Report No.	B1515447
FCC ID	K7SF8E845MSE
Specifications	FCC Part 15, Class B
Test Method	ANSI C63.4
Application	■Original □Class II Changes
Applicant	Belkin Corporation
Applicant address	501 West Walnut Street Compton, CA 90220-5221, USA
Product name	Rechargeable Wireless Optical Mouse
Items tested	Wireless Mouse
Model No.	F8E845-MSE
Sample No.	C31142
EUT Condition	■Engineering sample □Pre-production □Final production
Frequency Range	26.96MHz to 27.28MHz
Results	**Passed** (As detailed within this report)
Date	09/18/2004 (month / day / year)(Sample received) 10/13/2004 (month / day / year)(Tested)
Prepared by	Tuson Yeh Project Engineer
Authorized by	Jacob Lin V. General Manager (Jacob Lin)
Issue date	December 13, 2004 (month / day / year)
Modified by TRC	None
Tested by	Training Research Co., Ltd. **(Accredited by NVLAP)**
Office at	1F, No. 255, Nan Yang Street, Hsichih, Taipei Hsien 221, Taiwan
Open site at	No. 15, Lane 530, Pa-Lian RD., Sec. 1, Hsichih City, Taipei Hsien, Taiwan, R.O.C.

Conditions of issue :

- ***This test report shall not be reproduced except in full, without written approval of TRC. And the test result contained within this report only relate to the sample submitted for testing.***
- ***The test data in this test report are following the procedures in accordance with the terms of accreditation.***
- ***This test report and measurements made by TRC are traceable to the NIST only Conducted and Radiated Method (TRC is accredited by NVLAP, code No.: 200174-0).***
- ***The device has been tested is fully complied with the requirements the Directive FCC Part 15.***

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Chapter 1 Introduction

EUT	:	Wireless Mouse
Model No.	:	F8E845-MSE
Product name	:	Rechargeable Wireless Optical Mouse
Frequency Range	:	26.96 – 27.28 MHz
Power Type	:	Powered by two 1.5VDC AA batteries

*This EUT has one channel (each with 256 IDs): 27.1010MHz

Test method:

Pretest was found that the emission of operating mode is worse than standby mode. So, The final test is made at the operating mode.

During the measurement, the following mode were tested:

#1 Stand-alone Transmitting

#2 Charging by Adaptor.

The conduction pretest was found out "#**2 Charging by Adaptor**" was the worst case.

The radiation pretest was found out "#**1 Stand-alone transmitting**" was the worst case.

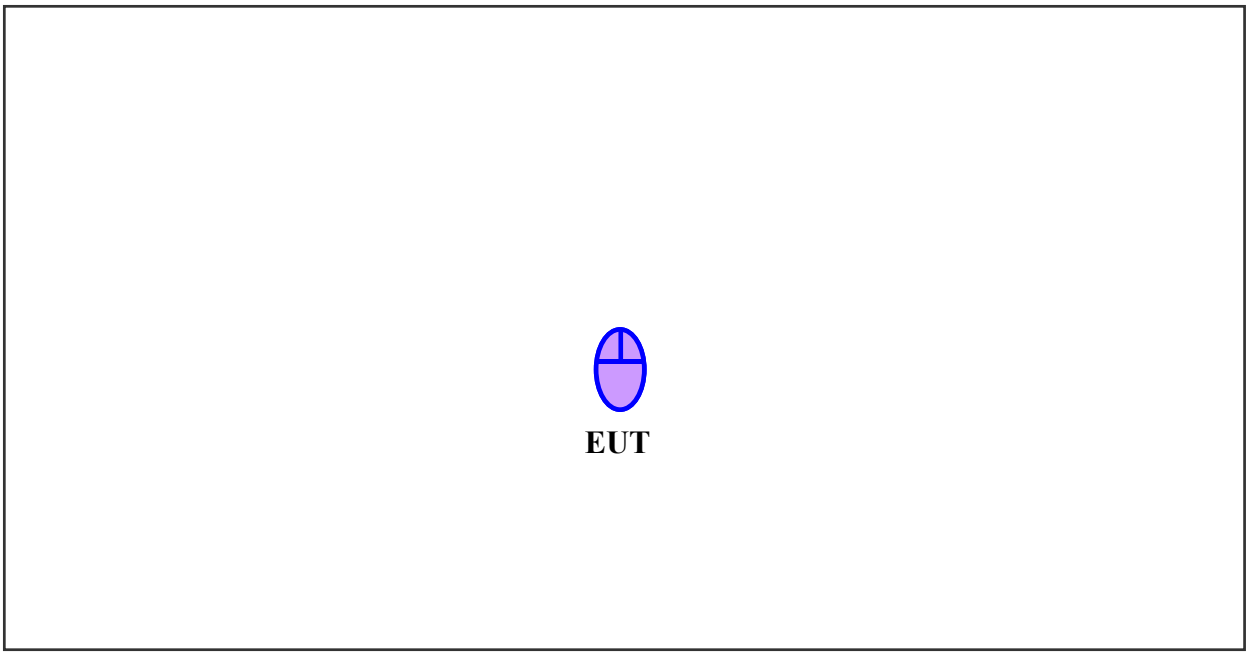
We only recorded this data in this report.

While testing, the EUT was made to transmit continuously and adjusted at a position, which transmitted the maximum emission.

The test placement as the photographs showed is the worst case emission placed. (If the emission is close to the ambient, the resolution BW and view resolution will be reduced and the data will be recorded by detection of maximum hold peak mode.)

