE0158-HO-01
Kind of EUT : Passive Entry System (Control Unit) Power : DC 12V
Model No. : TWD1U778 Temp./ Humi. : 24deg. C. / 43%
Serial No. : 001 Engineer : Tomotaka Sasagawa

Mode / Remarks : Tx 125kHz, ANT:ROOM4, Worst-axis: Z-axis

LIMIT : FCC15. 209 (a) 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15. 209 (a) 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]	
0.12500	73.3	PEAK	19.7	0.2	0.0	93.2	125.6	32.4	0	36	
0.12500	53.3	AV	19.7	0.2	0.0	73.2	105.7	32.5	0	36	
0.25000	17.6	PEAK	19.6	0.2	0.0	37.4	119.6	82.2	0	221	
0.25000	5.6	AV	19.6	0.2	0.0	25.4	99.6	74.2	0	221	
0.37500	35.6	PEAK	19.5	0.2	0.0	55.3	116.1	60.8	0	352	
0.37500	10.4	AV	19.5	0.2	0.0	30.1	96.1	66.0	0	352	
0.50000	9.8	QP	19.4	0.2	0.0	29.4	73.6	44.2	0	351	
0.62500	18.0	QP	19.4	0.3	0.0	37.7	71.7	34.0	0	352	
0.75000	9.6	QP	19.4	0.3	0.0	29.3	70.1	40.8	0	64	
0.87500	14.3	QP	19.4	0.3	0.0	34.0	68.7	34.7	0	285	
1.00000	9.7	QP	19.3	0.3	0.0	29.3	67.6	38.3	0	248	
1.12500	12.1	QP	19.3	0.3	0.0	31.7	66.5	34.8	0	356	
1.25000	9.5	QP	19.4	0.3	0.0	29.2	65.6	36.4	0	149	

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 below 30MHz (Fundamental and Spurious Emission) (Maximum Power)

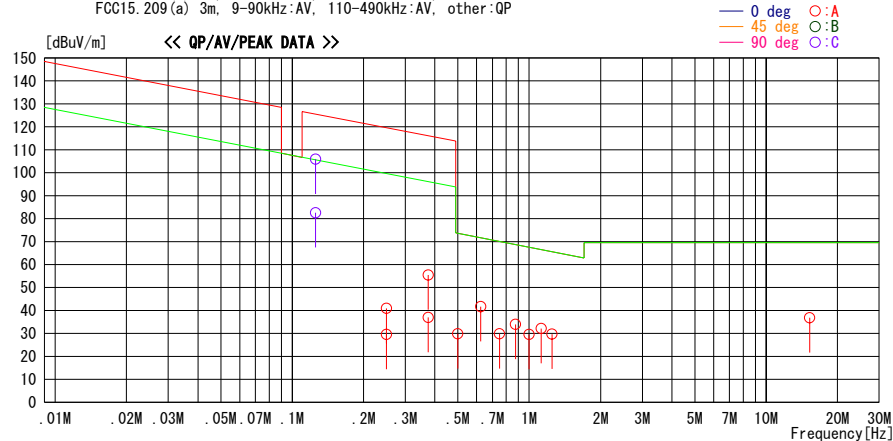
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2009/03/17

Company : Alps Electric Co., Ltd. Report No. : 29FE0158-HO-01
Kind of EUT : Passive Entry System (Control Unit) Power : DC 12V
Model No. : TWD1U778 Temp./ Humi. : 24deg. C. / 43%
Serial No. : 001 Engineer : Tomotaka Sasagawa

