APPENDIX 2: Data of EMI test

Radiated Emission below 30MHz (Fundamental and Spurious Emission)

Loop Antenna: 0/45/90deg

DATA OF RADIATED EMISSION TEST

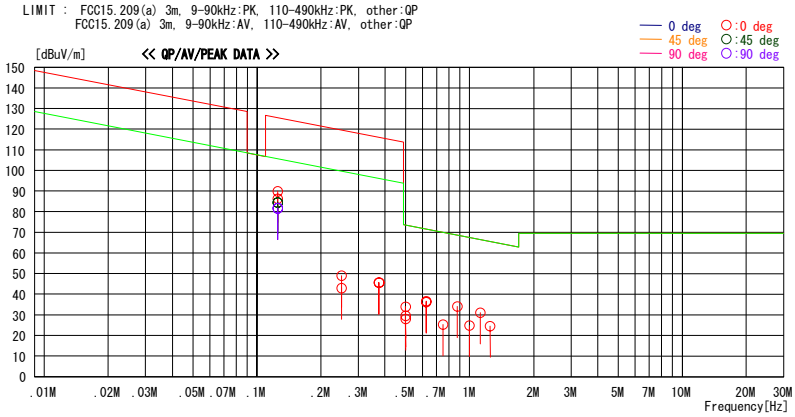
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2008/10/06

Company : ALPS ELECTRIC CO., LTD.
Kind of EUT : Switch Assy Immobilizer Antenna
Model No. : TWK1A001
Serial No. : 1

Report No. : 29AE0071-HO-01
Power : DC 5V
Temp. / Humi. : 23deg.C. / 68%
Enginner : Akio Hayashi

Mode / Remarks : Continuous waves output(with ASK modulation) mode, EUT-axis:X(Worst)

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. [MHz]	Reading [dBuV]	DET	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna	Table [deg]	Comment
0.12500	102.4	PEAK	19.7	0.1	32.3	89.9	125.6	35.7	0deg	6	
0.12500	97.1	PEAK	19.7	0.1	32.3	84.6	125.6	41.0	45deg	332	
0.12500	94.2	PEAK	19.7	0.1	32.3	81.7	125.6	43.9	90deg	277	
0.12500	98.7	AV	19.7	0.1	32.3	86.2	105.7	19.5	0deg	6	
0.12500	97.0	AV	19.7	0.1	32.3	84.5	105.7	21.2	45deg	332	
0.12500	94.2	AV	19.7	0.1	32.3	81.7	105.7	24.0	90deg	277	
0.25000	55.4	AV	19.7	0.2	32.3	43.0	99.6	56.6	0deg	359	
0.25000	61.4	PEAK	19.7	0.2	32.3	49.0	119.6	70.6	0deg	359	
0.37500	57.8	AV	19.6	0.2	32.2	45.4	96.1	50.7	0deg	354	
0.37500	58.1	PEAK	19.6	0.2	32.2	45.7	116.1	70.4	0deg	354	
0.49999	41.9	PEAK	19.6	0.2	32.2	29.5	73.6	44.1	0deg	8	
0.49999	40.5	AV	19.6	0.2	32.2	28.1	73.6	45.5	0deg	8	
0.50000	46.4	QP	19.6	0.2	32.2	34.0	73.6	39.6	0deg	8	
0.62500	49.1	PEAK	19.6	0.2	32.2	36.7	71.7	35.0	0deg	6	
0.62500	48.6	AV	19.6	0.2	32.2	36.2	71.7	35.5	0deg	6	
0.75000	37.7	QP	19.6	0.2	32.2	25.3	70.1	44.8	0deg	359	
0.87500	46.5	QP	19.6	0.2	32.2	34.1	68.7	34.6	0deg	174	
1.00000	37.3	QP	19.6	0.2	32.2	24.9	67.6	42.7	0deg	350	
1.12500	43.4	QP	19.6	0.3	32.2	31.1	66.5	35.4	0deg	359	
1.25000	36.9	QP	19.6	0.3	32.2	24.6	65.6	41.0	0deg	359	

