Test-setup photo(s):
Radiated emission 30 MHz - 5 GHz

TÜV PRODUCT SERVICE INC 19035 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 612 638 0297 Fax: 612 638 0298 Rev.No 1.0

EXHIBIT 3

Report Of Measurement
Includes sample calculations, block diagrams, photographs
of test configurations and properly signed and dated report.

TÜV PRODUCT SERVICE

TEST RESULT SUMMARY

FCC PART 15 SUBPART C
Section 15.231

MANUFACTURER'S NAME	Taiwan Uniplex Corp
NAME OF EQUIPMENT	Passive Infrared Motion Sensor
MODEL NUMBER	**PIRMOTION-1**
MANUFACTURER'S ADDRESS	8F, No 203 Pa-te Road Sec 2 Taipei Taiwan R.O.C.
TEST REPORT NUMBER	W8337.1
TEST DATE	17 July 1998

According to testing performed at TÜV Product Service Inc, the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in FCC Part 15.

It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

TÜV Product Service Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the requirements of FCC Part 15.

Date: 23 October 1998

Location: Taylors Falls MN USA

R. M. Johnson
Test Engineer

J T. Schneider
Site Manager

Not Transferable

TÜV PRODUCT SERVICE

EMC EMISSION - TEST REPORT

Test Report File No. : **W211833701.1** Date of issue: 23 October 1998

Model / Serial No. : **PIRMOTION-1 /**

Product Type : Passive Infrared Motion Sensor

Applicant : Taiwan Uniplex Corp

Manufacturer : Taiwan Uniplex Corp

License holder : Taiwan Uniplex Corp

Address : 8F, No 203 Pa-te Road Sec 2

: Taipei Taiwan R.O.C.

Test Result : ■ **Positive** ☐ **Negative**

Test Project Number Reference(s) : **W8337.1**

Total pages including Appendices 25

TÜV Product Service Inc is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001.

TÜV Product Service Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV Product Service Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV Product Service Inc issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval. This report shall not be used by the client to claim product endorsement by NVLAP or any agency of the US government.

TÜV Product Service Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI

TÜV PRODUCT SERVICE INC 19035 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 612 638 0297 Fax: 612 638 0298 Rev.No 1.0

DIRECTORY - EMISSIONS

TÜV PRODUCT SERVICE INC 19035 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 612 638 0297 Fax: 612 638 0298 Rev.No 1.0

EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

☐ - EN 50081-1 / 1991

☐ - EN 55011 / 1991 ☐ - Group 1 ☐ - Group 2
☐ - Class A ☐ - Class B

☐ - EN 55013 / 1990

☐ - EN 55014 / 1987 ☐ - Household appliances and similar
☐ - Portable tools
☐ - Semiconductor devices

☐ - EN 55014 / A2:1990

☐ - EN 55014 / 1993 ☐ - Household appliances and similar
☐ - Portable tools
☐ - Semiconductor devices

☐ - EN 55015 / 1987

☐ - EN 55015 / A1:1990

☐ - EN 55015 / 1993

☐ - EN 55022 / 1987 ☐ - Class A ☐ - Class B

☐ - EN 55022 / 1994 ☐ - Class A ☐ - Class B

☐ - BS

☐ - VCCI ☐ - Class A ☐ - Class B

■ - FCC Part 15 Subpart C Section 15.231

☐ - AS 3548 (1992) ☐ - Class A ☐ - Class B

☐ - CISPR 11 (1990) ☐ - Group 1 ☐ - Group 2
☐ - Class A ☐ - Class B

☐ - CISPR 22 (1993) ☐ - Class A ☐ - Class B

TÜV PRODUCT SERVICE INC 19035 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 612 638 0297 Fax: 612 638 0298 Rev.No 1.0

Environmental conditions in the lab:

	Actual
Temperature	: 24 °C
Relative Humidity	: 62 %
Atmospheric pressure	: 98.4 kPa
Power supply system	: 3 VDC

Sign Explanations:

☐ - not applicable
■ - applicable

Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)

The *CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)* measurements were performed at the following test location:

☐ - **Test not applicable**

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room
☐ - New Brighton Lab Shielded Room

Test equipment used :

Model Number	Manufacturer	Description	Serial Number	Cal Date

Use of the calibrated equipment on this list ensures traceability to national and international standards.

