

FCC CLASS B COMPLIANCE REPORT

for

Electromagnetic Emissions

of

KEYBOARD

ID Number : K7SF8E206PS2
Trade Name : BELKIN
Model Number : F8E206-BLK-PS2
Serial Number : N/A
Report Number : SZ0302027
Date : March 8, 2003

Prepared for :

BELKIN CORPORATION
501W.WALNUT STREET,COMPTON,CA90220 USA

Prepared by :

COMPLIANCE ENGINEERING SERVICES (CHINA)

d.b.a.

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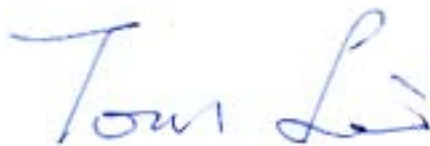
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VERIFICATION OF COMPLIANCE

Equipment Under Test: KEYBOARD
Trade Name: BELKIN
Model Number: F8E206-BLK-PS2
Serial Number: N/A
Applicant: BELKIN CORPORATION
501W.WALMUT STREET,COMPTON,CA90220 USA
Manufacturer: BELKIN CORPORATION
501W.WALMUT STREET,COMPTON,CA90220 USA
Type of Test: FCC Class B
Measurement Procedure: ANSI C63.4: 2000
File Number: SZ0302027
Date of test: March 8,2003
Deviation: None
Condition of Test Sample: Normal

The above equipment was tested by Compliance Engineering Services (China) for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, Subpart B and the measurement procedure according to ANSI C63.4. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.



Tom Lai / Q.A. Manager

FCC ID LABEL

BELKIN Standard Keyboard

Model Name: F8E206-BLK-PS2

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference,
and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC ID: K7SF8E206PS2

DC: 5.0V MAX: 20mA

S/N:XXXXXXXXXX

CE  N10117

MADE IN CHINA

DLK-9810

F8E206-BLK-PS2 SPECIFICATION

1. Outline:



DimensionS: LxWxH=459x172x39mm

2.Scope:

This keyboard F8E206-BLK-PS2 is 107/108 key, especially with new key support for Microsoft Windows, also compatible with AT or PS/2.

3.Features:

- 3.1.ACPI power management keys
- 3.2.107/108 Enhanced layout
- 3.3.Fully compatible with PS/2 and Microsoft Windows OS
- 3.4.Membrane key switch with tactile feedback
- 3.5.High quality membrane tactile key switch
- 3.6.Worldwide language layout supported
- 3.7. A target calculated Mean Time Between Failures(MTBF) is greater than 5,000 hour

4.Specifications :

- 4.1.Key Switch Actuation Switch Travel: 3.5±0.3mm
 Switch Feeling: Silent tactile feedback
 Working Voltage:5.0±0.25VDC
- 4.2.Electrical Specification Current Consumption:30mA max
 Power Consumption:0.2 Watts max
- 4.3.Environmental data: Operating temperature:0 to 45
 Storage temperature:-20 to 60
 Humidity: -20% to 90%(non-condensing)

4.4.Connector

4.4.1.MINI DIN 6 pin connector pin assignment, See Figure 1

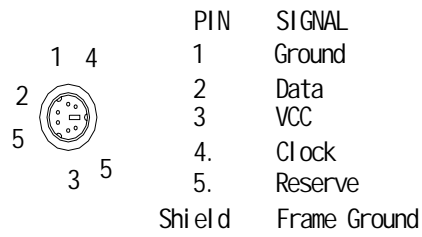


Figure 1

4.4.2. DIN standard 5 pin connector pin assignment, See Figure 2

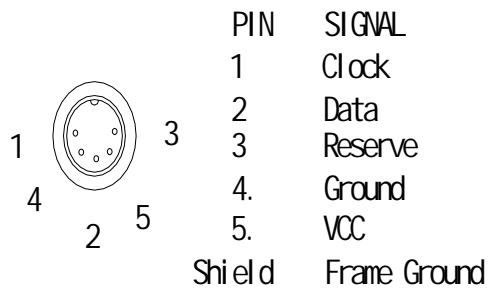


Figure 2

SYSTEM DESCRIPTION

EUT Test Program:

1. EMC test program was loaded and executed in Windows 2000 mode.
2. Data was sent to EUT and monitor is full of “H” patterns on the screen.
3. Test program sequentially exercised printer and modem, then sent “H” patterns to them individually.
4. Repeat 2 to 3. Test program is self-repeating throughout the test.