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

Loop Antenna: 135deg

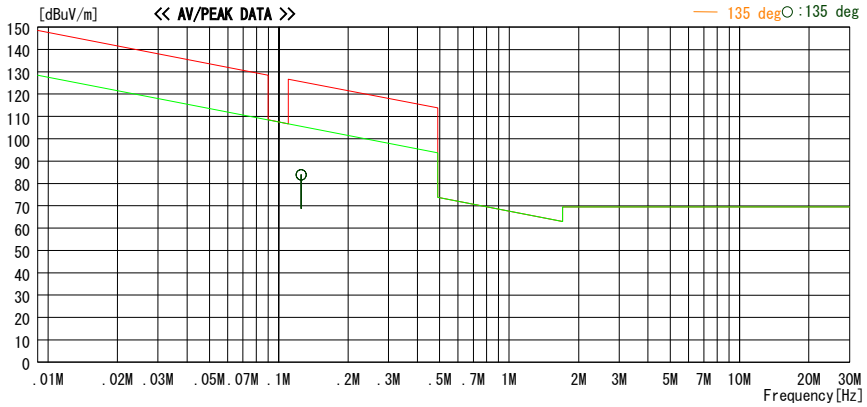
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2008/10/06

Company	: ALPS ELECTRIC CO., LTD.	Report No.	: 29AE0071-HO-01
Kind of EUT	: Switch Assy Immobilizer Antenna	Power	: DC 5V
Model No.	: TWK1A001	Temp. / Humi.	: 23deg.C. / 68%
Serial No.	: 1	Enginner	: Akio Hayashi

Mode / Remarks : Continuous waves output(with ASK modulation) mode, EUT-axis:X(Worst)

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. [MHz]	Reading [dBuV]	DET	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna	Table [deg]	Comment
0.12500	96.5	PEAK	19.7	0.1	32.3	84.0	125.6	41.6	135 deg	208	
0.12500	96.5	AV	19.7	0.1	32.3	84.0	105.7	21.7	135 deg	208	

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

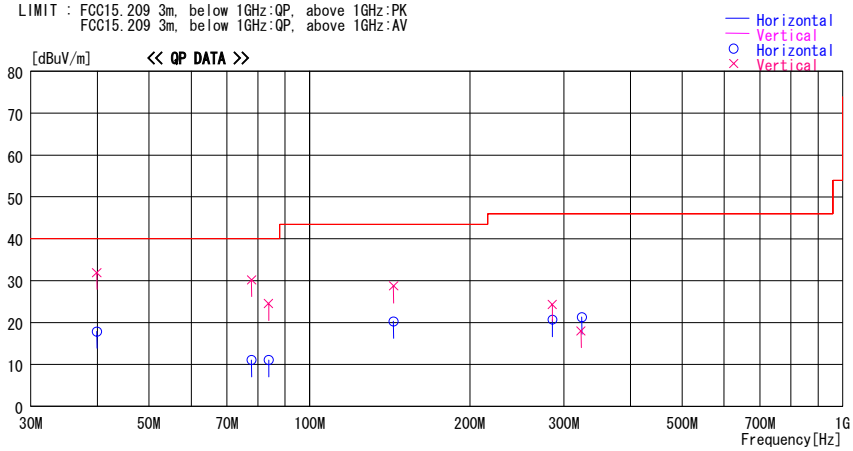
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2008/10/07

Company : ALPS ELECTRIC CO., LTD.
Kind of EUT : Switch Assy Immobilizer Antenna
Model No. : TWK1A001
Serial No. : 1

Report No. : 29AE0071-HO-01
Power : DC5V
Temp./Humi. : 23deg.C / 62%
Engineer : Akio Hayashi

Mode / Remarks : Continuous waves output(with ASK modulation) mode, EUT-axis(Hor:Z, Ver:X)

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 Factor [dB/m]	Loss& Gain [dB]	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
39.933	29.2	QP	13.6	-24.9	17.9	327	295	Hori.	40.0	22.1	
39.935	43.2	QP	13.6	-24.9	31.9	208	100	Vert.	40.0	8.1	
77.868	28.9	QP	6.4	-24.2	11.1	269	290	Hori.	40.0	28.9	
77.870	48.0	QP	6.4	-24.2	30.2	265	100	Vert.	40.0	9.8	
83.857	28.2	QP	7.0	-24.1	11.1	280	289	Hori.	40.0	28.9	
83.859	41.6	QP	7.0	-24.1	24.5	274	120	Vert.	40.0	15.5	
143.759	29.1	QP	14.6	-23.4	20.3	215	231	Hori.	43.5	23.2	
143.761	37.5	QP	14.6	-23.4	28.7	265	100	Vert.	43.5	14.8	
285.516	23.8	QP	19.1	-22.2	20.7	359	300	Hori.	46.0	25.3	
285.516	27.4	QP	19.1	-22.2	24.3	321	100	Vert.	46.0	21.7	
323.100	24.5	QP	15.3	-21.8	18.0	128	100	Vert.	46.0	28.0	
324.500	27.8	QP	15.3	-21.8	21.3	321	100	Hori.	46.0	24.7	