Mode / Remarks : Tx 125kHz, ANT:DR, Worst-axis: Z-axis

LIMIT : FCC15.209(a) 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.209(a) 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]	
0.12537	86.0	PEAK	19.7	0.2	0.0	105.9	125.6	19.7	0	283	
0.12537	62.7	AV	19.7	0.2	0.0	82.6	105.6	23.0	0	283	
0.25000	21.2	PEAK	19.6	0.2	0.0	41.0	119.6	78.6	0	357	
0.25000	9.8	AV	19.6	0.2	0.0	29.6	99.6	70.0	0	357	
0.37500	35.7	PEAK	19.5	0.2	0.0	55.4	116.1	60.7	0	220	
0.37500	17.3	AV	19.5	0.2	0.0	37.0	96.1	59.1	0	220	
0.50000	10.2	QP	19.4	0.2	0.0	29.8	73.6	43.8	0	1	
0.62500	22.0	QP	19.4	0.3	0.0	41.7	71.7	30.0	0	1	
0.75000	10.1	QP	19.4	0.3	0.0	29.8	70.1	40.3	0	299	
0.87500	14.2	QP	19.4	0.3	0.0	33.9	68.7	34.8	0	343	
1.00000	9.9	QP	19.3	0.3	0.0	29.5	67.6	38.1	0	228	
1.12500	12.5	QP	19.3	0.3	0.0	32.1	66.5	34.4	0	346	
1.25000	10.0	QP	19.4	0.3	0.0	29.7	65.6	35.9	0	151	
15.25514	16.2	QP	19.6	1.1	0.0	36.9	69.5	32.6	0	151	

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 above 30MHz (Spurious Emission) **(Minimum Power)**

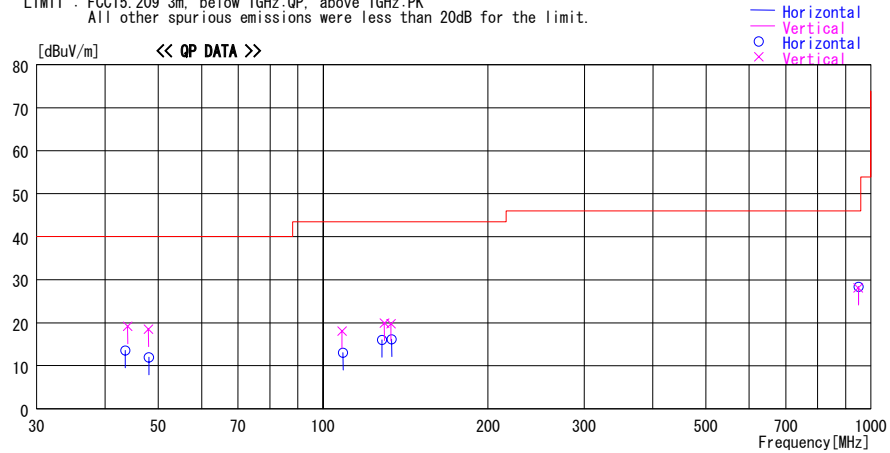
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UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2009/03/17

Company : Alps Electric Co., Ltd. Report No. : 29FE0158-HO-01
Kind of EUT : Passive Entry System (Control Unit) Power : DC 12V
Model No. : TWD1U778 Temp./Humi. : 24deg.C. / 43%
Serial No. : 001 Engineer : Tomtoaka Sasagawa

Mode / Remarks : Tx 125kHz, ANT:ROOM4, Worst-axis:Z-axis

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



Frequency	Reading	DET	Antenna	Loss&	Level	Polar.	Limit	Margin	Comment
[MHz]	[dBuV]		Factor	Gain	[dBuV/m]		[dBuV/m]	[dB]	
43.500	22.9	QP	12.5	-21.8	13.6	Hori.	40.0	26.4	
43.994	28.7	QP	12.3	-21.8	19.2	Vert.	40.0	20.8	
48.052	22.7	QP	11.0	-21.7	12.0	Hori.	40.0	28.0	
48.021	29.2	QP	11.0	-21.7	18.5	Vert.	40.0	21.5	
108.303	27.5	QP	11.5	-20.9	18.1	Vert.	43.5	25.4	
108.750	22.4	QP	11.5	-20.9	13.0	Hori.	43.5	30.5	
128.100	23.0	QP	13.6	-20.6	16.0	Hori.	43.5	27.5	
129.450	26.8	QP	13.7	-20.6	19.9	Vert.	43.5	23.6	
133.050	26.5	QP	13.9	-20.6	19.8	Vert.	43.5	23.7	
133.500	22.8	QP	14.0	-20.6	16.2	Hori.	43.5	27.3	
949.839	22.4	QP	22.5	-16.5	28.4	Hori.	46.0	17.6	
949.839	22.1	QP	22.5	-16.5	28.1	Vert.	46.0	17.9	

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.