Emissions Test Conditions: RADIATED EMISSIONS (Magnetic Field)

The *RADIATED EMISSIONS (MAGNETIC FIELD)* measurements were performed at the following test location:

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)

at a test distance of :

☐ - 3 meters
☐ - 30 meters

■ - **Test not applicable**

Test equipment used :

Model Number	Manufacturer	Description	Serial Number	Cal Date

Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements, in the frequency range of 30 MHz-1000 MHz, were tested in a horizontal and vertical polarization at the following test location :

☐ - **Test not applicable**

■ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)

at a test distance of :

■ - 3 meters
☐ - 10 meters
☐ - 30 meters

Test equipment used :

	Model Number	Manufacturer	Description	Serial Number	Cal Date
■ -	3146	Electro-Mechanics (EMCO)	Log Periodic Antenna	9103-3075	7-97
■ -	3108	Electro-Mechanics (EMCO)	Biconical Antenna	2118	7-97
■ -	8566B	Hewlett-Packard	Spectrum Analyzer	2221A01596	4-98
■ -	85662A	Hewlett-Packard	Analyzer Display	2152A03640	4-98
■ -	85650A	Hewlett-Packard	Quasi-Peak Adapter	2811A01127	4-98
■ -	ZHL-1042J	Mini-Circuits	Preamplifier	H072294-11	4-98

Use of the calibrated equipment on this list ensures traceability to national and international standards.

Emissions Test Conditions: INTERFERENCE POWER

The *INTERFERENCE POWER* measurements were performed by using the absorbing clamp on the mains and interface cables in the frequency range 30 MHz - 300 MHz at the following test location :

■ - **Test not applicable**

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room
☐ - New Brighton Lab Shielded Room

Test equipment used :

Model Number	Manufacturer	Description	Serial Number	Cal Date

Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *EQUIVALENT RADIATED EMISSIONS* measurements in the frequency range 1 GHz - 100 GHz were performed in a horizontal and vertical polarization at the following test location :

■ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room

at a test distance of:

☐ - 1 meters
■ - 3 meters
☐ - 10 meters

☐ **- Test not applicable**

Test equipment used :

	Model Number	Manufacturer	Description	Serial Number	Cal Date
■ -	3115	Electro-Mechanics (EMCO)	Horn Antenna	9001-3275	8-97
■ -	8566B	Hewlett-Packard	Spectrum Analyzer	2221A01596	4-98
■ -	85662A	Hewlett-Packard	Analyzer Display	2152A03640	4-98
■ -	85650A	Hewlett-Packard	Quasi-Peak Adapter	2811A01127	4-98
■ -	ZHL-1042J	Mini-Circuits	Preamplifier	H072294-11	4-98
■ -	AFT-8434	Avantek	Preamplifier	9112 Z221	4-98

Use of the calibrated equipment on this list ensures traceability to national and international standards.

Equipment Under Test (EUT) Test Operation Mode - Emission tests :

The device under test was operated under the following conditions during emissions testing:

☐ - Standby

☐ - Test program (H - Pattern)

☐ - Test program (color bar)

☐ - Test program (customer specific)

☐ - Practice operation

☐ - Normal Operating Mode

■ - Transmitter on.