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)

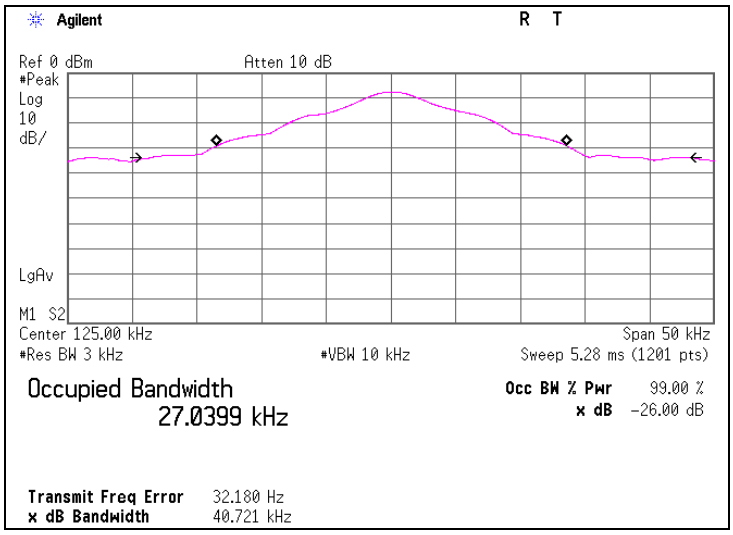
*The test result is rounded off to one or two decimal places, so some differences might be observed.

-26dB Bandwidth

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

COMPANY	:	ALPS ELECTRIC CO., LTD.	REGULATION	:	Reference data
EQUIPMENT	:	Switch Assy Immobilizer Antenna	TEST DISTANCE	:	3m
MODEL	:	TWK1A001	DATE	:	10/7/2008
S/ N	:	1	TEMPERATURE	:	23 deg.C
POWER	:	DC 5V	HUMIDITY	:	62 %
MODE	:	Continuous waves output (with ASK modulation) mode	Engineer	:	Akio Hayashi
	:	Ant-Max			

	FREQ [kHz]	-26dB Bandwidth [kHz]
	125.0	40.721

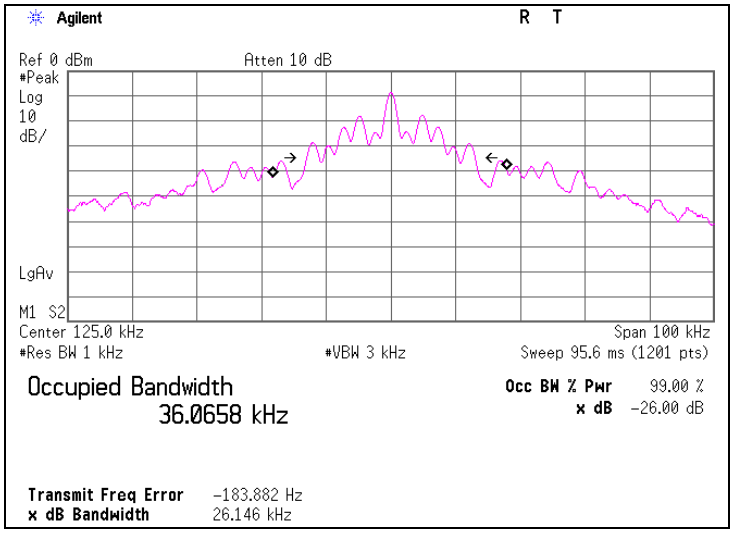


99% Occupied Bandwidth

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

COMPANY	:	ALPS ELECTRIC CO., LTD.	REGULATION	:	RSS-Gen 4.6.1
EQUIPMENT	:	Switch Assy Immobilizer Antenna	TEST DISTANCE	:	3m
MODEL	:	TWK1A001	DATE	:	10/7/2008
S/ N	:	1	TEMPERATURE	:	23 deg.C
POWER	:	DC 5V	HUMIDITY	:	62 %
MODE	:	Continuous waves output (with ASK modulation) mode	Engineer	:	Akio Hayashi
	:	Ant-Max			

	FREQ [kHz]	99% Occupied Bandwidth [kHz]
	125.0	36.066



APPENDIX 3: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-03	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE	2008/03/25 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	RE	2008/01/10 * 12
MJM-06	Measure	PROMART	SEN1955	RE	-
MSTW-14	EMI measurement program	TSJ	TEPTO-DV	RE	-
MSA-09	Spectrum Analyzer	Advantest	R3273	RE	2007/12/21 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	RE	2008/06/12 * 12
MLPA-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	RE	2007/12/12 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	-	RE	2008/07/03 * 12
MCC-31	Coaxial cable	UL Japan	-	RE	2008/06/20 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	RE	2008/03/06 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	RE	2008/08/18 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2008/01/12 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2008/01/12 * 12
MCC-51	Coaxial cable	UL Japan	-	RE	2008/07/18 * 12
MAT-30	Attenuator(6dB)	TME	UFA-01	RE	2008/03/10 * 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.