PRODUCT INFORMATION

Housing Type: Plastic
EUT Power Rating: 5V DC
Power during Test: 5V DC from PC
Power Cord Type: Unshielded, 1.8m
OSC/Clock Frequencies: N/A

I/O Port of EUT:

I/O Port Type	Q'TY	Tested with
PS/2	1	1

Difference between model numbers as below:

	Model Number	Trade Name
1.	DLK-9810	DELUX

Note: The model number and trade name(list on this report) are different (Please refer list as above) just for marketing only.

SUPPORT EQUIPMENT

No.	Equipment	Model #	Serial #	FCC ID	Trade Name	Data Cable	Power Cord
1.	PC	PC-6	N/A	DoC	N/A	N/A	Unshielded, 1.5m
2.	LCD MONITOR	SDM-M61	N/A	DoC	SONY	Shielded, 1.5m	Unshielded, 1.5m
3.	PRINTER	KX-P11801	1KKBQ41529	ACJ5Z6KX-P1191	PANASONIC	Shielded, 1.5m	Unshielded, 1.5m
4.	MODEM	SUPERFAX6.0	9013593	IFAXDM1414	ACCEX	Shielded, 1.5m	Unshielded, 1.5m
5.	MOUSE	C4736-601401	N/A	DoC	HP	Unshielded, 1.5m	N/A

Note: All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

Grounding: Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

SECTION 1 EN 55022(LINE CONDUCTED AND RADIATED EMISSION)

MEASUREMENT PROCEDURE

(PRELIMINARY LINE CONDUCTED EMISSION TEST)

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN 55022 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per EN 55022.
- 3) All I/O cables were positioned to simulate typical actual usage as per EN 55022.
- 4) The EUT received DC power from PC, and PC received AC power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5) All support equipment received power from a second LISN supplying power of 120VAC/60Hz, if any.
- 6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7) Analyzer / Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- 8) During the above scans, the emissions were maximized by cable manipulation.
- 9) The following test mode(s) were scanned during the preliminary test:

Preliminary Conducted Emission Test			
Frequency Range Investigated		150KHz TO 30 MHz	
Mode of operation	Date	Data Report No.	Worst Mode
NORMAL	03/08/2003	F8E206-BLK-PS2_0(L) F8E206-BLK-PS2_0(N)	<input checked="" type="checkbox"/>

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

MEASUREMENT PROCEDURE&LIMIT (FINAL LINE CONDUCTED EMISSION TEST)

- 1) EUT and support equipment was set up on the test bench as per step 9 of the preliminary test.
- 2) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using an Average detector.
- 3) The test data of the worst case condition(s) was reported on the Summary Data page.

Data Sample:

Freq. MHz	Peak Raw dBuV	Q.P. Raw dBuV	Average Raw dBuV	Q.P. Limit dBuV	Average Limit dBuV	Q.P. Margin dB	Average Margin dB	Note
x.xx	43.9	---	---	56.0	46.0	---	-2.1	L 1

- Freq. = Emission frequency in MHz
- Raw dBuV = Uncorrected Analyzer/Receiver reading
- Limit dBuV = Limit stated in standard
- Margin dB = Reading in reference to limit
- Note = Current carrying line of reading
- “---“ = The emission level complied with the Average limits, with at least 2 dB margin, so no further recheck.

LINE CONDUCTED EMISSION LIMIT

Frequency	Maximum RF Line Voltage	
	Q.P.	AVERAGE
150kHz-500kHz	66-56dBuV	56-46dBuV
500kHz-5MHz	56dBuV	46dBuV
5MHz-30MHz	60dBuV	50dBuV

Note: The lower limit shall apply at the transition frequency.