Configuration of the device under test:

☐ - See Constructional Data Form in Appendix B - Page B2

■ - See Product Information Form in Appendix B - beginning on Page B3

The following peripheral devices and interface cables were connected during the measurement:

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - unshielded power cable

☐ - unshielded cables

☐ - shielded cables MPS.No.: _____

☐ - customer specific cables

☐ - _____

☐ - _____

Emission Test Results:

Conducted emissions 10/150 kHz - 30 MHz

The requirements are ☐ - MET ☐ - NOT MET

Minimum limit margin _____ dB at _____ MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: _____

Radiated emissions (magnetic field) 10 kHz - 30 MHz

The requirements are ☐ - MET ☐ - NOT MET

Minimum limit margin _____ dB at _____ MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: _____

Radiated emissions (electric field) 30 MHz - 1000 MHz

The requirements are ■ - MET ☐ - NOT MET

Minimum limit margin for fundamental 8 dB at 418.0 MHz

Minimum limit margin for spurious >10 dB at 836.0 MHz

Remarks: The fundamental was measured to be 92 dBuV/m in peak mode, minus 20 dB (based on 10% duty cycle) to get average measurement, or 72 dBuV/m (3981 uV/m) compared to a limit of 80.2 dBuV/m (10200 uV/m). The second harmonic was measured to be 69 dBuV/m in peak mode, minus 20 dB (based on 10% duty cycle) to get average measurement, or 49 dBuV/m (282 uV/m) compared to a limit of 60.2 dBuV/m (1020 uV/m).

Interference Power at the mains and interface cables 30 MHz - 300 MHz

The requirements are ☐ - MET ☐ - NOT MET

Minimum limit margin _____ dB at _____ MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: _____

Equivalent Radiated emissions 1 GHz - 4.2 GHz

The requirements are ■ - MET ☐ - NOT MET

Minimum limit margin 5 dB at 1672 MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: Peak analyzer reading of 69.1 dBuV/m, minus 20 dB (based on 10% duty cycle) to get average measurement, or 49.1 dBuV/m (285 uV/m) compared to a limit of 54 dBuV/m (501 uV/m).

DEVIATIONS FROM STANDARD:

None.

GENERAL REMARKS:

The bandwidth of the fundamental must be less than 0.25% of the center frequency, or 1.045 MHz. Page A5 of A5 shows the bandwidth to be less than 200 kHz.

SUMMARY:

The requirements according to the technical regulations are

■ - met

☐ - **not** met.

The device under test does

■ - fulfill the general approval requirements mentioned on page 3.

☐ - **not** fulfill the general approval requirements mentioned on page 3.

Testing Start Date: 17 July 1998

Testing End Date: 17 July 1998

- TÜV PRODUCT SERVICE INC -

Joel T. Schneider

J. T. Schneider
Site Manager

Tested By:
R. M. Johnson

TÜV PRODUCT SERVICE INC 19035 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 612 638 0297 Fax: 612 638 0298 Rev.No 1.0

Test-setup photo(s):
Conducted emission 10/150 kHz - 30 MHz

Not Applicable

FCC ID: TAI A7P2

Appendix A

Test Data Sheets

and

Test Setup Drawing(s)

TÜV PRODUCT SERVICE INC 19035 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 612 638 0297 Fax: 612 638 0298 Rev.No 1.0

