# Winmate Development Ltd.

Application
For
Certification
**(FCC ID: QCT234508901)**

Transmitter

WO# 0204872
WL/Sandy
May 22, 2002


- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
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**MEASUREMENT/TECHNICAL REPORT**

**Winmate Development Ltd. - MODEL: GLOBAL 218**
**SENARIO 20402**

**FCC ID: QCT234508901**

**May 22, 2002**

This report concerns (check one:) Original Grant_X_ Class II Change__

Equipment Type: Low Power Transmitter (example: computer, printer, modem, etc.)

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes__ No_X_

If yes, defer until: _____
date

Company Name agrees to notify the Commission by: _____
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes___ No_X_

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [12-18-01 Edition] provision.

Report prepared by:

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Intertek Testing Services
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| Exhibit type | File Description | filename |
|---|---|---|
| Test Report | Test Report | report.pdf |
| Operation Description | Technical Description | descri.pdf |
| Test Setup Photo | Radiated Emission | radiated photos.doc |
| Test Report | Bandedge Plot | bw.pdf |
| External Photo | External Photo | external photos.doc |
| Internal Photo | Internal Photo | internal photos.doc |
| Block Diagram | Block Diagram | block.pdf |
| Schematics | Circuit Diagram | circuit.pdf |
| ID Label/Location | Label Artwork and Location | label.pdf |
| User Manual | User Manual | manual.pdf |
| Timing Diagram | Timing Diagram | timing.pdf |

# EXHIBIT 1

# GENERAL DESCRIPTION

## 1.0 General Description

### 1.1 Product Description

The Equipment Under Test (EUT) is a Radio Control Car (Transmitter) operating at 27MHz. The EUT is powered by 4.5V d.c. (3 x "AAA" alkaline battery). There are two buttons and a switch in the EUT. The two buttons are used to control the remote car directions. The switch is used to power ON / OFF the EUT and turbo the car speed.

Antenna Type: Integral, External

The Model: SENARIO 20402 is the same as the Model: GLOBAL 218 in hardware aspect. The difference in model number serves as marketing strategy.

For electronic filing, the brief circuit description is saved with filename: descri.pdf

### 1.2 Related Submittal(s) Grants

This is a single application for certification of a transmitter.

## 1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). All measurements were performed in Open Area Test Sites. Preliminary scans were performed in the Open Area Test Sites only to determine worst case modes. For each scan, the procedure for maximizing emissions in Appendices D and E were followed. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Justification Section"** of this Application.

## 1.4 Test Facility

The open area test site and conducted measurement facility used to collect the emission data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC.

# EXHIBIT 2

# SYSTEM TEST CONFIGURATION

## 2.0 System Test Configuration

### 2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (1992).

The EUT was powered from 3 x fully charged 1.5V "AAA" battery.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The unit was operated standalone and placed in the center of the turntable.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

For simplicity of testing, the unit was wired to transmit continuously.

The frequency range from 27MHz to 270MHz was searched for spurious emissions from the device. Only those emissions reported were detected. All other emissions were at least 20 dB below the applicable limits.

### 2.2 EUT Exercising Software

There was no special software to exercise the device. Once the button is depressed, the unit transmits the typical signal. For simplicity of testing, the unit was wired to transmit continuously.

### 2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

2.4 Equipment Modification

Any modifications installed previous to testing by Winmate Development Ltd. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services.

2.5 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

2.6 Support Equipment List and Description

This product was tested in a standalone configuration.

All the items listed under section 2.0 of this report are

*Confirmed by:*

*Wilson Loke*
*Manager*
*Intertek Testing Services Hong Kong Ltd.*
*Agent for Winmate Development Ltd.*

Signature

May 22, 2002 Date

# EXHIBIT 3

# EMISSION RESULTS

## 3.0 Emission Results

Data is included worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD + AV

3.1 Field Strength Calculation (cont'd)

Example

Assume a receiver reading of 62.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB

AV = -10 dB

FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 dBμV/m

Level in mV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m

3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission
at
54.287 MHz

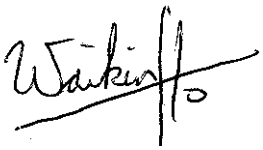
For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos.doc

3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 10.5 dB

***TEST PERSONNEL:***



*Signature*

Ben W. K. Ho, Compliance Engineer
*Typed/Printed Name*

May 22, 2002
*Date*

Company: Winmate Development Ltd. Date of Test: May 3, 2002
Model: GLOBAL 218
Mode: 27MHz TX