The testing configuration of test setup is showing in the next page.
<u>There is no deviation from standard test method.</u>

Configuration of Test Setup (Test mode: "#1")

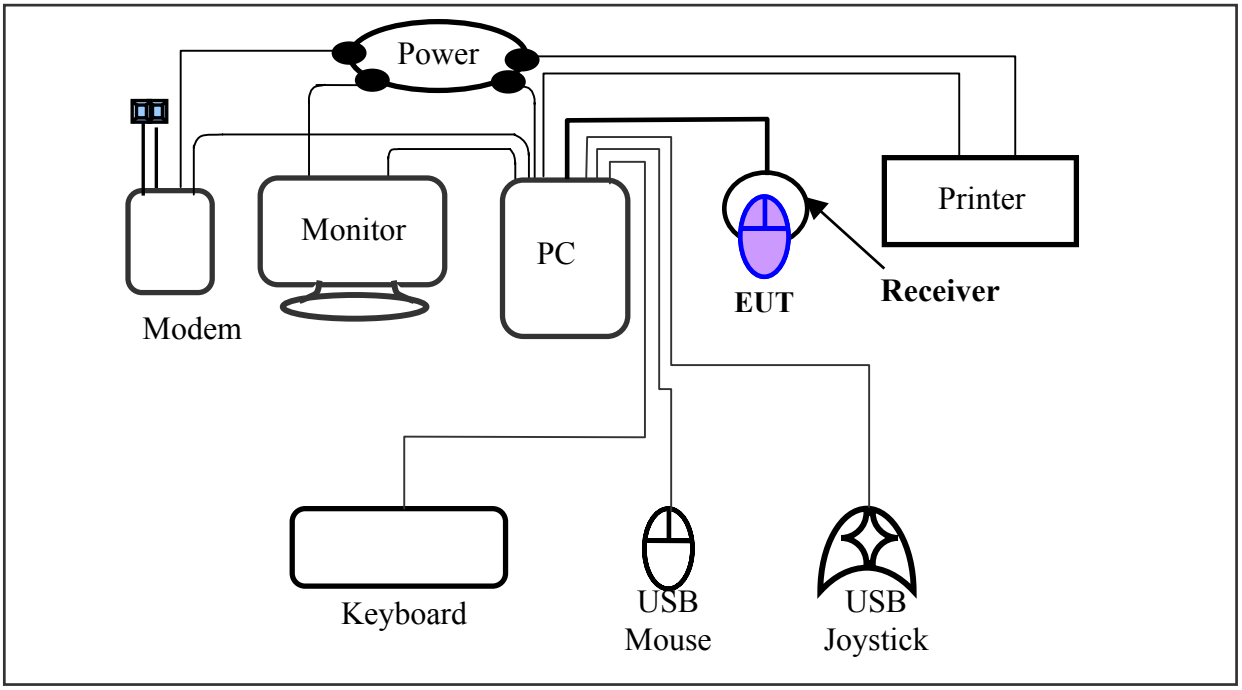


EUT:

*Put two AA size, 1.5V battery into the battery cell of EUT, powers the subject device.

The EUT does not be connected with any product.

Configuration of Test Setup (Test mode: #2)



Connections:

PC:

*Serial Port --- via a 110cm shielded RS-232 cable to an external modem.
*Monitor Port --- a monitor with 1.5m length data cable.
*Keyboard port --- a keyboard with 1.5m length data cable.
*Mouse port --- to EUT.
*USB port A --- an USB joystick with 1.8m long, shielded, no ferrite bead data cable.
*USB port B --- a USB mouse with 1.88m long, shielded, no ferrite bead data cable.
*Printer port --- a printer with 1.8m length data cable

(Each port on PC is connected with suitable device)

Receiver:

*PS/2 Jack --- via a 1.52 m length data cable with a ferrite core that connect to the Mouse port of PC.
*Power Jack --- via a 1.86m length power cable with an adapter connected to the power source.
*Power Adaptor --- Trade: TOM LEE; Model: AD3506003; I/P: 120Vac 60Hz; O/P: 6Vdc 300mA

EUT:

*Put two AA size, 1.5V battery into the battery cell of EUT, and put the EUT on the Receiver.

List of Support Equipment

Conducted (Radiated) test:

PC	**:**	**HP Pavilion w1064d**
Model No.	:	HP Pavilion w1000
Serial No.	:	THT 42610VZ
FCC ID	:	Doc Approved
Power type	:	AC 100 –127 4.0A, 200-240 2.0A, 50 ~ 60Hz
Power cord	:	Non-shielded, 2.33m long, Plastic, No ferrite core

PC	**:**	**HP Pavilion t123d**
Model No.	:	DD281A-AB0
Serial No.	:	TW31720157
FCC ID	:	Doc Approved
Power type	:	AC 100 –127 4.0A, 200-240 2.0A, 50 ~ 60Hz
Power cord	:	Non-shielded, 2.33m length, Plastic, No ferrite core

Monitor	**:**	**HP pavilion mx70**
Model No.	:	P1283A
Serial No.	:	THTBR00257
FCC ID	:	DOC Approved
Power type	:	100 ~ 240V AC 15A 50/60Hz
Power cord	:	Shielded, 1.83m long, No ferrite core
Data cable	:	Shielded, 1.46m (1.80m) length, with two ferrite cores (no ferrite core)

Keyboard	**:**	**HP**
Model No.	:	5219
Serial No.	:	BN31206351
FCC ID	:	E5XKB5209
Power type	:	By PC
Data cable	:	Shielded, 1.60m length

Mouse	**:**	**HP**
Model No.	:	MO42KOA
Serial No.	:	0306044011
FCC ID	:	DOC Approved
Power type	:	By PC
Power cord	:	Non-shielded, 1.88m length, No ferrite core

Printer	**:**	**HP**
Model No.	:	C2642A
Serial No.	:	SG69A196GV
FCC ID	:	B94C2642X
Power type	:	230 VAC, 50Hz
Power cord	:	Non-shielded, 2m long, no ferrite core
Data cable	:	Shielded, 1.84m long, no ferrite core

Modem	**:**	**ACEEX**
Model No.	:	DM-1414V
FCC ID	:	IFAXDM1414
Power type	:	120VAC, 60Hz/ 9VAC, 1A
Power cord	:	Non-shielded, 1.9m long, no ferrite cord
Data cable	:	RS232, Shielded, 1.2m long, no ferrite core
		RJ11C x 2, 7' length, non-shielded, no ferrite core

USB Joystick	**:**	**Rockfire**
Model No.	:	QF-337uv
Serial No.	:	10600545
FCC ID	:	CE Approval
Power type	:	Powered by PC
Power cable	:	Shielded, 1.8m length, No ferrite bead data cable

Wireless Receiver	**:**	**Chic Technology Corp.**
Model No.	:	RMO241
Serial No.	:	N/A
FCC ID	:	Doc Approved
Power type	:	By PC

Chapter 2 Conducted Emission Test

Test Condition and Setup:

All the equipment is placed and setup according to the standard.
The EUT is assembled on a wooden table that is 80 cm high, is placed 40 cm from the back-wall that is a vertical conducting plane. One LISN is for EUT, the other LISN is for support equipment. They are all placed on the conductive ground. The EUT's LISN connect a line switch box for selecting L1 or L2, then connect to a preamplifier and Spectrum.

