

APPENDIX 2: Data of EMI test

Radiated Emission below 30MHz (Fundamental and Spurious Emission)

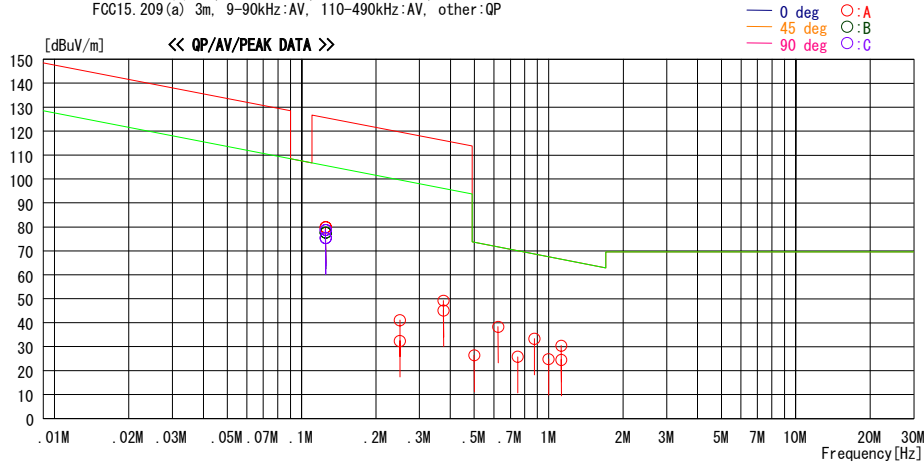
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2009/04/28

Company : Alps Electric Co., Ltd. Report No. : 29HE0134-HO-03
Kind of EUT : ANT ASSY-IMMOBILISER Power : DC 12.0V
Model No. : TWK1A004 Temp./Humi. : 23deg.C / 41%
Serial No. : 09042202 Engineer : Keisuke Kawamura

Mode / Remarks : Continuous Transmitting mode(125KHz), Max Axis_X

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	92.2	PEAK	19.7	0.2	32.2	79.9	125.6	45.7	0	A	7 Worst
0.12500	92.1	AV	19.7	0.2	32.2	79.8	105.6	25.8	0	A	7 Worst
0.12500	89.9	PEAK	19.7	0.2	32.2	77.6	125.6	48.0	45	B	326
0.12500	89.9	AV	19.7	0.2	32.2	77.6	105.6	28.2	45	B	326
0.12500	87.7	PEAK	19.7	0.2	32.2	75.4	125.6	50.2	90	C	77
0.12500	87.7	AV	19.7	0.2	32.2	75.4	105.6	30.4	90	C	77
0.12500	91.1	PEAK	19.7	0.2	32.2	78.8	125.6	46.8	135	C	26
0.12500	91.1	AV	19.7	0.2	32.2	78.8	105.6	27.0	135	C	26
0.25000	53.5	PEAK	19.6	0.2	32.2	41.1	119.6	78.5	0	A	359
0.25000	44.9	AV	19.6	0.2	32.2	32.5	99.6	67.1	0	A	359
0.37500	61.7	PEAK	19.5	0.2	32.1	49.3	116.1	66.8	0	A	359
0.37500	57.6	AV	19.5	0.2	32.1	45.2	96.1	50.9	0	A	359
0.50000	38.9	QP	19.4	0.2	32.1	26.4	73.6	47.2	0	A	352
0.62500	50.8	QP	19.4	0.3	32.1	38.4	71.7	33.3	0	A	358
0.75000	38.2	QP	19.4	0.3	32.1	25.8	70.1	44.3	0	A	359
0.87500	45.8	QP	19.4	0.3	32.1	33.4	68.7	35.3	0	A	353
1.00000	37.3	QP	19.3	0.3	32.1	24.8	67.6	42.8	0	A	355
1.12500	42.9	QP	19.3	0.3	32.1	30.4	66.5	36.1	0	A	350
1.12500	37.0	QP	19.3	0.3	32.1	24.5	66.5	42.0	0	A	345

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 + ATTN. - 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)

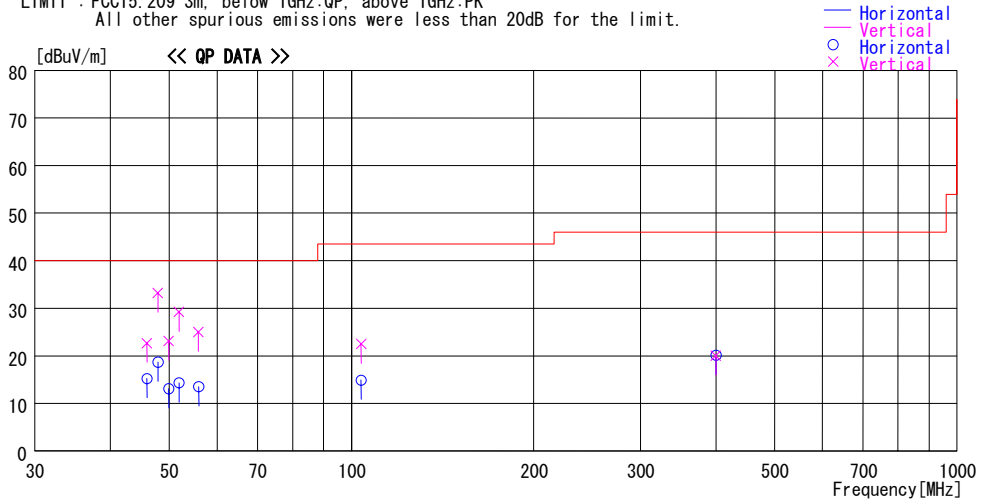
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2009/04/28

