

# FCC PART 15 B

## MEASUREMENT AND TEST REPORT

For

**RF Magnetics Ltd.**

Rm.512, 5/F, ICDevelopmentCentre, 6 ScienceParkAve. West, HKSTP,  
Shatin, N.T. Hong Kong.

**MODEL: VP-4**

January 15, 2010

<b>This Report Concerns:</b>	<b>Equipment Type:</b>
<input checked="" type="checkbox"/> Original Report	Receiver of Wireless Foot Pedal
<b>Test By:</b>	Steven Zou/
<b>Report Number:</b>	<b>BCT09LR-1277E-2</b>
<b>Test Date:</b>	January 01~ 15, 2009
<b>Reviewed By:</b>	Thom Chen/
<b>Approved By:</b>	Kendy Wang/
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# 1 - GENERAL INFORMATION

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## 1.1 Product Description for Equipment Under Test (EUT)

### Client Information

Applicant: **RF Magnetics Ltd.**  
Address of applicant: Rm.512, 5/F, ICDevelopmentCentre, 6 ScienceParkAve. West, HKSTP, Shatin, N.T. Hong Kong.  
Manufacturer: **RF Magnetics Ltd.**  
Address of manufacturer: Rm.512, 5/F, ICDevelopmentCentre, 6 ScienceParkAve. West, HKSTP, Shatin, N.T. Hong Kong.

### General Description of E.U.T

EUT Description: **Receiver of Wireless Foot Pedal**  
Trade Name: N.A.  
Model No.: **VP-4**  
Power Rating: DC 5V from PC USB port

Remark: \* *The test data gathered are from the production sample provided by the manufacturer.*

## 1.2 Test Standards

The following Declaration of Conformity report of EUT is prepared in accordance with  
FCC Rules and Regulations Part 15 Subpart B 2006

The objective of the manufacturer is to demonstrate compliance with the described above standards.

## 1.3 Test Summary

For the EUT described above. The standards used were FCC Part 15 Subpart B for Emissions

Table 1 : Tests Carried Out Under FCC Part 15 Subpart B

Standard	Test Items	Status
FCC Part 15 Subpart B	Conduction Emission, 0.15MHz to 30MHz	✓
FCC Part 15 Subpart B	Radiation Emission, 30MHz to 1000MHz	✓

✓ Indicates that the test is applicable  
✗ Indicates that the test is not applicable

## **1.4 Test Methodology**

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

The maximum emission levels emanating from the device are compared to the FCC Part 15 Subpart B limits for radiation emissions and the measurement results contained in this test report show that EUT is to be technically compliant with FCC requirements.

All measurement required was performed at BONTEK COMPLIANCE TESTING LABORATORY LTD. at 1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China

## **1.5 Test Facility**

The test facility is recognized, certified, or accredited by the following organizations:

### **FCC – Registration No.: 338263**

BONTEK COMPLIANCE TESTING LABORATORY LTD. , EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 338263, March, 2008.

### **IC Registration No.: 7631A**

The 3m alternate test site of BONTEK COMPLIANCE TESTING LABORATORY LTD. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 7631A on August 2009.

### **CNAS - Registration No.: L3923**

BONTEK COMPLIANCE TESTING LABORATORY LTD. to ISO/IEC 17025:25 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

The acceptance letter from the CNAS is maintained in our files: Registration:L3923,February,2009.

### **TUV - Registration No.: UA 50145371-0001**

BONTEK COMPLIANCE TESTING LABORATORY LTD. An assessment of the laboratory was conducted according to the"Procedures and Conditions for EMC Test Laboratories"with reference to EN ISO/IEC 17025 by a TUV Rheinland auditor. Audit Report NO. 17010783-001

## 1.6 Test Equipment List and Details

Test equipments list of BONTEK COMPLIANCE TESTING LABORATORY LTD. .