MEASUREMENT PROCEDURE & LIMIT (PRELIMINARY RADIATED EMISSION TEST)

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane as per EN 55022 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per EN 55022.
- 3) All I/O cables were positioned to simulate typical actual usage as per EN 55022.
- 4) The EUT received DC power source from PC, and PC received AC power from the outlet socket under the turntable. All support equipment received 120VAC/60Hz power from socket under the turntable, if any.
- 5) The antenna was placed at 10 meter away from the EUT as stated in EN 55022. The antenna connected to the Analyzer via a cable and at times a pre-amplifier would be used.
- 6) The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 7) The following test mode(s) were scanned during the preliminary test:

Preliminary Radiated Emission Test			
Frequency Range Investigated		30 MHz TO 1000 MHz	
Mode of operation	Date	Data Report No.	Worst Mode
NORMAL	03/08/2003	F8E206-BLK-PS2-0(V) F8E206-BLK-PS2-0(H)	<input checked="" type="checkbox"/>

Then, the EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for final testing.

MEASUREMENT PROCEDURE (FINAL RADIATED EMISSION TEST)

- 1) EUT and support equipment were set up on the turntable as per step 7 of the preliminary test.
- 2) The Analyzer / Receiver scanned from 30MHz to 1000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 3) Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.
- 4) The test data of the worst case condition(s) was reported on the Summary Data page.

Data Sample:

Freq. (MHz)	Raw Data (dBuV/m)	Corr. Factor (dB)	Emiss. Level (dBuV/m)	Limits	Margin (dB)	Reading Type P/Q
xx.xx	14.02	12.25	26.27	30.00	-3.73	P

Freq.	= Emission frequency in MHz
Raw Data (dBuV/m)	= Uncorrected Analyzer / Receiver reading
Corr. Factor (dB)	= Correction factors of antenna factor and cable loss
Emiss. Level	= Raw reading converted to dBuV and CF added
Limit dBuV/m	= Limit stated in standard
Margin dB	= Reading in reference to limit
P	=Peak Reading
Q	=Quasi-peak

RADIATED EMISSION LIMIT

Frequency (MHz)	Distance (m)	Maximum Field Strength Limit (dBu V/m/ Q.P.)
30-230	10	30.0
230-1000	10	37.0

Note: The lower limit shall apply at the transition frequency.

SUMMARY DATA (LINE CONDUCTED TEST)

Model Number: F8E206-BLK-PS2

Location: G-site

Tested by: Ray

Test Mode: Normal

Test Results: Passed

Temperature: 25°C

Humidity: 65%RH

(The chart below shows the highest readings taken from the final data)

FREQ MHz	PEAK RAW dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.175	42.6	---	---	65.2	55.2	---	-12.6	L1
0.358	37.9	---	---	60.1	50.1	---	-12.2	L1
0.450	38.3	---	---	57.4	47.4	---	-9.1	L1
0.631	34.8	---	---	56.0	46.0	---	-11.2	L1
11.660	40.5	---	---	60.0	50.0	---	-9.5	L1
22.560	40.7	---	---	60.0	50.0	---	-9.3	L1
0.177	43.3	---	---	65.2	55.2	---	-11.9	L2
0.358	37.8	---	---	60.1	50.1	---	-12.3	L2
0.450	37.6	---	---	57.4	47.4	---	-9.8	L2
0.903	34.8	---	---	56.0	46.0	---	-11.2	L2
11.800	43.6	---	---	60.0	50.0	---	-6.4	L2
22.560	41.3	---	---	60.0	50.0	---	-12.8	L2

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

****NOTE: “---” denotes the emission level was or more than 2dB below the Average limit,
 so no re-check anymore.**

SUMMARY DATA (RADIATED EMISSION TEST)

Model Number: F8E206-BLK-PS2

Location: G-site

Tested by: Ray

Polar: Vertical--10m

Test Mode: Normal

Test Results: Passed

Detector Function: Peak/QP

Temperature: 25°C

Humidity:65%RH

(The chart below shows the highest readings taken from the final data)

Freq. (MHz)	Raw Data (dBuV/m)	Corr. Factor (dB)	Emiss. Level (dBuV/m)	Limits	Margin (dB)	Reading Type (P/Q)
37.58	4.78	19.08	23.86	30.00	-6.14	P
79.70	11.43	6.88	18.31	30.00	-11.69	P
83.83	13.06	7.32	20.38	30.00	-9.62	P
86.93	14.04	7.74	21.78	30.00	-8.22	P
125.74	10.75	11.99	22.74	30.00	-7.26	P
129.22	11.87	11.92	23.79	30.00	-6.21	P