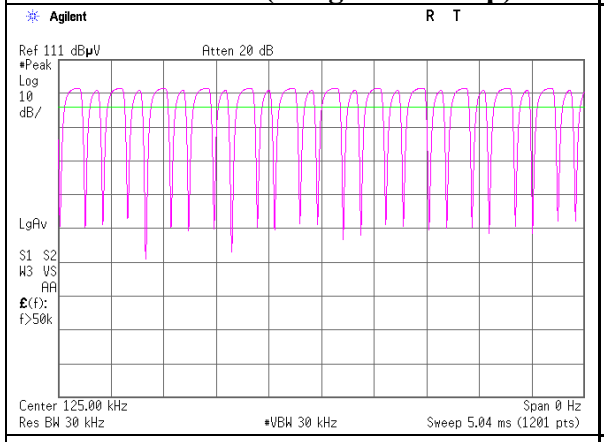
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item:

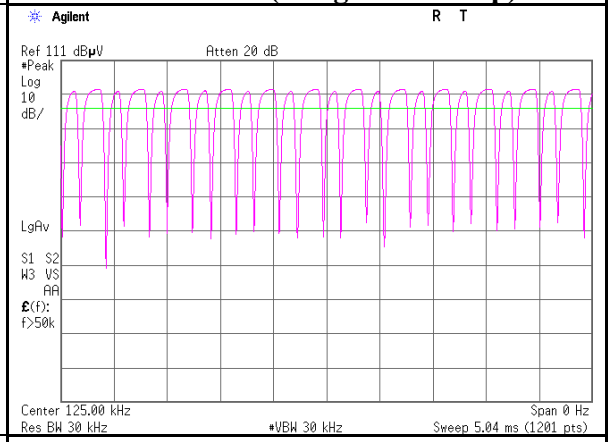
RE: Spurious emission

APPENDIX 4: Data for Pulse line

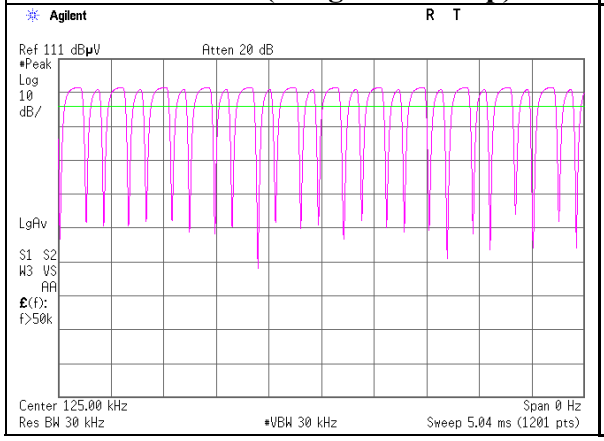
Pulse line(Long time Sweep)1



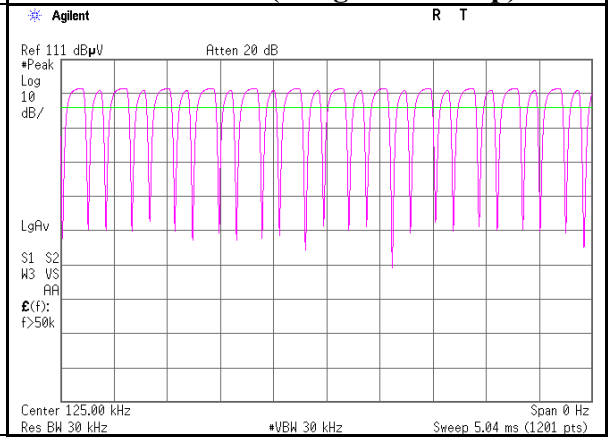
Pulse line(Long time Sweep)2



Pulse line(Long time Sweep)3



Pulse line(Long time Sweep)4



Pulse line(Short time Sweep)