No.	Instrument no.	Equipment	Manufacturer	Model No.	S/N	Calculator date	Calculator due date
1	BCT-EMC001	EMI Test Receiver	R&S	ESCI	100687	2009-4-14	2010-4-13
2	BCT-EMC002	EMI Test Receiver	R&S	ESPI	100097	2009-4-14	2010-4-13
3	BCT-EMC003	Amplifier	HP	8447D	1937A02492	2009-4-14	2010-4-13
4	BCT-EMC004	Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	07101	2009-4-14	2010-4-13
5	BCT-EMC005	Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	07102	2009-4-14	2010-4-13
6	BCT-EMC006	Power Clamp	SCHWARZBECK	MDS-21	3812	2009-4-14	2010-4-13
7	BCT-EMC007	Positioning Controller	C&C	CC-C-1F	MF7802113	N/A	N/A
8	BCT-EMC008	Electrostatic Discharge Simulator	TESEQ	NSG437	125	2009-4-14	2010-4-13
9	BCT-EMC009	Fast Transient Burst Generator	SCHAFFNER	MODULA6150	34572	2009-4-14	2010-4-13
10	BCT-EMC010	Fast Transient Noise Simulator	Noiseken	FNS-105AX	31485	2009-4-14	2010-4-13
11	BCT-EMC011	Color TV Pattern Generator	PHILIPS	PM5418	TM209947	N/A	N/A
12	BCT-EMC012	Power Frequency Magnetic Field Generator	EVERFINE	EMS61000-8K	608002	2009-4-14	2010-4-13
13	BCT-EMC013	N/A	N/A	N/A	N/A	N/A	N/A
14	BCT-EMC014	Capacitive Coupling Clamp	TESEQ	CDN8014	25096	2009-4-14	2010-4-13
15	BCT-EMC015	High Field Biconical Antenna	ELECTRO-METRICS	EM-6913	166	2009-4-14	2010-4-13
16	BCT-EMC016	Log Periodic Antenna	ELECTRO-METRICS	EM-6950	811	2009-4-14	2010-4-13

17	BCT-EMC017	Remote Active Vertical Antenna	ELECTRO-METRICS	EM-6892	304	2009-4-14	2010-4-13
18	BCT-EMC018	TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	9163-324	2009-4-14	2010-4-13
19	BCT-EMC019	Horn Antenna	SCHWARZBECK	BBHA9120A	B08000991-0001	2009-4-14	2010-4-13
20	BCT-EMC020	Teo Line Single Phase Module	SCHWARZBECK	NSLK8128	D-69250	2009-4-14	2010-4-13
21	BCT-EMC021	10dB attenuator	SCHWARZBECK	MTAIMP-136	R65.90.0001#06	2009-4-14	2010-4-13
22	BCT-EMC022	Electric bridge	Zentech	100 LCR METER	803024	N/A	N/A
23	BCT-EMC023	RF Current Probe	FCC	F-33-4	80	2009-4-14	2010-4-13
24	BCT-EMC024	SIGNAL GENERATOR	HP	8647A	3349A02296	2009-4-14	2010-4-13
25	BCT-EMC025	MICROWAVE AMPLIFIER	HP	8349B	2627A00994	2009-4-14	2010-4-13
26	BCT-EMC026	Triple-Loop Antenna	EVERFINE	LLA-2	607004	2009-4-14	2010-4-13
27	BCT-EMC027	CDN	FRANKONIA	M2+M3	A3027019	2009-10-20	2010-10-19
28	BCT-EMC028	6dB Attenuator	FRANKONIA	75-A-FFN-06	1001698	2009-10-20	2010-10-19
29	BCT-EMC029	EMV-Mess-Systeme GMBH	FRANKONIA	FLL-75	1020A1109	2009-10-20	2010-10-19
30	BCT-EMC030	EM Injection Clamp	FCC	F-203I-13mm	091536	2009-10-20	2010-10-19
31	BCT-EMC031	9KHz-2.4GHz Signal generator	MARCONI INSTRUMENTS	2024	112260/042	2009-10-20	2010-10-19

## **2 - SYSTEM TEST CONFIGURATION**

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### **2.1 Justification**

The system was configured for testing in a typical fashion (as Normal used by a typical user).