The spectrum measured from 150KHz to 30MHz. Conducted emission levels are detected at max. peak mode. But if the max. peak mode failed or over average limit, it will be measured by QP and average detection mode using the Receiver.

Final AC Power line Conducted Emission Measurement set the measurement equipment in Average Detector mode, Re-test all the frequencies that conducted emission level over the limit, if the Quasi-Peak Detector measurement result higher than the Average Detector measurement result 6 dB above at same frequency, than that frequency emission type category as Broad Band Noise. The Quasi-Peak Detector measure result will minus 13dB. As measured result.

While testing, there is the worst-emission plot printed at peak detection mode, and there are more than 6 highest emissions relative to limit recorded. The plot is kept as the original data, not included in test report.

List of test Instrument :

				Calibration Date	
Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum analyzer	8591EM	H P	3710A01203	05/13/04	05/12/05
LISN (EUT)	3825/2	EMCO	9411-2284	07/21/04	07/20/05
LISN (Support E.)	3825/2	EMCO	9210-2007	09/03/04	09/02/05
Preamplifier	CB-001	TRC	98-02	05/29/04	05/28/05
Line switch box	CB-01	TRC	98-04	05/29/04	05/28/05
FTB-1-6 Attenuator	15542	mini-circuits	9620 03	05/29/04	05/28/05
20dB Attenuator	CAT-20	mini-circuits	9620 13	05/29/04	05/28/05
Coixal Cable	BNC3200B-0058	Jyebao	CL-05	05/29/04	05/28/05
Coixal Cable	BNC31VB-0316	Jyebao	IF-01ca0069-036	05/29/04	05/28/05
50ohm terminator	370BNM	NARDA	PWR5W	07/21/04	07/20/05
50ohm terminator	370BNM	NARDA	PWR5W	07/21/04	07/20/05
50ohm terminator	370BNM	NARDA	PWR5W	09/03/04	09/02/05
50ohm terminator	370BNM	NARDA	PWR5W	09/03/04	09/02/05

The level of confidence of 95% , the uncertainty of measurement of conducted emission is +3.1/-4.84 dB .

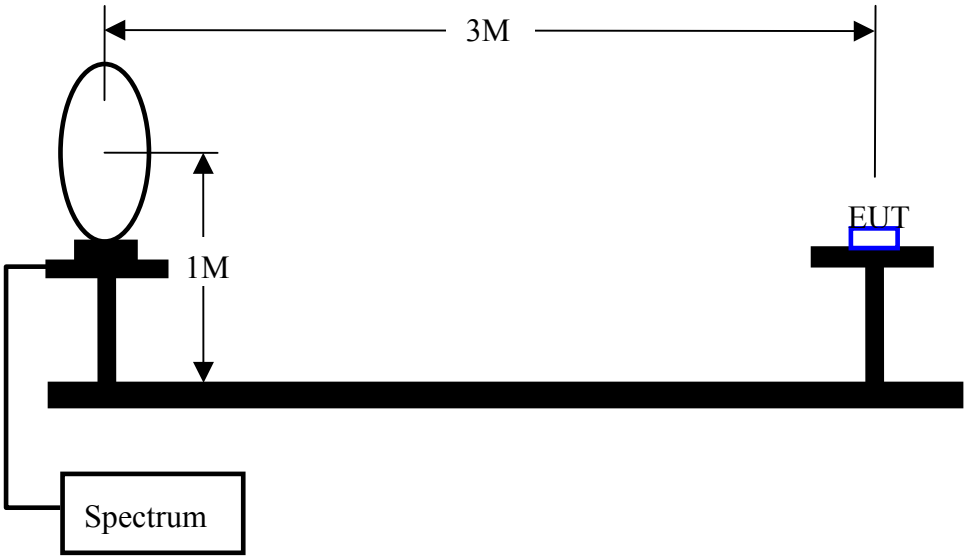
Test Result: Pass (Appendix A)

Conducted Test Placement: (Photographs)(Test mode: #2)

Chapter 3 Peak Power Measurement (Frequency Band: 26.96 ~ 27.28)

Test Setup:

1. Test Setup:



2. Test Procedure:

a. The EUT was setup in the anechoic chamber as shown above.
b. The loop antenna was located upon its plane vertical, 3-meter distance from the EUT. The center of the loop is 1-meter above the ground plane.
c. In order to find the maximum radiation, the EUT was rotated 360°. The measuring antenna was rotated about its axis at each azimuth about the EUT.

List of test Instrument :

				Calibration Date	
Instrument Name	**Model No.**	**Brand**	**Serial No.**	**Last time**	**Next time**
Receiver	SCR3102	SCHAFFNER	012	05/13/04	05/12/05
Control Box	TWR95-4	TRC	C9001-2	N/A	N/A
Antenna	6502	EMCO	9206-2777	06/10/04	06/09/05
Open test side				05/29/04	05/28/05
Pre-amplifier	TRC-CB-2	TRC	CB-002	05/29/04	05/28/05
Coaxial Cable (20meter)	RG-214/U	Jyebao	CL-002	05/29/04	05/28/05
Coaxial Cable (50cm)	BNC31VB-0316	Jyebao	CL-002	05/29/04	05/28/05
Coaxial Cable (20cm)	BNC31VB-0318	Jyebao	CL-007	05/29/04	05/28/05
Coaxial Cable (55cm)	BNC31VB-0316	Jyebao	CL-006	05/29/04	05/28/05
Coaxial Cable (55cm)	BNC31VB-0316	Jyebao	CL-005	05/29/04	05/28/05

The level of confidence of 95%, the uncertainty of measurement of radiated emission is +2.85/-2.77 dB.

Test Result : Pass

Chapter 4 Radiated Emission Test

Test Condition and Setup:

Pretest : Prior to the final test ,the EUT is placed in an anechoic chamber, and scan from 30MHz to 1GHz. The devices rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit. This is done to ensure the radiation exactly emits form the EUT.

Final test: Final radiation measurement was made on a **3 – meter** open-field test site. The EUT's maximum emission of radiation is placed on a nonconductive table, which is 0.8m height, the top surface is 1.0 x 1.5 meter. All placement is according to standard.