SUMMARY DATA

(RADIATED EMISSION TEST)

Model Number: F8E206-BLK-PS2

Location: G-Site

Tested by: Ray

Polar: Horizontal--10m

Test Mode: Normal

Test Results: Passed

Detector Function: Peak/QP

Temperature:25°C

Humidity: 65%RH

(The chart below shows the highest readings taken from the final data)

Freq. (MHz)	Raw Data (dBuV/m)	Corr. Factor (dB)	Emiss. Level (dBuV/m)	Limits	Margin (dB)	Reading Type (P/Q)
85.08	9.01	7.46	16.47	30.00	-13.53	P
110.78	7.14	11.36	18.50	30.00	-11.50	P
125.02	7.09	12.00	19.09	30.00	-10.91	P
129.75	6.72	11.91	18.62	30.00	-11.37	P
134.83	6.83	11.75	18.58	30.00	-11.42	P
213.18	6.99	11.39	18.38	30.00	-11.62	P

TEST FACILITY

- Location:** No. 6, Jinao industrial park, No. 35 Jukeng Road, Dashuikeng Village, Guanlan Town, Baoan District, Shenzhen, China
- Description:** There is one 3/10m open area test sites and one line conducted labs for final test.
The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4 and CISPR 22/EN 55022 requirements.
- Site Filing:** A site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.
- Site Accreditation:** Accredited by NVLAP(Lab code:200577-0) for EMC.
- Instrument Tolerance:** All measuring equipment is in accord with ANSI C63.4 and CISPR 22 requirements that meet industry regulatory agency and accreditation agency requirement.
- Ground Plane:** Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna. It has no holes or gaps having longitudinal dimensions larger than one-tenth of a wavelength at the highest frequency of measurement up to 1GHz.

TEST EQUIPMENT LIST

Instrumentation: The following list contains equipment used at Compliance Engineering Services (China) for testing. The equipment conforms to the CISPR 16-1 / ANSI C63.2-1988 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 10kHz to 1.0GHz or above.

Equipment used during the tests:

Open Area Test Site: G

Open Area Test Site G					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL. DUE
EMI Test Receiver	HP	8546A	3448A00232	06/01/2002	05/31/2003
AMPLIFIER	HP	8447D	2944A07999	06/01/2002	05/31/2003
ANTENNA	EMCO	3142	9910-1436	06/01/2002	05/31/2003
CABLE	TIME MICROWAVE	LMR-400	N-TYPE04	06/01/2002	05/31/2003

Conducted Emission Test Site: G

Conducted Emission Test Site G					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL. DUE
EMI Test Receiver	HP	8546A	3448A00232	06/01/2002	05/31/2003
EMI MEASURING RECEIVER	SCHAFFNER	SCR3501	1001021293	06/01/2002	05/31/2003
LISN(EUT)	EMCO	3825/2	1371	06/01/2002	05/31/2003
LISN	EMCO	3825/2	8901-1459	06/01/2002	05/31/2003

The calibrations of the measuring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the manual for the measuring instrument.