### **2.2 EUT Exercise Software**

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software offered by manufacturer, can let the EUT being Normal operation.

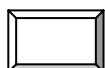
### **2.3 Special Accessories**

As shown in section 2.5, interface cable used for compliance testing is shielded as Normal Operation only supplied by **RF Magnetics Ltd.** and its respective support equipment manufacturers.

### **2.4 Equipment Modifications**

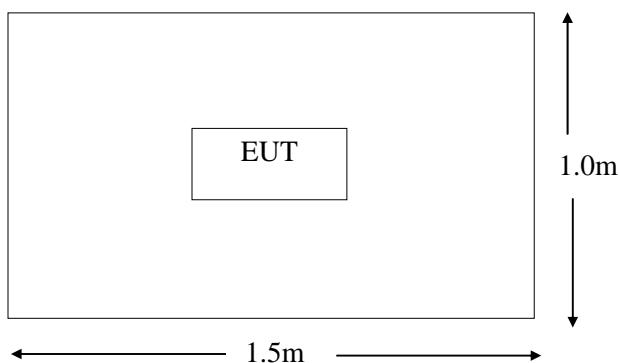
The EUT tested was not modified by BCT.

### **2.5 Configuration of Test System**



EUT

### **2.6 Test Setup Diagram**



### 3 - DISTURBANCE VOLTAGE AT THE MAINS TERMINALS

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#### 3.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is 3.4 dB.

#### 3.2 Limit of Disturbance Voltage at The Mains Terminals

Frequency Range (MHz)	Limits ( dBuV)	
	Quasi-Peak	Average
0.150~0.500	66~56	56~46
0.500~5.000	56	46
5.000~30.00	60	50

Note: (1)The tighter limit shall apply at the edge between two frequency bands.

#### 3.3 EUT Setup

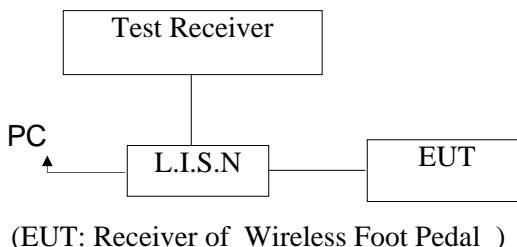
The setup of EUT is according with ANSI C63.4-2009 measurement procedure. The specification used was the FCC Rules and Regulations Part 15 Subpart B limits.

The EUT was placed center and the back edge of the test table.

The AV cables were draped along the test table and bundled to 30-40cm in the middle.

The spacing between the peripherals was 10 cm.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.



(EUT: Receiver of Wireless Foot Pedal )

#### 3.4 Instrument Setup

The test receiver was set with the following configurations:

Test Receiver Setting:

Frequency Range.....150 KHz to 30 MHz  
Detector.....Peak & Quasi-Peak & Average  
Sweep Speed.....Auto  
IF Band Width.....9 KHz

### 3.5 Test Procedure

During the conducted emission test, the EUT power cord was connected to the auxiliary outlet of the first Artificial Mains.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination.

All data was recorded in the peak detection mode. Quasi-peak and Average readings were only performed when an emission was found to be marginal (within -10 dB $\mu$ V of specification limits). Quasi-peak readings are distinguished with a "QP". Average readings are distinguished with a "AV".