Table 1

**Radiated Emissions**

| Polarity | Frequency (MHz) | Reading (dBµV) | Antenna Factor (dB) | Pre-Amp Gain (dB) | Average Factor (-dB) | Net at 3m (dBµV/m) | Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| V | 27.143 | 71.8 | 15.4 | 16 | 3.7 | 67.5 | 80.0 | -12.5 |
| V | 54.287 | 33.8 | 11.7 | 16 | -- | 29.5 | 40.0 | -10.5 |
| H | 81.430 | 33.7 | 6.7 | 16 | -- | 24.4 | 40.0 | -15.6 |
| H | 108.573 | 35.0 | 12.2 | 16 | -- | 31.2 | 43.5 | -12.3 |
| H | 135.732 | 34.8 | 11.9 | 16 | -- | 30.7 | 43.5 | -12.8 |
| H | 162.864 | 32.8 | 13.1 | 16 | -- | 29.9 | 43.5 | -13.6 |

Notes:
1. Peak Detector Data unless otherwise stated.
2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.

Test Engineer: Ben W. K. Ho

Company: Winmate Development Ltd. Date of Test: May 2, 2002
Model: GLOBAL 218
Mode: Charging

Table 2

**Radiated Emissions**

| Polarity | Frequency (MHz) | Reading (dBµV) | Antenna Factor (dB) | Pre-Amp Gain (dB) | Net at 3m (dBµV/m) | Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| V | 31.652 | 27.4 | 11.6 | 16 | 23.0 | 40 | -17.0 |
| V | 34.171 | 27.5 | 11.6 | 16 | 23.1 | 40 | -16.9 |
| V | 45.159 | 27.5 | 11.9 | 16 | 23.4 | 40 | -16.6 |
| V | 54.164 | 28.1 | 11.7 | 16 | 23.8 | 40 | -16.2 |
| V | 58.605 | 29.1 | 11.0 | 16 | 24.1 | 40 | -15.9 |
| V | 64.712 | 30.4 | 9.9 | 16 | 24.3 | 40 | -15.7 |

Notes:
1. Peak Detector Data unless otherwise stated.
2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.

Test Engineer: Ben W. K. Ho

# EXHIBIT 4

# EQUIPMENT PHOTOGRAPHS

## 4.0 Equipment Photographs

For electronic filing, the photographs of the tested EUT are saved with filename: external photos.doc & internal photos.doc

# EXHIBIT 5

# PRODUCT LABELLING

## 5.0 Product Labelling

For electronic filing, the FCC ID label artwork and the label location are saved with filename: label.pdf

# EXHIBIT 6

# TECHNICAL SPECIFICATIONS

## 6.0 Technical Specifications

For electronic filing, the block diagram and schematics of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

# EXHIBIT 7

# INSTRUCTION MANUAL

## 7.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf

This manual will be provided to the end-user with each unit sold/leased in the United States.

# EXHIBIT 8

# MISCELLANEOUS INFORMATION

## 8.0 Miscellaneous Information

This miscellaneous information includes details of the bandedge plot, the test procedure and calculation of factors such as pulse desensitization and averaging factor.

8.1 Bandedge Plot

For electronic filing, the plot shows the fundamental emission when modulated is saved with filename: bw.pdf. From the plot, the field strength of any emission appearing between the band edges and up to 10 kHz above and below the band edges are at least 44.7 dB below the carrier at 26.961MHz and 27.38MHz. It fulfil the requirement of 15.227(b).

Figure 8.1 Bandwidth

## 8.2 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF*.

Pulse desensitivity was not applicable for this device. The effective period ($T_{eff}$) was approximately 0.54 ms for a digital "1" bit, as shown in the plots of Exhibit 8.3. With a resolution bandwidth (3 dB) of 100 kHz, the pulse desensitivity factor was 0 dB.

8.3 Calculation of Average Factor

Averaging factor in dB = 20 log (duty cycle)

The specification for output field strengths in accordance with the FCC rules specify measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation. The duty cycle is measured by placing the spectrum analyzer in zero scan (receiver mode) and linear mode at maximum bandwidth (3 MHz at 3 dB down) and viewing the resulting time domain signal output from the analyzer on a Tektronix oscilloscope. The oscilloscope is used because of its superior time base and triggering facilities.

The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 13.53 ms
Effective period of the cycle = 4 x (1.66 + 0.54) ms = 8.8 ms

DC = 8.8 ms / 13.53 ms = 0.65

Therefore, the averaging factor is found by 20 $\log_{10}$ 0.65 = -3.7 dB

For electronic filing, the plot shows the transmission timing is saved with filename: timing.pdf.

## 8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 1992.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Exhibit 8.3.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 450 kHz to 30 MHz.

8.4 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements are made as described in ANSI C63.4 - 1992.

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.2). Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the forbidden bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, unless otherwise reported. Measurements taken at a closer distance are so marked.