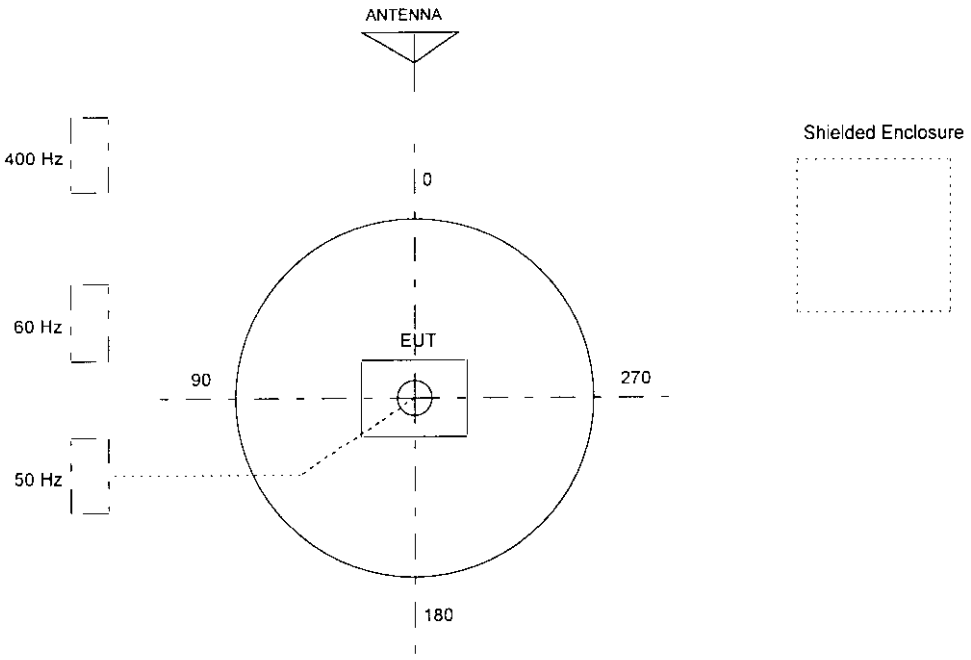
PRODUCT SERVICE

TEST SETUP FOR EMISSIONS TESTING

WILD RIVER LAB
Large Test Site

Notes:

1. Items shown in dotted lines are located on the floor below the test area. It is 5 meters vertically from the ground floor to the test area.
2. 50 Hz, 60 Hz, and 400 Hz are power panels for alternating current.
3. The antenna may be positioned horizontally 3, 10 or 30 meters from the center of the turntable.
4. The circle is a 6.7 meter diameter turntable.
5. A ground plane is in the plane of this sheet.
6. The test sample is shown in the azimuthal position representing zero degrees.



TÜV PRODUCT SERVICE INC 19035 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 612 638 0297 Fax: 612 638 0298 Rev.No 1.0

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

Large Test Site
3 Meter Antenna Distance
Equipment Under Test:
HC ELECTRONICS
PIR-MOTION SENSOR
Notes:

Report W8337 Run 3
Date 07/17/98 Page 1
Engineer
Tech: RMJ
Requester

Frequency MHz	Level dBuV	Factor dB	Cable dB	Peak dBuV/m	Duty Cycle Correction		Average dBuV/m	15.231 Limit
ALL READINGS MAXIMIZED.								
418.08	73.61	16.8	1.8	92.2	-20	H	72.2	80.2
836.17	43.55	22.7	2.6	68.9	-20	H	48.9	60.2
1254.2	28.1	25.8	3.3	57.3	-20	V	37.3	60.2
1672.3	37.55	27.7	3.9	69.1	-20	V	49.1	54
2090.4	26.65	29.5	8	64.2	-20	V	44.2	60.2
2508.4	28.55	30.6	8.4	67.6	-20	V	47.6	60.2
2926.5	21.85	31.2	5.4	58.4	-20	V	38.4	60.2
3344.6	13.6	32.3	5.5	51.4	-20	V	31.4	60.2
3762.6	10.35	33.7	6.1	50.2	-20	V	30.2	54
4180.7	7.85	34.1	6.3	48.2	-20	V	28.2	54

EUT HAS A 10% DUTY CYCLE, THEREFORE A 20 DB RELAXATION WILL BE EMPLOYED.

END OF SCAN.

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

Large Test Site Figure____ Report W8337 Run 3
3 Meter Antenna Distance Date 07/17/98 Page 2
Equipment Under Test: Engineer
HC ELECTRONICS Tech: RMJ
PIR-MOTION SENSOR Requester
Notes:

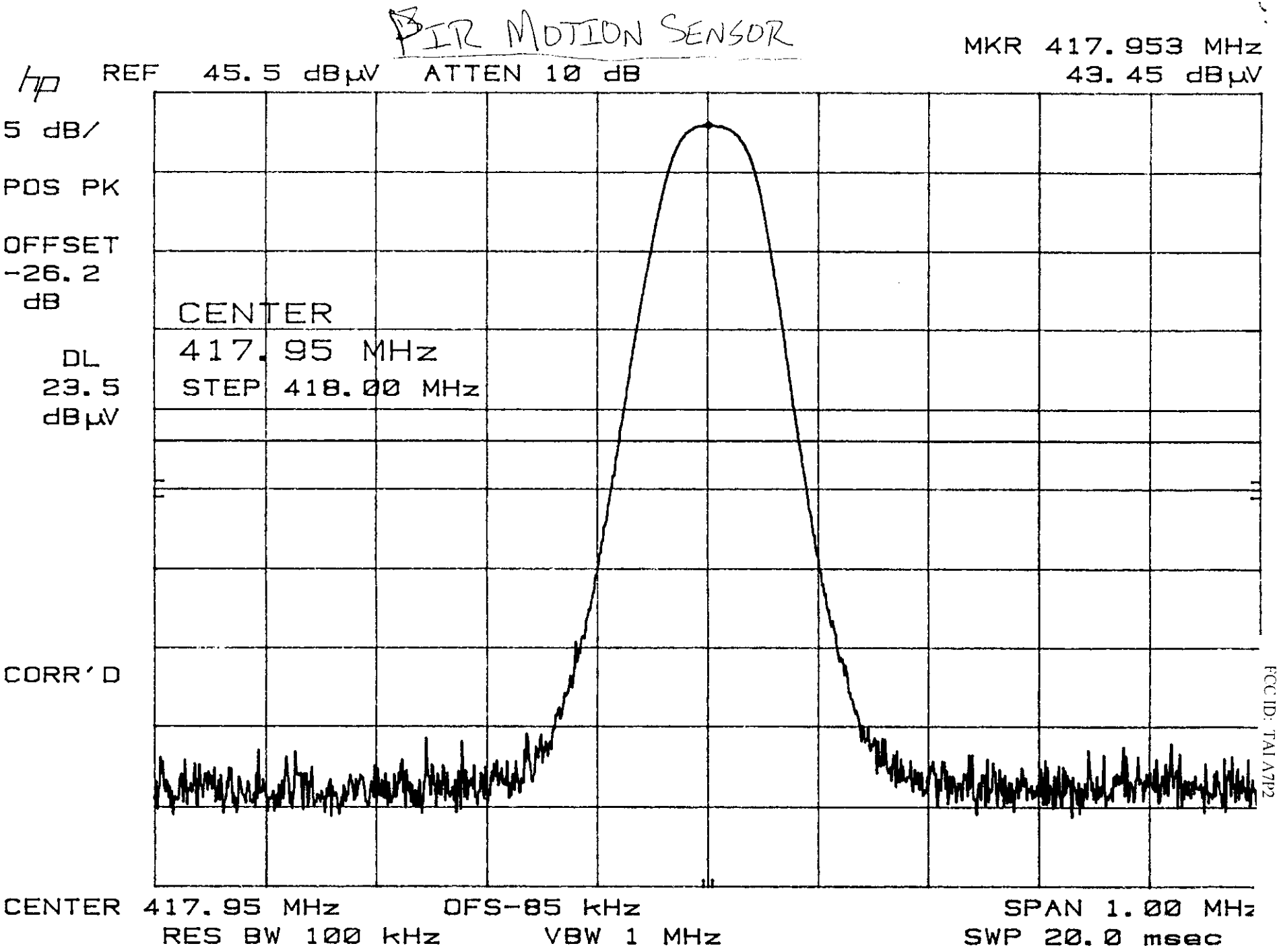
Measurement Summary

Frequency MHz	Final dBuV/m	Final uV/m	Azimuth deg	Polar\ Height		Delta 15.231	Delta
418.08	72.2	4073.8	--	H	--	-10	
836.17	48.9	278.61	--	H	--	-11.3	
1254.2	37.3	73.282	--	V	--	-22.9	
1672.3	49.1	285.10		V		-4.9	
2090.4	44.2	162.18		V		-16	
2508.4	47.6	239.88		V		-12.6	
2926.5	38.4	83.176		V		-21.8	
3344.6	31.4	37.153		V		-28.8	
3762.6	30.2	32.359		V		-23.8	
4180.7	28.2	25.703		V		-25.8	