### 3.6 Summary of Test Results

According to the data in section 3.6, the EUT complied with the FCC Part 15 B Conducted margin, with the *worst* margin reading of:

### 3.7 Disturbance Voltage Test Data

Temperature ( °C )	22~25
Humidity ( %RH )	50~55
Barometric Pressure ( mbar )	950~1000
EUT	Receiver of Wireless Foot Pedal
M/N	VP-4
Operating Mode	Normal Operation

Test data see following pages

**Remark:** (1) When PK reading is less than relevant limit 20dB, the QP reading and AV reading will not be recorded.  
(2) Where QP reading is less than relevant AV limit, the AV reading will not be measured

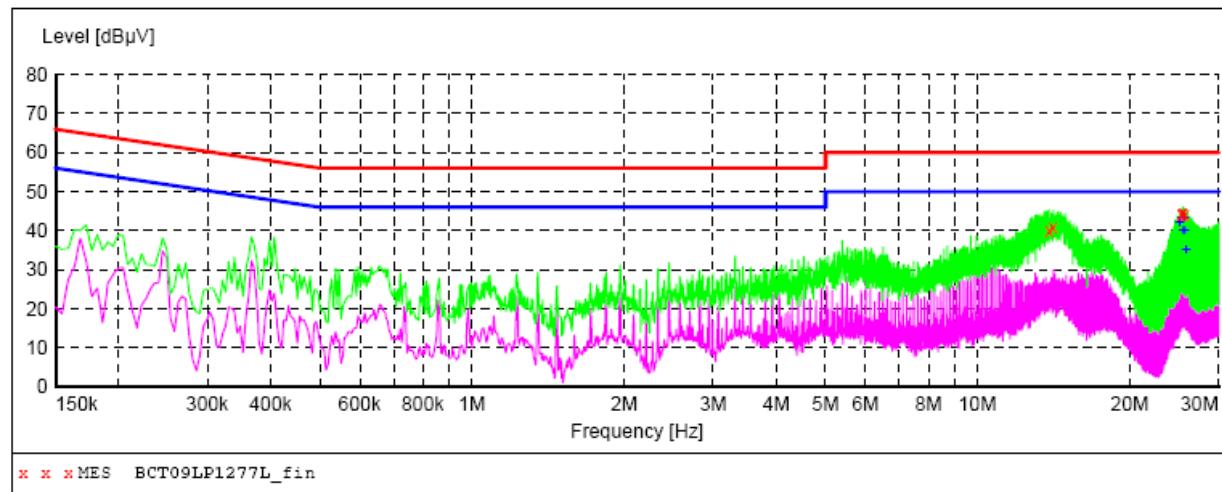
### 3.8 Test Result

**PASS**

## Conducted Emission Test Data

EUT: Receiver of Wireless Foot Pedal M/N: VP-4  
 Operating Condition: Normal Operation  
 Test Site: Shielded Room  
 Operator: Yang  
 Test Specification: AC 230V/50Hz  
 Comment: Live Line  
 Tem:24°C Hum:55%

**SCAN TABLE: "Voltage (150K-30M) FIN"**  
Short Description: 150K-30M Voltage



### MEASUREMENT RESULT: "BCT09LP1277L\_fin"

1/8/2010 14:01

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
13.857000	40.00	10.8	60	20.0	QP	L1	GND
14.113500	40.80	10.8	60	19.2	QP	L1	GND
25.269000	44.30	11.1	60	15.7	QP	L1	GND
25.395000	44.50	11.1	60	15.5	QP	L1	GND
25.516500	44.50	11.1	60	15.5	QP	L1	GND
25.764000	44.30	11.1	60	15.7	QP	L1	GND