Company : Alps Electric Co., Ltd. Report No. : 29HE0134-HO-03
Kind of EUT : ANT ASSY-IMMOBILISER Power : DC 12.0V
Model No. : TWK1A004 Temp./Humi. : 23deg.C. / 41 %
Serial No. : 09042202 Engineer : Keisuke Kawamura

Mode / Remarks: Continuous Transmitting mode(125KHz), MAX Axis_Z(V&H)

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]							
45.932	32.9	QP	11.6	-21.8	22.7	349	100	Vert.	40.0	17.3	
45.935	25.4	QP	11.6	-21.8	15.2	272	293	Hori.	40.0	24.8	
47.928	44.0	QP	11.0	-21.8	33.2	350	100	Vert.	40.0	6.8	
47.928	29.5	QP	11.0	-21.8	18.7	83	301	Hori.	40.0	21.3	
49.923	24.4	QP	10.4	-21.7	13.1	265	293	Hori.	40.0	26.9	
49.925	34.4	QP	10.4	-21.7	23.1	10	100	Vert.	40.0	16.9	
51.920	26.0	QP	10.0	-21.7	14.3	272	293	Hori.	40.0	25.7	
51.924	40.9	QP	10.0	-21.7	29.2	345	100	Vert.	40.0	10.8	
55.915	37.6	QP	9.1	-21.7	25.0	184	100	Vert.	40.0	15.0	
55.919	26.1	QP	9.1	-21.7	13.5	277	365	Hori.	40.0	26.5	
103.846	25.0	QP	10.8	-20.9	14.9	85	310	Hori.	43.5	28.6	
103.849	32.6	QP	10.8	-20.9	22.5	348	100	Vert.	43.5	21.0	
400.000	21.7	QP	17.5	-19.1	20.1	0	100	Hori.	46.0	25.9	
400.000	21.6	QP	17.5	-19.1	20.0	0	100	Vert.	46.0	26.0	

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)

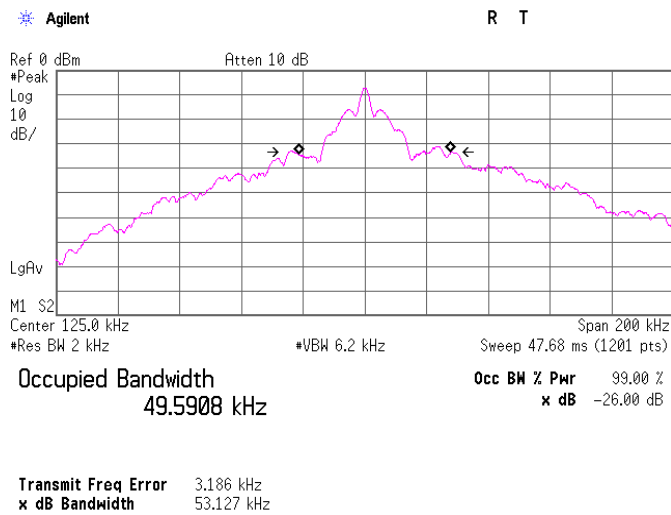
*The test result is rounded off to one or two decimal places, so some differences might be observed.

-26dB Bandwidth and 99% Occupied Bandwidth

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

COMPANY	: Alps Electric Co., Ltd.	REPORT NO	: 29HE0134-HO-03
EQUIPMENT	: ANT ASSY-IMMOBILISER	REGULATION	: Reference Data (for FCC)/RSS-Gen 4.6.1
MODEL	: TWK1A004	TEST DISTANCE	: 3m
S/N	: 09042202	DATE	: 04/28/2009
POWER	: DC 12V	TEMPERATURE	: 23 deg.C
MODE	: Continuous Transmitting mode	HUMIDITY	: 41 %
		Engineer	: Keisuke Kawamura

FREQ	-26dB Bandwidth	99% Occupied Bandwidth
[kHz]	[kHz]	[kHz]
125.0	53.1	49.591



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	2008/05/17 * 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	2009/04/14 * 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
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
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2009/03/18 * 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:

RE: Spurious emission, -26dB Bandwidth, 99% Occupied Bandwidth

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