The emissions was examined from 30 MHz to 1000 MHz measured by receiver.

The whole range Antenna is used to measure frequency from 30 MHz to 1 GHz. The final test is used the receiver.

Measure more than six top marked frequencies generated form pretest by computer step by step at each frequency. The EUT is rotated 360 degrees, and antenna is raised and lowered from 1 to 4 meters to find the maximum emission levels. The antenna is used with both horizontal and vertical polarization.

Appropriated preamplifier, which is made by TRC is used for improving sensitivity and precautions is taken to avoid overloading. The spectrum analyzer's 6dB bandwidth is set to 120 KHz, and the EUT is measured at quasi-peak mode.

If the emission is close to the frequency band of ambient, the tester will recheck the data and the corrected data will be written in the test data sheet. If the emission is just within the ambient, the data from shield room will be taken as the final data.

List of test Instrument :

				Calibration Date	
Instrument Name	**Model No.**	**Brand**	**Serial No.**	**Last time**	**Next time**
Receiver	SCR3102	SCHAFFNER	012	05/13/04	05/12/05
Control Box	TWR95-4	TRC	C9001-2	N/A	N/A
Antenna	6502	EMCO	9206-2777	06/10/04	06/09/05
Open test side				05/29/04	05/28/05
Pre-amplifier	TRC-CB-2	TRC	CB-002	05/29/04	05/28/05
Coaxial Cable (20meter)	RG-214/U	Jyebao	CL-002	05/29/04	05/28/05
Coaxial Cable (50cm)	BNC31VB-0316	Jyebao	CL-002	05/29/04	05/28/05
Coaxial Cable (20cm)	BNC31VB-0318	Jyebao	CL-007	05/29/04	05/28/05
Coaxial Cable (55cm)	BNC31VB-0316	Jyebao	CL-006	05/29/04	05/28/05
Coaxial Cable (55cm)	BNC31VB-0316	Jyebao	CL-005	05/29/04	05/28/05

The level of confidence of 95%, the uncertainty of measurement of radiated emission is +2.85/-2.77 dB.

Test Result : Pass (Appendix B)

Radiated Test Placement: (Photographs)

Appendix A

Conducted Emission Test Result: (Test mode: #2)

Testing room : Temperature : 23 ° C Humidity : 70 % RH

Line 1

Frequency (KHz)	*READING AMPLITUDE*			*LIMIT*		*Margin (dB)*
	Peak (dBμV)	*Quasi-Peak (dBμV)*	*Average (dBμV)*	*Quasi-Peak (dBμV)*	*Average (dBμV)*	
155.00	34.87	***.**	***.**	65.86	55.86	-20.99
173.00	33.82	***.**	***.**	65.34	55.34	-21.52
215.00	32.44	***.**	***.**	64.14	54.14	-21.70
580.00	32.29	***.**	***.**	56.00	46.00	-13.71
724.00	29.66	***.**	***.**	56.00	46.00	-16.34
10150.00	34.45	***.**	***.**	60.00	50.00	-15.55

Line 2

Frequency (KHz)	*READING AMPLITUDE*			*LIMIT*		*Margin (dB)*
	Peak (dBμV)	*Quasi-Peak (dBμV)*	*Average (dBμV)*	*Quasi-Peak (dBμV)*	*Average (dBμV)*	
164.00	32.32	***.**	***.**	65.60	55.60	-23.28
266.00	31.62	***.**	***.**	62.69	52.69	-21.06
488.00	30.40	***.**	***.**	56.34	46.34	-15.94
599.00	30.19	***.**	***.**	56.00	46.00	-15.81
682.00	29.57	***.**	***.**	56.00	46.00	-16.43
10180.00	33.13	***.**	***.**	60.00	50.00	-16.87

****The reading amplitudes are all under limit.***

Appendix B

Peak Power Test Result: (Horizontal) (Test mode: #1)

Frequency	Reading Amplitude	Correction Factors	Corrected Amplitude	Limit	Margin
MHz	dBμV/m	dB	dBμV/m	dBμV/m	dB
27.0995	51.02	-8.30	42.72	80.00	-37.28

Radiated Emission Test Result: (Horizontal) (Test mode: #1)

Test Conditions:

Testing site : Temperature : 27 ° C Humidity : 80 % RH

Frequency	Reading Amplitude	Ant. Height	Table	Correction Factors	Corrected Amplitude	Limit	Margin
MHz	dBμV	m	degree	dB/m	dBμV/m	dBμV/m	dB
270.9863	30.00	0.97	8	-1.11	28..89	46.02	-17.13
298.0840	35.33	1.10	0	-1.40	33.93	46.02	-12.09
325.1820	35.24	0.99	42	0.11	35.35	46.02	-10.67
352.2803	32.88	1.00	41	1.83	34.71	46.02	-11.31
433.5765	21.50	0.98	41	5.27	26.77	46.02	-19.25
***							

Note:

1. Margin = Amplitude – limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude – Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude gain)

(For example : 30MHz correction factor = 15.5 + (–15.26) = 0.24 dB/m)

Peak Power Test Result: (Vertical) (Test mode: #1)

Frequency	Reading Amplitude	Correction Factors	Corrected Amplitude	Limit	Margin
MHz	dBμV	dB/m	dBμV	dBμV/m	dB
27.0995	44.44	-8.30	36.14	80.00	-43.86

Radiated Emission Test Result: (Vertical) (Test mode: #1)

Test Conditions:

Testing site : Temperature : 27 ° C Humidity : 80 % RH

Frequency	Reading Amplitude	Ant. Height	Table	Correction Factors	Corrected Amplitude	Limit	Margin
MHz	dBμV	m	degree	dB/m	dBμV/m	dBμV/m	dB
54.1825	36.51	1.00	0	-6.25	30.26	40.00	-9.74
81.2975	41.37	1.00	285	-9.88	31.49	40.00	-8.51
270.9863	31.80	2.09	85	-1.11	30.69	46.02	-15.33
298.0865	27.82	1.76	0	-1.40	26.42	46.02	-19.60
325.0853	25.89	0.99	134	0.11	26.00	46.02	-20.02
***							

Note:

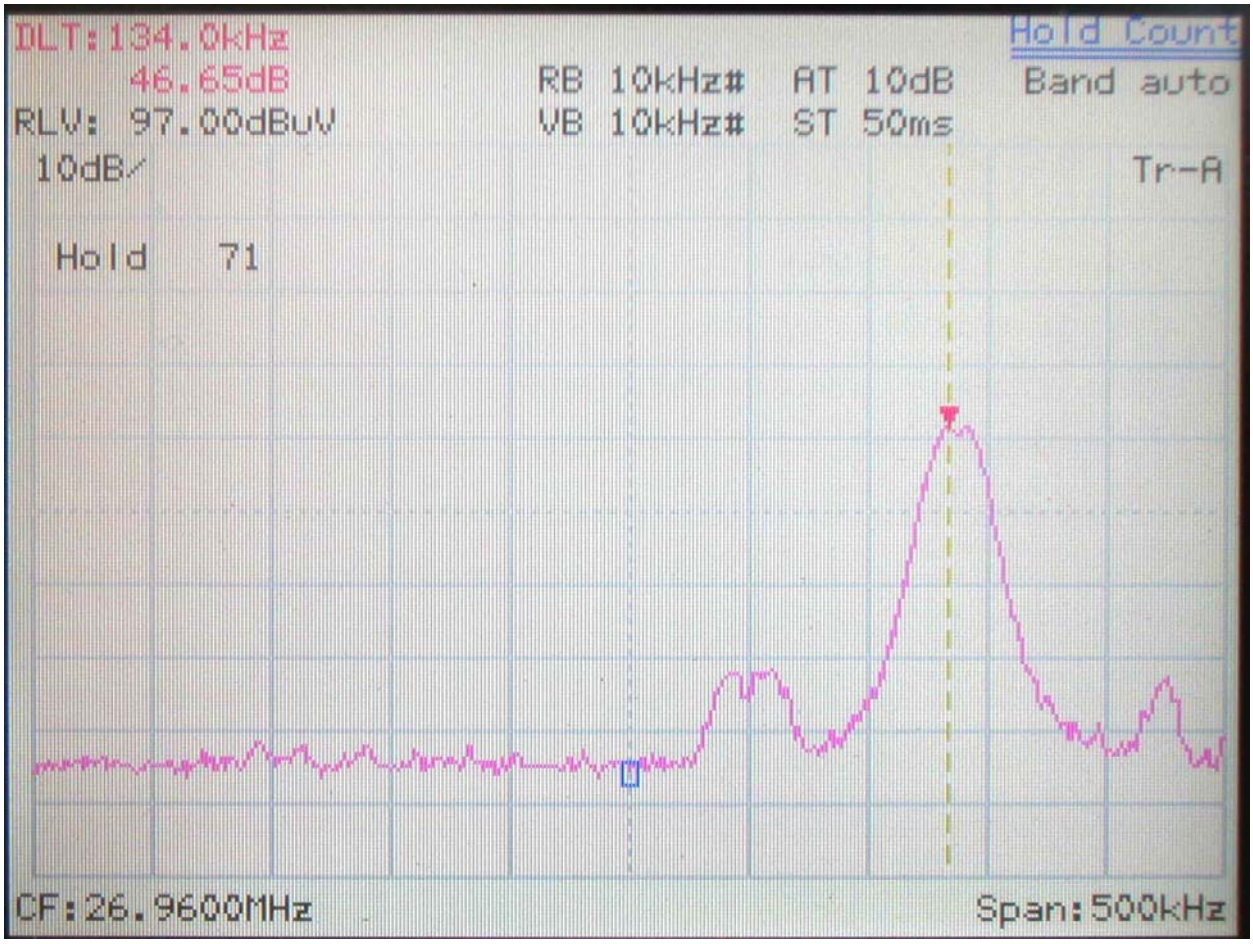
1. Margin = Amplitude – limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude – Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude gain)

(For example : 30MHz correction factor = 15.5 + (–15.26) = 0.24 dB/m)

Appendix C

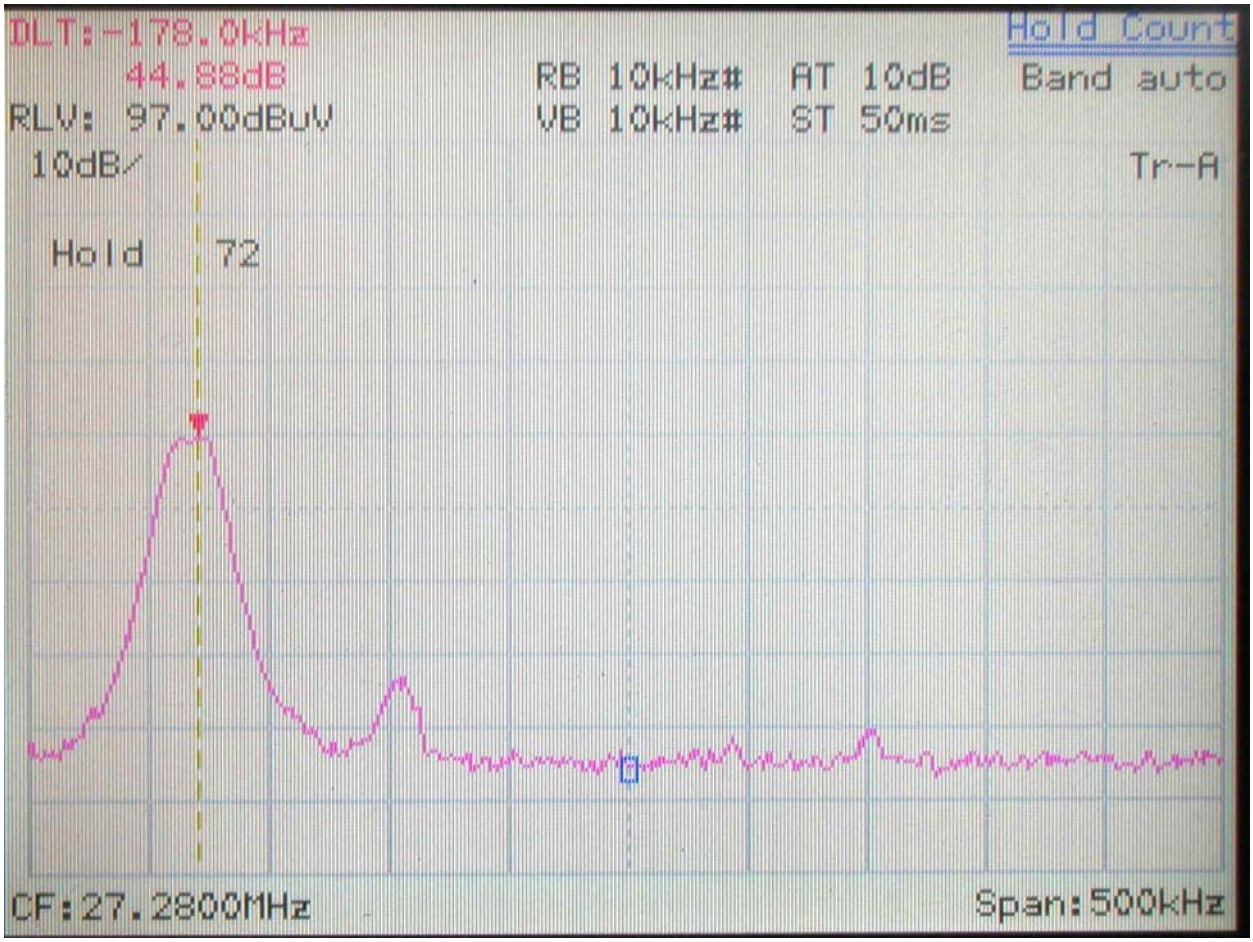
Band Edge of Measurement: (Frequency Band: 26.96 ~ 27.28)