### MEASUREMENT RESULT: "BCT09LP1277L\_fin2"

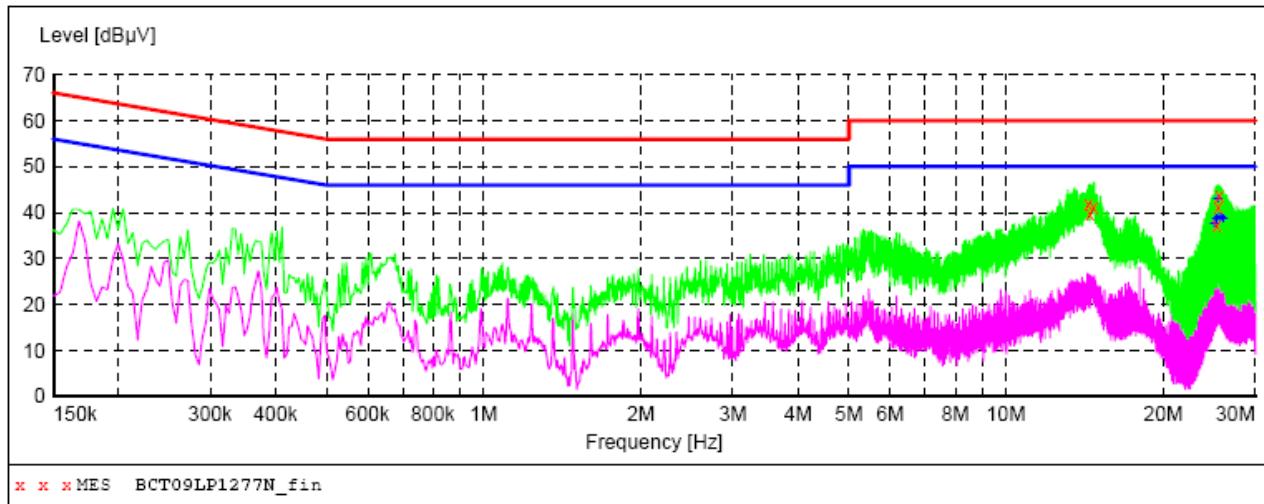
1/8/2010 14:01

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
25.147500	42.30	11.0	50	7.7	AV	L1	GND
25.395000	43.40	11.1	50	6.6	AV	L1	GND
25.516500	40.30	11.1	50	9.7	AV	L1	GND
25.642500	43.40	11.1	50	6.6	AV	L1	GND
25.764000	40.20	11.1	50	9.8	AV	L1	GND
25.885500	35.30	11.1	50	14.7	AV	L1	GND

## Conducted Emission Test Data

EUT: Receiver of Wireless Foot Pedal M/N: VP-4  
 Operating Condition: Normal Operation  
 Test Site: Shielded Room  
 Operator: Yang  
 Test Specification: AC 120V/60Hz  
 Comment: Neutral Line  
 Tem:24°C Hum:55%

**SCAN TABLE: "Voltage (150K-30M) FIN"**  
Short Description: 150K-30M Voltage



### MEASUREMENT RESULT: "BCT09LP1277N\_fin"

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
14.370000	41.90	10.7	60	18.1	QP	N	GND
14.487000	39.70	10.7	60	20.3	QP	N	GND
14.694000	41.10	10.7	60	18.9	QP	N	GND
25.323000	37.30	11.1	60	22.7	QP	N	GND
25.449000	41.00	11.1	60	19.0	QP	N	GND
25.575000	43.70	11.1	60	16.3	QP	N	GND

### MEASUREMENT RESULT: "BCT09LP1277N\_fin2"

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
25.080000	37.70	11.0	50	12.3	AV	N	GND
25.327500	38.70	11.1	50	11.3	AV	N	GND
25.453500	42.80	11.1	50	7.2	AV	N	GND
25.575000	39.00	11.1	50	11.0	AV	N	GND
25.822500	39.10	11.1	50	10.9	AV	N	GND
26.070000	38.50	11.1	50	11.5	AV	N	GND

## 4 - RADIATED DISTURBANCES

### 4.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is 4.0 dB.

### 4.2 Limit of Radiated Disturbances

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dB $\mu$ V/m)
30 ~ 88	3	40
88~216	3	43.5
216 ~ 960	3	46
960 ~ 1000	3	54

Note: (1) The tighter limit shall apply at the edge between two frequency bands.  
(2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