BLOCK DIAGRAM OF TEST SETUP

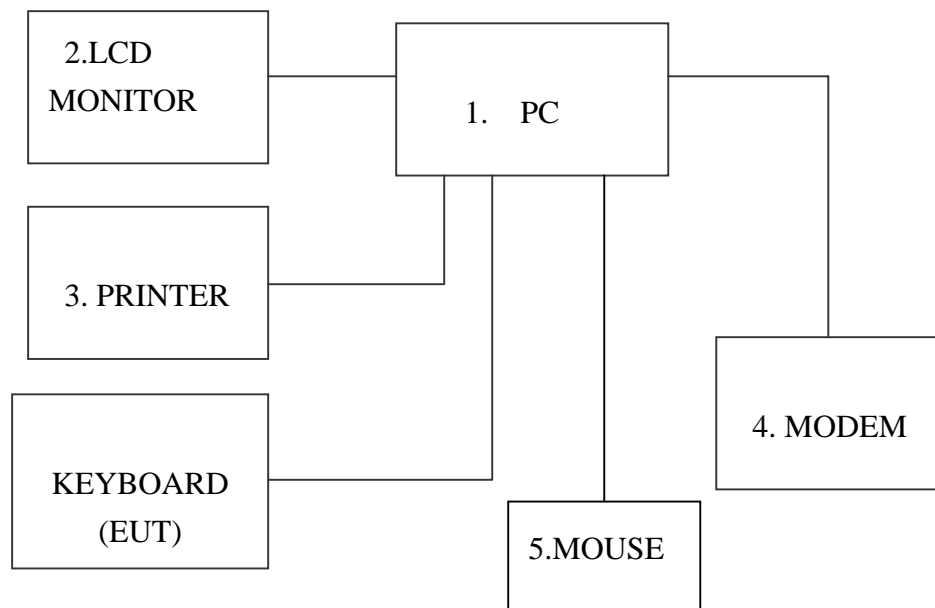
System Diagram of Connections between EUT and Simulators

EUT: KEYBOARD

Trade Name: BELKIN

Model Number: F8E206-BLK-PS2

Power Cord: Unshielded, 1.8m



APPENDIX 1

PHOTOGRAPHS OF TEST SETUP

(TEST SETUP OF LINE CONDUCTED EMISSION)

LINE CONDUCTED EMISSION TEST (EN 55022)



APPENDIX 2

PHOTOGRAPHS OF TEST SETUP

(TEST SETUP OF RADIATED EMISSION)

RADIATED EMISSION TEST (EN 55022)



APPENDIX 3

PHOTOGRAPHS OF EUT

Front view of EUT



Back view of EUT



Left view of EUT



Under view of EUT



Inside view of EUT



APPENDIX 4

SPECTRUM PLOT OF L1 AND L2



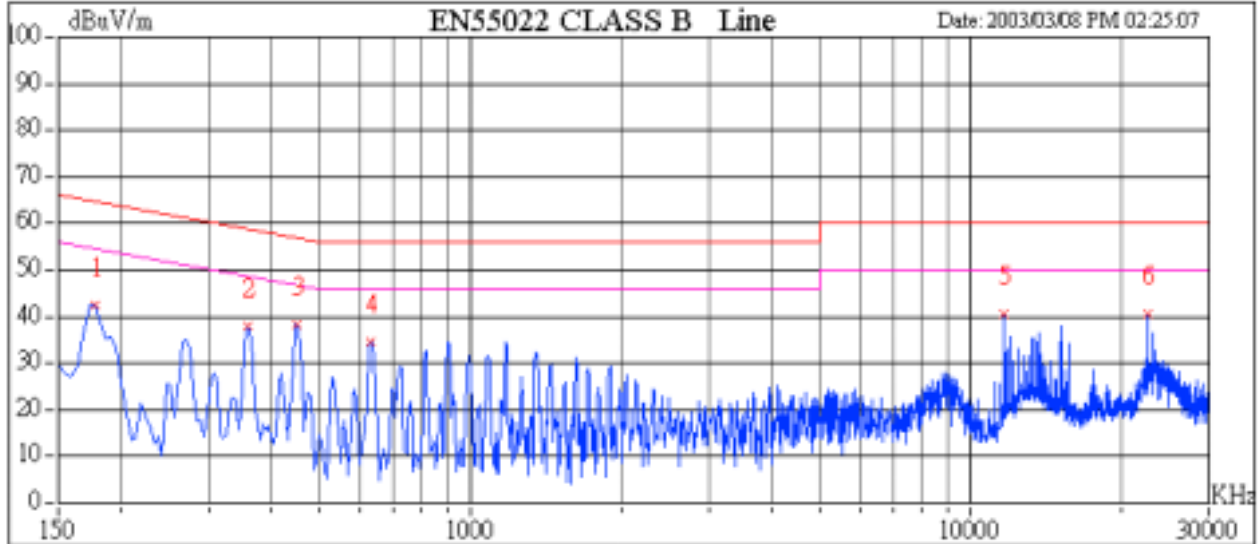
Tel: 86-755-28059000
 Fax: 86-755-28055221