Lower channel



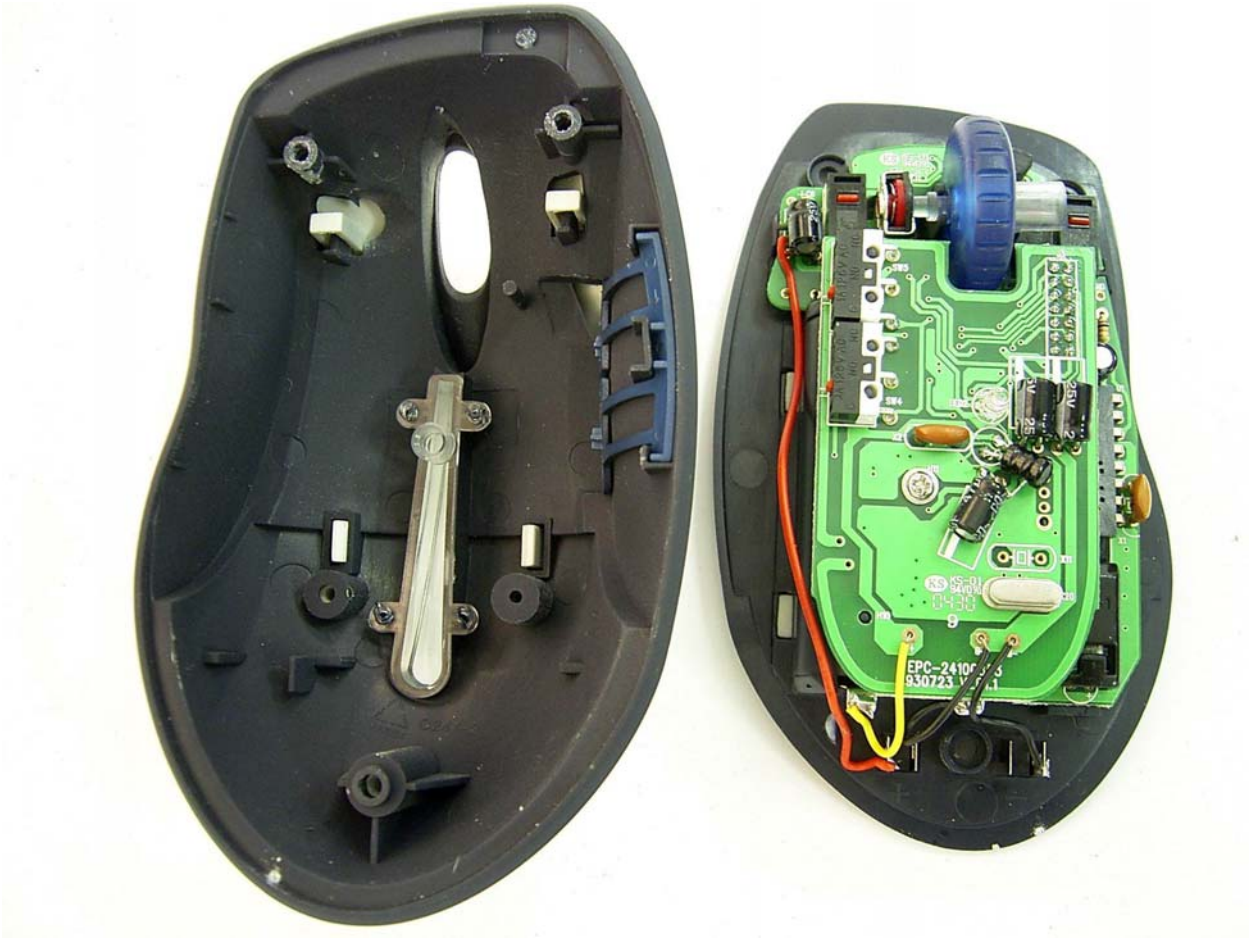
26.96MHz << Class B Limit.