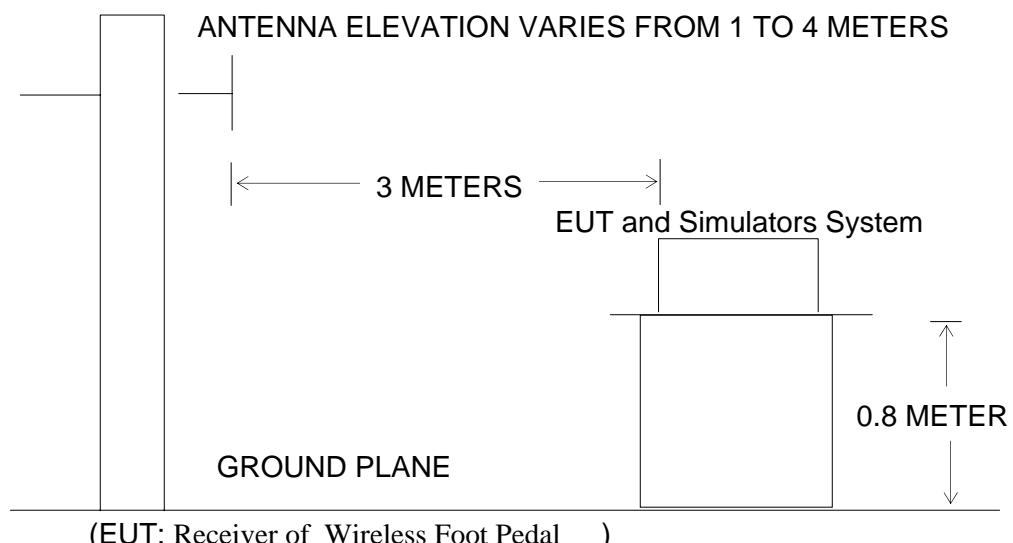
### 4.3 EUT Setup

The radiated emission tests were performed in the in the 3-meter anechoic chamber, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC Part 15 Subpart B limits.

The EUT was placed on the center of the test table.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

Block diagram of test setup (In chamber)



#### 4.4 Test Receiver Setup

According to FCC Part 15 rule, the frequency was investigated from 30 to 1000 MHz. During the radiated emission test, the test receiver was set with the following configurations:

Test Receiver Setting:

Detector.....Peak & Quasi-Peak  
IF Band Width.....120KHz  
Frequency Range.....30MHz to 1000MHz  
Turntable Rotated.....0 to 360 degrees

Antenna Position:

Height.....1m to 4m  
Polarity.....Horizontal and Vertical

#### 4.5 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within  $-10 \text{ dB}\mu\text{V}$  of specification limits), and are distinguished with a "QP" in the data table.

#### 4.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of  $-7 \text{ dB}\mu\text{V}$  means the emission is  $7 \text{ dB}\mu\text{V}$  below the maximum limit for Subpart B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corr. Ampl.}$$

#### 4.7 Radiated Emissions Test Result

Temperature ( °C )	22~25
Humidity ( %RH )	50~54
Barometric Pressure ( mbar )	950~1000
EUT	Receiver of Wireless Foot Pedal
M/N	VP-4
Operating Mode	Normal Operation

Test data see following pages

**Remark:** (1) When PK reading is less than relevant limit 20dB, the QP reading and AV reading will not be recorded.  
(2) Where QP reading is less than relevant AV limit, the AV reading will not be measured