Site G

Custom Name: BELKIN
 Model Name: F8E206-BLK-PS2
 Test Mode:

Project No.: SZ0302027
 Engineer Name: Ray

Index: 1



	Freq(KHz)	Peak Amptd(dBuV)	QP Amptd(dBuV)	Avg Amptd(dBuV)	QP Limit(dBuV)	Avg Limit(dBuV)	Margin(dB)	Factor(dB)
1	177.7500	42.64			65.21	55.21	-12.56	2.30
2	358.1250	37.85			60.05	50.05	-12.20	0.84
3	450.6250	38.31			57.41	47.41	-9.10	0.60
4	631.0000	34.76			56.00	46.00	-11.24	0.42
5	11660.0000	40.49			60.00	50.00	-9.51	0.50
6	22560.0000	40.70			60.00	50.00	-9.30	0.84



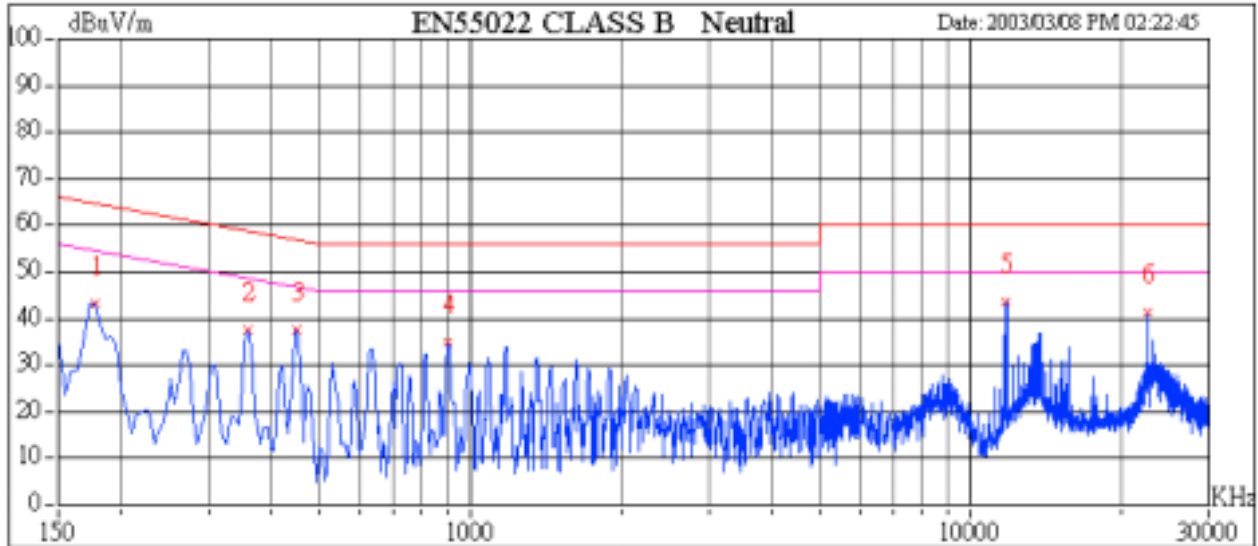
Tel: 86-755-28059000
 Fax: 86-755-28055221

Site G

Custom Name: BELKIN
 Model Name: F8E206-BLK-PS2
 Test Mode:

Project No.: SZ0302027
 Engineer Name: Ray

Index: 1



	Freq(KHz)	Peak Amptd(dBuV)	QP Amptd(dBuV)	Avg Amptd(dBuV)	QP Limit(dBuV)	Avg Limit(dBuV)	Margin(dB)	Factor(dB)
1	177.7500	43.25			65.21	55.21	-11.96	2.59
2	358.1250	37.77			60.05	50.05	-12.29	0.97
3	450.6250	37.59			57.41	47.41	-9.82	0.60
4	903.8750	34.78			56.00	46.00	-11.22	0.35
5	11800.0000	43.58			60.00	50.00	-6.42	0.34
6	22560.0000	41.34			60.00	50.00	-8.66	0.79