Minimum Passing Margin for 15.231 fundamental is 10 dB at 418.08 MHz
Minimum Passing Margin for 15.231 harmonic/spurious is 4.9 dB at 1672.3 MHz

File W8337 Run 3

PIR MOTION SENSOR



TÜV PRODUCT SERVICE

Appendix B

Constructional Data Form

and

Product Information Form(s)

TÜV PRODUCT SERVICE INC 19035 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 612 638 0297 Fax: 612 638 0298 Rev.No 1.0

TÜV PRODUCT SERVICE

Constructional Data Form

Not Applicable

TÜV PRODUCT SERVICE INC 19035 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 612 638 0297 Fax: 612 638 0298 Rev.No 1.0

TÜV PRODUCT SERVICE

PRODUCT INFORMATION FORM

NOTE: It is required to complete both 1) a Product Information Form for each unit under test and 2) a Constructional Data Form for each system tested as outlined in the enclosed instructions.

** Please show the exact spelling [including spacing, capitalization, etc] as you want shown on the After Test Documentation.*

*Company Name: ~~BBC Corp.~~ TAIWAN UNIPLEX CORP.

*Company Address: ~~433 E. Little Canada Rd. 8F~~, NO. 203 ~~ST PAUL MN~~ 'Pa-te Road Sec. 2 ~~55117~~ Taipei, Taiwan R.O.C.

Customer Representatives: Bill Williamson (H.C. ELECTRONICS, MAX HENDRICKSON)

*Equipment Description: Passive Infra-Red Motion Sensor for BBC #6000 Security System

*Model Number: ~~PIR-MOTION~~ PIRMOTION-1

*Serial Number: N/A

Type of Test
- ☐ Development
- ☐ Initial Design Verification
- ☐ Design Change (Please describe exact changes below)
- ☒ Production Sample (Audit Test)
- ☐ _____

Changes Made: _____

Oscillator Frequencies: 418 ± 75 KC
4 MHZ

Power Interface

Frequency	
Voltage	3 VOLTS
~~# of Phases~~	
Current	18 MA PK

Power Supply

Description	'Battery 3 V.
Manufacturer	MALLORY / SANYO
Model Number	DL 2450
Switching Freq	N/A

Power Cable
- ☐ Hardwired
- ☐ Shielded
- ☐ Attached
- ☐ Flexible
- ☐ Unshielded
- ☑ Removable

Power Line Filter

Manufacturer: NA Model Number:

Cabinet Shielding Provision

Software and/or Operating Modes N/A

Interfacing Equipment or Simulators

Description	Model Number	Serial Number	FCC ID#

I/O Cables

Function	Length (meters)	Shielded	Analog/Digital	Active During Test
		Y N	A D	Y N
		Y N	A D	Y N
		Y N	A D	Y N
		Y N	A D	Y N
		Y N	A D	Y N
		Y N	A D	Y N

Block Diagram

BBC PART #15 RADIO TRANSMITTER FORMAT 7/16/98

CONFIDENTIAL

The FCC part #15 radio transmitter consists of:

Start pedestal	1.2ms duration
Logical "0" data bit	250 us.
Logical "0" pause time	125 us.
Total bit time	375 us.
Logical "1" data bit	125 us.
Logical "1" pause time	250 us.
Total bit time	375 us.

Carrier on/off modulation is used

Transmission frequencies are SAW resonator generated, and range between 417.950 and 418.110 MHz.

The total number of bits, which is 36 in total, consists of 19 identification bits, 5 sensor status bits, and 8-check sum bits. In addition, there is two "zero" bits and a "one" bit that follow the pedestal and precede the identification bits and a "one" bit that follow data transmission. This bit information is referred to as a "radio packet".

A microprocessor is used to detect all alarm signals, and generate all timing. The processor operates in "sleep mode", waking up only to confirm status changes on inputs, and generate the radio pedestal and data signals when necessary. The typical standby current drain is less than 2ua, and the peak transmission current is nominal 18 ma. The processor uses an internal RC timing clock circuit. The timer clock is calibrated at the time the program is inserted.