#### 4.8 Test Result

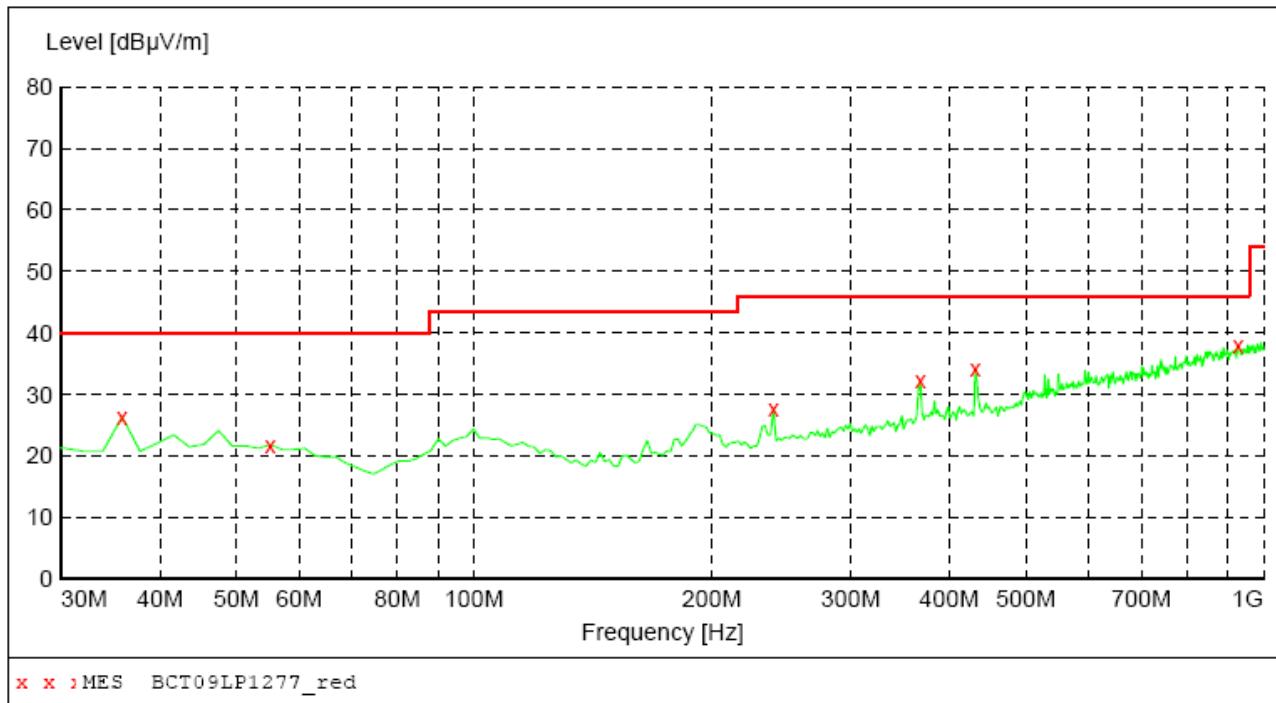
**PASS**

## Radiated Emission Test Data:

EUT: Receiver of Wireless Foot Pedal M/N: VP-4  
 Operating Condition: Normal Operation  
 Test Site: 3m CHAMBER  
 Operator: Chen  
 Test Specification: AC 120V/60Hz  
 Comment: Polarization: Horizontal  
 Tem:25°C Hum:50%

### ***SWEET TABLE: "test (30M-1G)"***

Short Description:		Field Strength			
Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	VULB9163 NEW