Radiated Emission above 30MHz (Spurious Emission) **(Maximum Power)**

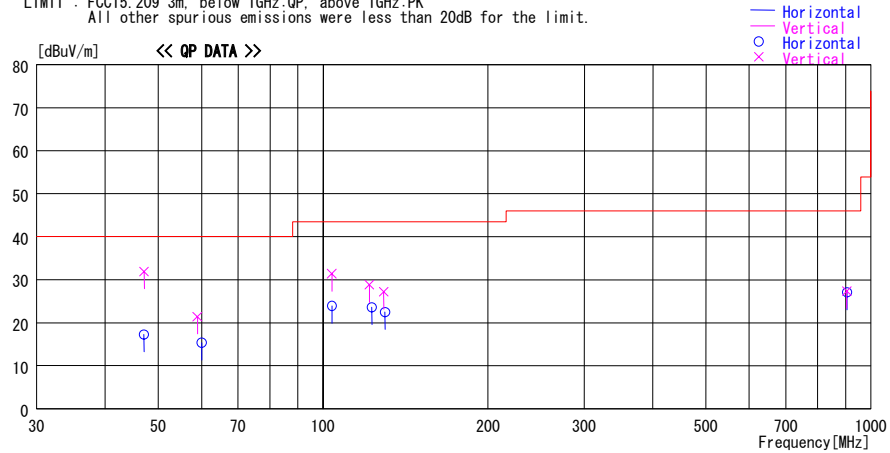
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Date : 2009/03/17

Company : Alps Electric Co., Ltd. Report No. : 29FE0158-HO-01
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Model No. : TWD1U778 Temp./Humi. : 24deg. C. / 43%
Serial No. : 001 Engineer : Tomtoaka Sasagawa

Mode / Remarks : Tx 125kHz, ANT:DR, Worst-axis:Z-axis

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



Frequency	Reading	DET	Antenna	Loss&	Level	Polar.	Limit	Margin	Comment
[MHz]	[dBuV]		Factor	Gain	[dBuV/m]		[dBuV/m]	[dB]	
47.100	27.8	QP	11.3	-21.8	17.3	Hori.	40.0	22.7	
47.141	42.4	QP	11.3	-21.8	31.9	Vert.	40.0	8.1	
58.957	34.5	QP	8.5	-21.6	21.4	Vert.	40.0	18.6	
60.004	28.7	QP	8.3	-21.6	15.4	Hori.	40.0	24.6	
103.751	34.0	QP	10.8	-20.9	23.9	Hori.	43.5	19.6	
103.751	41.5	QP	10.8	-20.9	31.4	Vert.	43.5	12.1	
121.481	36.5	QP	13.1	-20.8	28.8	Vert.	43.5	14.7	
122.700	31.2	QP	13.2	-20.8	23.6	Hori.	43.5	19.9	
129.084	34.1	QP	13.7	-20.6	27.2	Vert.	43.5	16.3	
129.874	29.4	QP	13.7	-20.6	22.5	Hori.	43.5	21.0	
905.411	22.3	QP	21.6	-16.8	27.1	Hori.	46.0	18.9	
904.338	22.6	QP	21.6	-16.8	27.4	Vert.	46.0	18.6	

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.

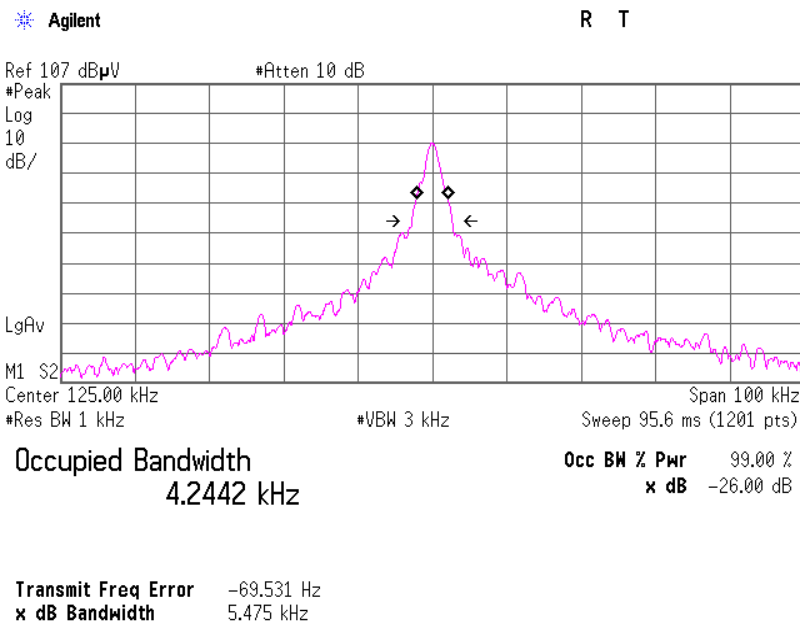
-26dB Bandwidth

UL Japan, Inc.

Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY	: Alps Electric Co., Ltd.	REPORT NO	: 29FE0158-HO-01
EQUIPMENT	: Passive Entry System (Control Unit)	REGULATION	: Reference data
MODEL	: TWD1U778	TEST DISTANCE	: 3m
S/ N	: 001	DATE	: 03/17/2009
POWER	: DC 12V	TEMPERATURE	: 24 deg.C
MODE	: Tx	HUMIDITY	: 43 %
	: Ant-Max	ENGINEER	: Tomotaka Sasagawa

FREQ	-26dB Bandwidth
[kHz]	[kHz]
125.0	5.475

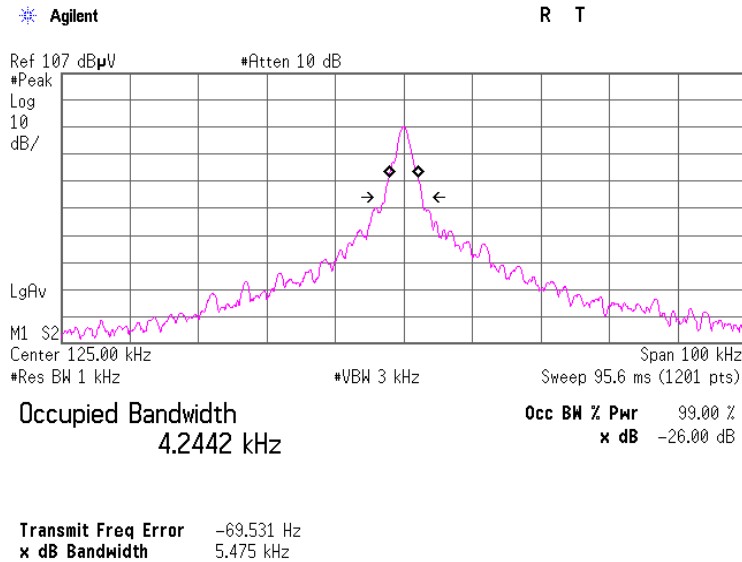


99% Occupied Bandwidth

UL Japan, Inc.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY	: Alps Electric Co., Ltd.	REPORT NO	: 29FE0158-HO-01
EQUIPMENT	: Passive Entry System (Control Unit)	REGULATION	: Reference data
MODEL	: TWD1U778	TEST DISTANCE	: 3m
S/N	: 001	DATE	: 03/17/2009
POWER	: DC 12V	TEMPERATURE	: 24 deg.C
MODE	: Tx	HUMIDITY	: 43 %
	: Ant-Max	ENGINEER	: Tomotaka Sasagawa

FREQ	99% Occupied Bandwidth
[kHz]	[kHz]
125.0	4.244



APPENDIX 3: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2008/04/17 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2009/02/05 * 12
MJM-05	Measure	PROMART	SEN1955	-	RE	-
CUST-MSTW-14	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MRENT-62	Spectrum Analyzer	Agilent	E4448A	MY46180856	RE	2008/11/25 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2008/04/02 * 12
MLPA-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	836553/009	RE	2008/11/14 * 12
MCC-13	Coaxial Cable	Fujikura/Agilent	-	-	RE	2009/02/16 * 12
MCC-31	Coaxial cable	UL Japan	-	-	RE	2008/06/20 * 12
MPA-19	Pre Amplifier	MITEQ	MLA-10K01-B01-35	1237616	RE	2009/02/23 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2008/10/18 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2008/10/18 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2009/02/16 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2008/11/14 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2008/09/04 * 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

UL Japan, Inc.

Head Office EMC Lab.

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