All transmitters use the same electronic circuitry. There are variations in activation method and the antenna output circuits.

A DWS transmitter can be activated to send packets in a Varity of ways:

Supervisory signals	This is a two-packet transmission that occurs at nominal 70-minute intervals. Self initiated.
Sensor open signals	This is a six-packet transmission that will occur when the magnet is moved away from the internal reed switch. There is a provision for activation from an external reed switch. The external connection is connected to provided pins, and the shorting jumper presently across these pins is moved toanother set of pins to short the reed switch.
Sensor closed signals	This is a six-packet transmission that occurs when magnet is moved to the reed switch.
Tamper signals	This is a six-packet transmission that occurs when plastic case is opened.
Low battery signals	This is a six-packet transmission that occurs when battery voltage drops to 2.5 volts. This is detected during a transmission time.

A Pendent transmitter will transmit only 12 packets when the button is depressed. The alarm bit will be a logical "1" during the time the button is held down during these packet transmissions. The interval between packets is greater that 200ms and less than 280ms. A 70 minute 2 packet supervisory signal is also sent.

The PIR transmitter responds the same as the DWS transmitter. It uses the same microprocessor program. The reed switch is replaced by the PIR signal.

The supervisory signals are self-initiated and occur at a nominal 70-minute interval. The spacing between any transmissions will ALWAYS be 200ms. or more. The number of packets will be 6 on sensor open, and another 6 on sensor closing. Packet interval spacing is selected by a scheme based on sensor number. The longest individual spacing is 280ms.

RADIO TRANSMISSION "ON TIME"

The worst case "on time" for any of the transmitters occurs when sending a battery good, no tamper, sensor closed, condition. There is a propriety relationship between the sensor identification number and the check sum bits such that the maximum number of Zero bits that can be sent in a packet total 28.

With this in mind, the total transmission "on time" for the longest packet is as follows

"0" bits	28	
"1" bits	7	
Adding these bits up along with the start pedestal——		1.200ms
	28X .250ms	7.0ms
	7X .125ms	.875ms
	TOTAL on time	9.075ms

BBC #6000 ALARM PANEL

The alarm panel incorporates a spatial diversity superhet receiver. The receiver is located on a circuit board on the bottom of the panel. The receiver uses a 407.3 mhz, =100kc,-75kc SAW resonator. The receiver decoding microprocessor uses a 4.194304mhz crystal. The panel uses another 4.194304mhz crystal for the TT decoder chip. This clock is presented to the control microprocessor which uses it for control. The signal here is divided by four, and sent to the speech chip for voice clock generation.

FCC #15 LABELS

FCC labels will be placed:

On the large flat area of the DWS
On the back of the Pendent transmitter
On the back of the PIR transmitter

CONFIDENTIAL

Appendix C

MEASUREMENT PROTOCOL FOR FCC

GENERAL INFORMATION

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. These test systems have a measurement uncertainty of ±4.5 dB. The equipment comprising the test systems are calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into it's characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

CONDUCTED EMISSIONS

The final level, expressed in dBμV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC limit.

To convert between dBμV and μV, the following conversions apply:

dBμV = 20(log μV)

μV = Inverse log(dBμV/20)

RADIATED EMISSIONS

The final level, expressed in dBμV/m, is arrived at by taking the reading from the spectrum analyzer (Level dBμV) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has the FCC limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment B. The amplifier gain is automatically accounted for by using an analyzer offset.

Example:

Frequency (MHz)	Level (dBμV)	+	Factor & Cable (dB)	=	Final (dBμV/m)	-	FCC B Limit (dBμV/m)	=	Delta FCC B (dB)
32.21	13.9	+	16.3	=	30.2	-	40.0	=	-9.8

DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

Conducted Emissions

Conducted emissions on the 60 Hz power interface of the EUT are measured in the frequency range of 450 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω/50 μH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 1000 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. Intentional radiators are rotated through three orthogonal axes to determine the attitude that maximizes the emissions.