### ***MEASUREMENT RESULT: "BCT09LP1277\_red"***

01/08/2010 23:07

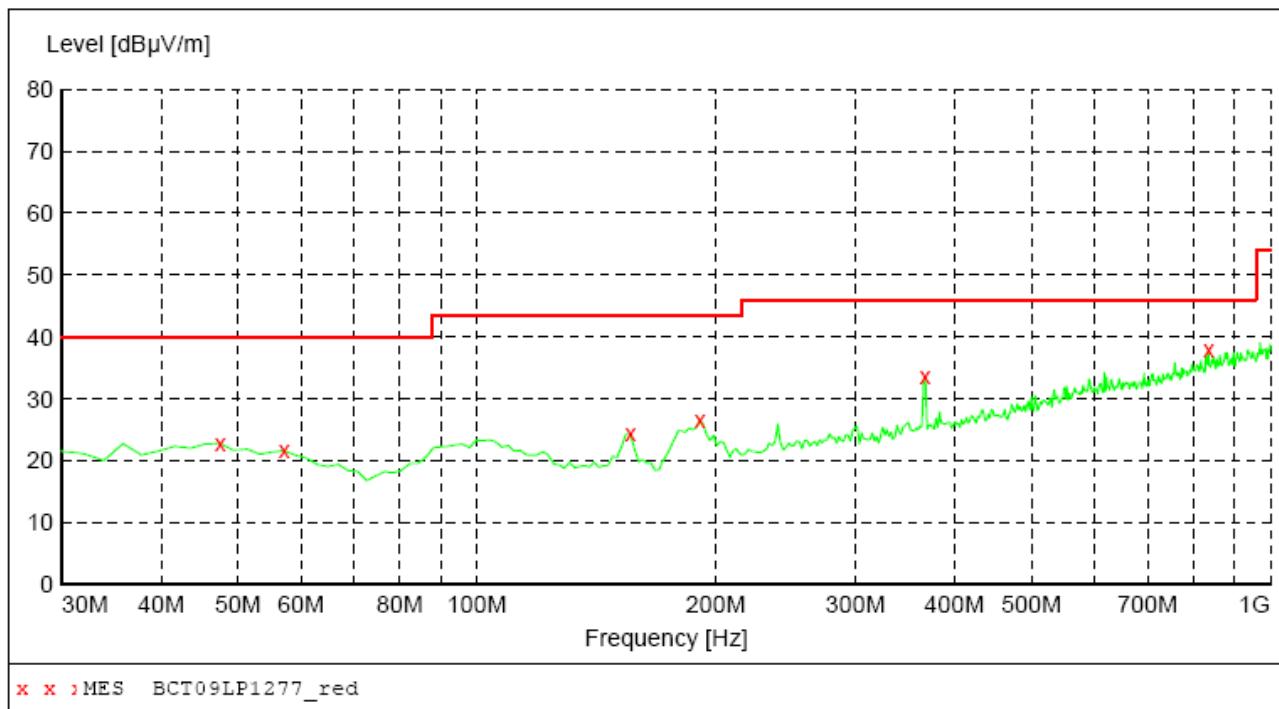
Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det. QP	Height cm	Azimuth deg	Polarization
35.820000	26.40	14.7	40.0	13.6	QP	300.0	0.00	HORIZONTAL
55.220000	21.80	15.6	40.0	18.2	QP	100.0	0.00	HORIZONTAL
239.520000	27.80	17.1	46.0	18.2	QP	100.0	0.00	HORIZONTAL
367.560000	32.30	20.7	46.0	13.7	QP	100.0	0.00	HORIZONTAL
431.580000	34.20	22.0	46.0	11.8	QP	100.0	0.00	HORIZONTAL
928.220000	38.10	31.5	46.0	7.9	QP	100.0	0.00	HORIZONTAL

## Radiated Emission Test Data:

EUT: Receiver of Wireless Foot Pedal M/N: VP-4  
 Operating Condition: Normal Operation  
 Test Site: 3m CHAMBER  
 Operator: Chen  
 Test Specification: AC 120V/60Hz  
 Comment: Polarization: Vertical  
 Tem:25°C Hum:50%

### ***SWEEP TABLE: "test (30M-1G)"***

Short Description:		Field Strength			
Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	VULB9163 NEW



### ***MEASUREMENT RESULT: "BCT09LP1277\_red"***

01/08/2010 23:09

Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	22.80	15.8	40.0	17.2	QP	100.0	0.00	VERTICAL
57.160000	21.60	15.1	40.0	18.4	QP	100.0	0.00	VERTICAL
156.100000	24.30	13.6	43.5	19.2	QP	100.0	0.00	VERTICAL
191.020000	26.70	16.1	43.5	16.8	QP	100.0	0.00	VERTICAL
367.560000	33.60	20.7	46.0	12.4	QP	100.0	0.00	VERTICAL
835.100000	37.90	30.1	46.0	8.1	QP	100.0	0.00	VERTICAL