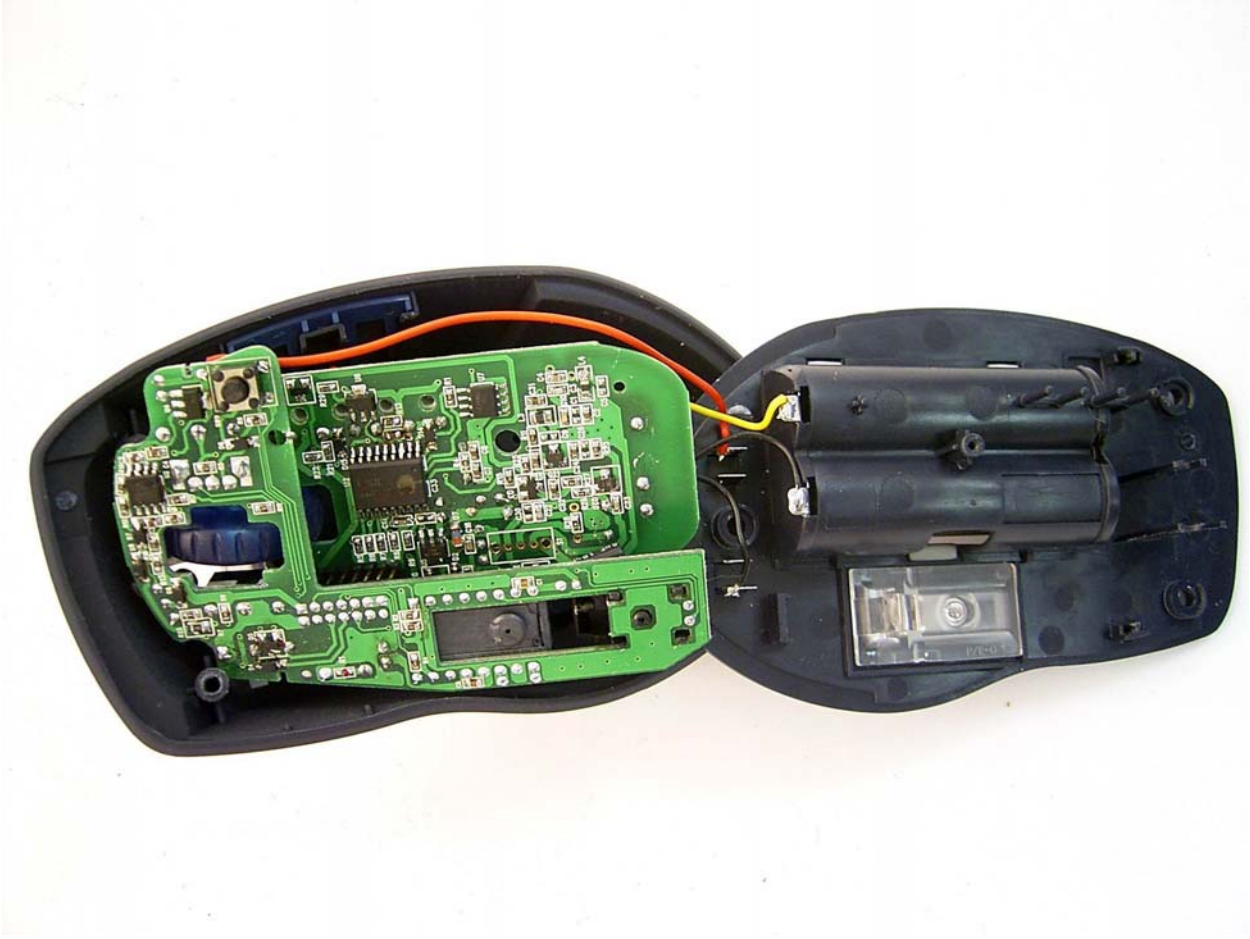
Upper channel:

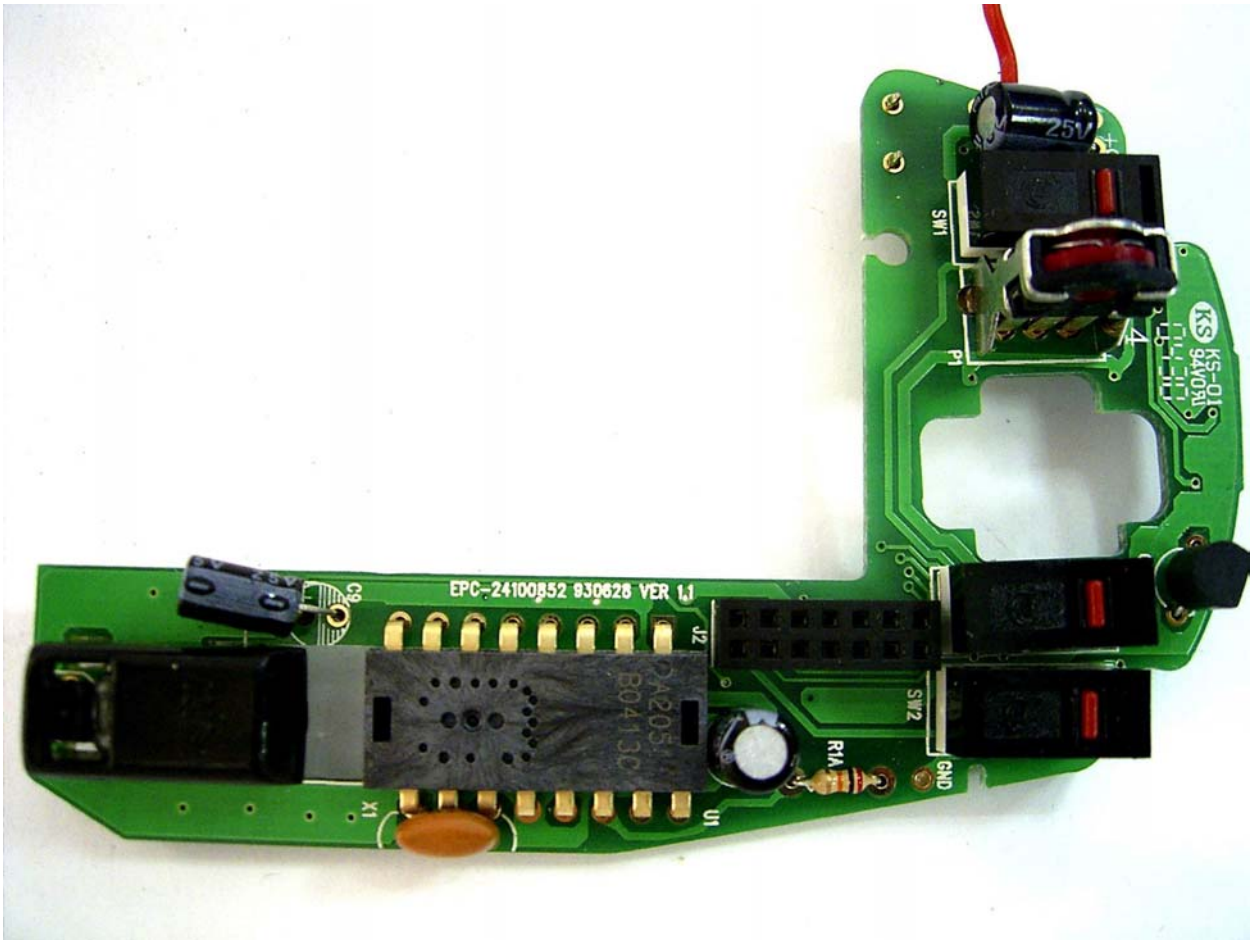


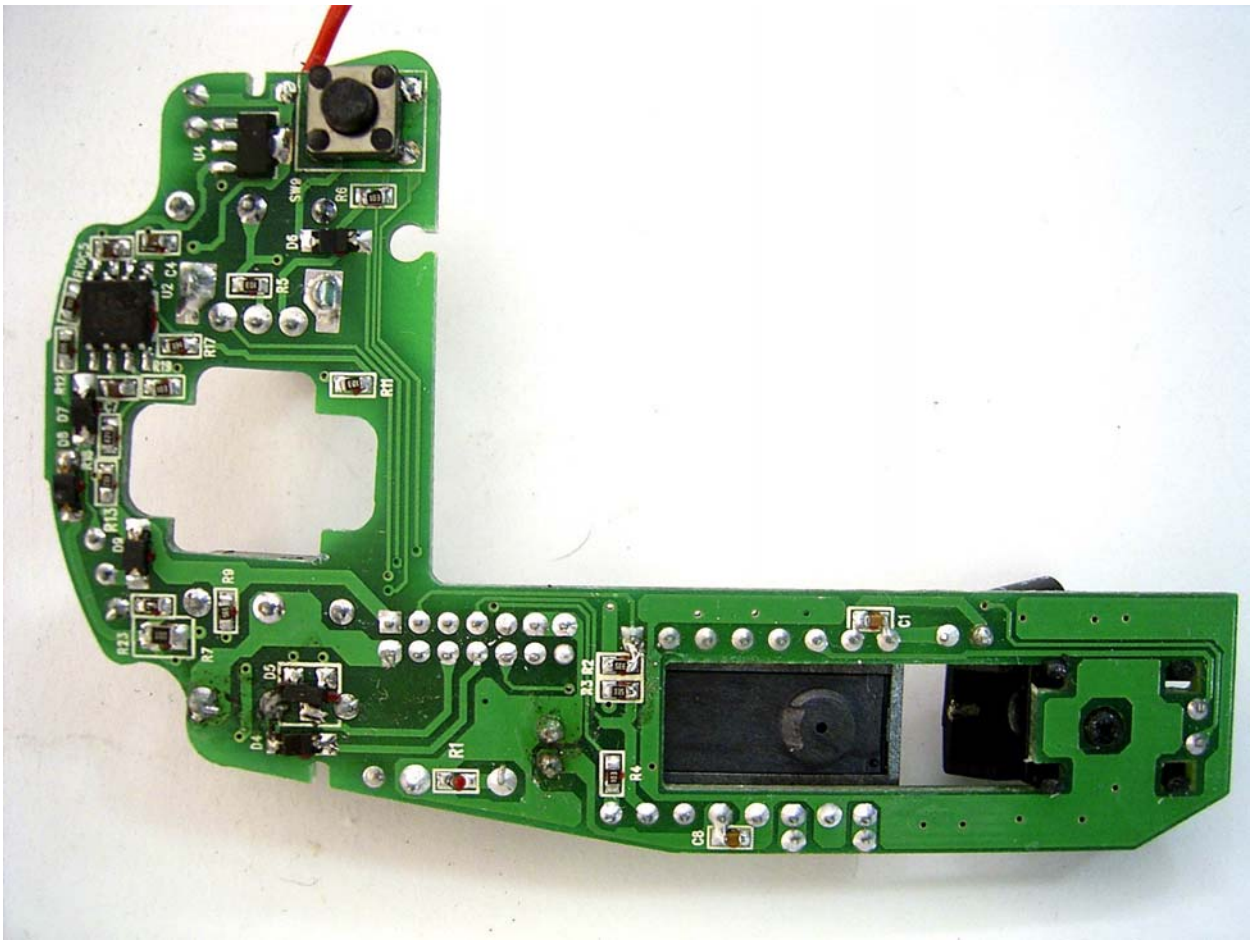
27.28 MHz << Class B Limit.

OPEN






EPC-24100852 930628 VER 1.1
25V
SW1
P1
KS-01
94V0
J2
SW2
R1A
GND
X1
U1


U4
SW9
R6
D6
U2
C4
R5
R17
R11
R9
R7
D5
D4
R1
R4
C1
C8

J3
25V
25V
LED2
X2
SW5
SW4
H11
H10
X11
X20
KS-01
94V0R1
EPC 24100
930723

Q1
R29
U6
R13
R1
U7
C31
C4
L4
C3
C1
C10
C5
C2
L3
R11
C9
C26
R25
R23
R22
R21
D15
U2
C6
D14
R4
C8
C7
R15
Q21
C24
R27
C33
C17
D7
C18
C30
C22
C32
R26
Q20
C23
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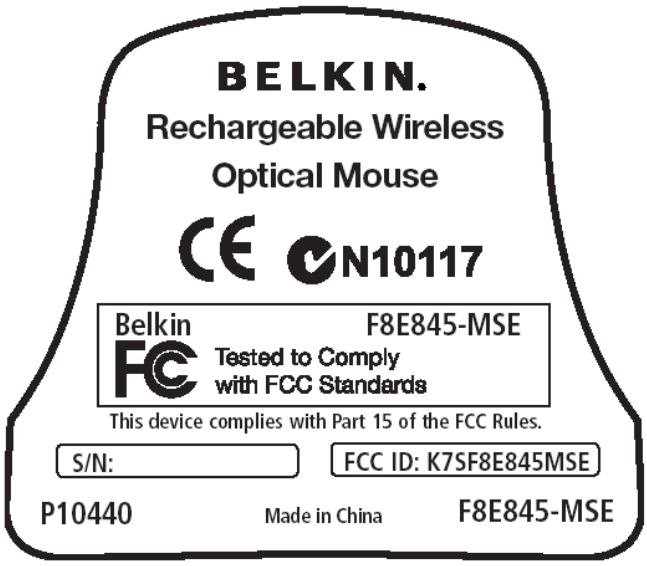
R7
R8
R9
U5
D2
S1
Q22
R30
R20
C20

LABEL Format:



LABEL Size: 55.4 x 33.09 mm

LABEL Position: