

# Electromagnetic Compatibility (EMC) Test Report

Product Name : MT-40 series

Model No. : MT-41, MT-44, MT-45

Applicant : Maestro Wireless Holdings Limited

Address : FLAT A&B,9/F,WING CHEONG FACTORY  
BUILDING,121 KING LAM STREET,CHEUNG SHA  
WAN,HONG KONG

Date of Receipt : 2016.03.25

Issued Date : 2016.04.20

Report No. : 1642063E

Report Version : V1.0

The test results relate only to the samples tested.

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# Test Report Verification



Product Name : MT-40 series  
 Applicant : Maestro Wireless Holdings Limited  
 Address : FLAT A&B,9/F,WING CHEONG FACTORY  
 BUILDING,121 KING LAM STREET,CHEUNG SHA  
 WAN,HONG KONG  
 Manufacturer : Maestro Wireless Holdings Limited  
 Address : FLAT A&B,9/F,WING CHEONG FACTORY  
 BUILDING,121 KING LAM STREET,CHEUNG SHA  
 WAN,HONG KONG  
 Model No. : MT-41, MT-44, MT-45  
 Trade Name : Maestro  
 DUT Voltage : 9-60V  
 Test Voltage : DC 48V  
 Applicable Standard : ISO21848-2005  
 Test Result : Pass  
 Performed Location : Quietek Corporation - Kunshan EMC Laboratory  
 No.351 Kunjia Rd., KunShan city,JiangSu  
 province,China.215300  
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Documented By : \_\_\_\_\_

Reviewed By : \_\_\_\_\_

Approved By : \_\_\_\_\_

## Laboratory Information

We, **QuieTek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted(audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scope:

<b>Taiwan R.O.C.</b>	<b>:</b>	<b>BSMI, NCC, TAF</b>
<b>USA</b>	<b>:</b>	<b>FCC , A2LA</b>
<b>Japan</b>	<b>:</b>	<b>VCCI</b>
<b>China</b>	<b>:</b>	<b>CNAS</b>

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : <http://www.quietek.com/english/about/certificates.aspx?bval=5>  
 The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : [http://www.quietek.com/index\\_en.aspx](http://www.quietek.com/index_en.aspx)

If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

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### **Suzhou Testing Laboratory :**

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## 1. General Information

### 1.1 DUT Description

Product Name	MT-40 series
Model No.	MT-41, MT-44, MT-45
Trade Name	Maestro

### 1.2 Mode of Operation

Tested Model:	
EMI	N/A
EMS	Normal Operation

### 1.3 Transient Immunity Test Result

**Class A:** All functions of the device/system perform as designed during and after the test.

**Class B:** All functions of a device/system perform as designed during exposure. However, one or more of them can go beyond specified tolerance. All functions return automatically to within normal limits after exposure is removed. Memory functions shall remain class A.

**Class C:** One or more functions of a device/system do not perform as designed during exposure but return automatically to normal operation after exposure is removed.

**Class D:** One or more functions of a device/system do not perform as designed during exposure and do not return to normal operation until exposure is removed and the device/system is reset by simple “operator/use” action.

**Class E:** One or more functions of a device/system do not perform as designed during and after exposure and cannot be returned to proper operation without repairing or replacing the device/system.

## 2. Technical Test

### 2.1 Summary of Test Result

Test Item	Normative References	Test Result
Electrical Properties	ISO21848-2005	Pass

### 2.2 Test Equipment

Electrical Properties / TR14

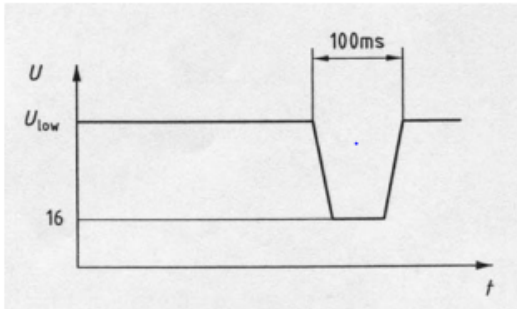
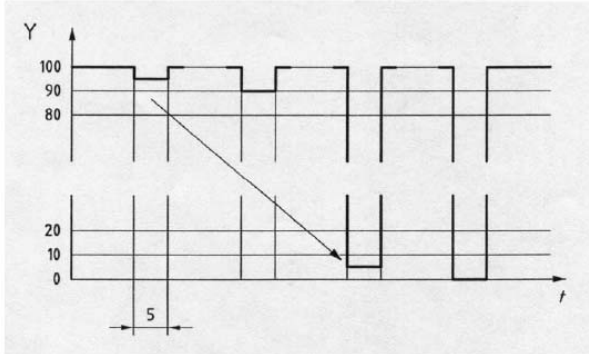
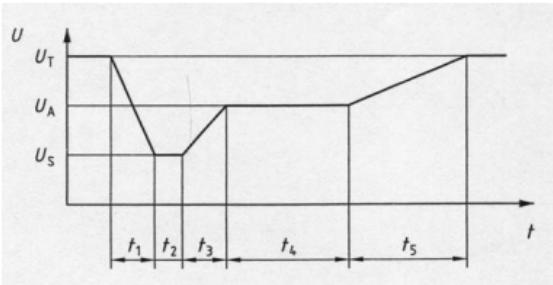
Equipment	Manufacturer	Model No.	Serial No.	Next Cal. Date
UCS200N	EMTest	UCS200N	V1106108706	2016.10.12
VDS200N	EMTest	VDS200N	V1106108708	2016.10.12

### 3. Electrical Properties

#### 3.1 Normative References

Standards Applicable for testing: ISO21848-2005

#### 3.2 Test Conditions

<p><b>Direct current supply voltage</b></p>	<p><b>Overtoltage</b></p>																
<p><math>U_{low}=30V</math>; <math>U_{high}=48V</math></p>	<p>The initial supply voltage increase from 42V to 58V,Duration : 400ms</p>																
<p><b>Superimposed alternating voltage</b></p>	<p><b>Slow decrease and increase of supply voltage</b></p>																
<p>a) <math>U_{dc}=48 V</math>; <math>U_{pp}=4V</math>    50 Hz ~ 1 kHz                  b) <math>U_{dc}=48 V</math>; <math>U_{pp}=1V</math>    1 kHz~20 kHz                  c) <math>U_{dc}=32 V</math>; <math>U_{pp}=4V</math>    50 Hz~ 1 kHz                  d) <math>U_{dc}=32 V</math>; <math>U_{pp}=1V</math>    1 kHz~20 kHz                  Sweep duration: 120s;Number of sweeps: 5</p>	<p>Decrease the supply voltage from the highest supply voltage, <math>U_{high}=48V</math>, to 0 V, then increase it from 0 V to <math>U_{high}=48V</math>, applying a change rate of <math>(3 \pm 0.1)</math> V/min linear.</p>																
<p><b>Voltage dips and interruptions</b></p>	<p><b>Reset voltage</b></p>																
																	
<p><b>Start pulse</b></p>	<p><b>Reversed voltage</b></p>																
 <table border="1" data-bbox="169 1832 794 1935"> <thead> <tr> <th><math>U_T</math> V</th> <th><math>U_S</math> V</th> <th><math>U_A</math> V</th> <th><math>t_1</math> ms</th> <th><math>t_2</math> ms</th> <th><math>t_3</math> ms</th> <th><math>t_4</math> ms</th> <th><math>t_5</math> ms</th> </tr> </thead> <tbody> <tr> <td>42</td> <td>18</td> <td>21</td> <td>5</td> <td>15</td> <td>50</td> <td>10,000</td> <td>100</td> </tr> </tbody> </table>	$U_T$ V	$U_S$ V	$U_A$ V	$t_1$ ms	$t_2$ ms	$t_3$ ms	$t_4$ ms	$t_5$ ms	42	18	21	5	15	50	10,000	100	<p>a) <math>U_T = -2(-42)V</math>                  b) <math>t = 100</math> ms (duration of the applied voltage)                  c) <math>R_i = 1</math> m<math>\Omega</math> (storage battery internal resistance)</p>
$U_T$ V	$U_S$ V	$U_A$ V	$t_1$ ms	$t_2$ ms	$t_3$ ms	$t_4$ ms	$t_5$ ms										
42	18	21	5	15	50	10,000	100										
<p><b>Single line interruption</b></p>	<p><b>Multiple line interruption</b></p>																

U <sub>T</sub> =42V; Open each PIN for 10s, then restore the connection for testing.	U <sub>T</sub> =42V; Open each plugin for 10s, then restore the connection for testing.
<b>Multiple voltage system</b>	<b>Short circuit protection</b>
Supply voltage :24V,Duration: 60s	The supply voltage line(positive/negative):48V
<b>Insulation resistance</b>	
Place system/subassembly half an hour at room temperature, apply a test voltage of 500 V d.c. to the DUT for 60 s.	

### 3.3 Test Procedure

- a. Turn on the measurement equipment and allow a sufficient time for stabilization.
- b. Turn on the DUT and allow a sufficient time for stabilization.
- c. DUT Testing. Perform emission data using the measurement setup.



### 3.4 Test Result

Test Site	TR14	Test Time	2016.03.29
DUT	MT-40 series	Test Voltage	DC 42V
Temperature	23°C	Humidity	42%RH
Barometer pressure	101kPa	Tested By	Amy
Test Mode	Normal Operation(1#)		

Test items	Test voltage	Temperature	Test Result	Observation
4.1 Direct current supply voltage	Refer clause 3.2	Room temperature	A	Note 1
4.2 Overvoltage	Refer clause 3.2	Room temperature	A	Note 1
4.3 Superimposed alternating voltage	Refer clause 3.2	Room temperature	A	Note 1
4.4 Slow decrease and increase of supply voltage	Refer clause 3.2	Room temperature	C	Note 2
4.5.1 Voltage dips and interruptions	Refer clause 3.2	Room temperature	A	Note 1
4.5.2 Reset voltage	Refer clause 3.2	Room temperature	C	Note 3
4.5.3 Start pulse	Refer clause 3.2	Room temperature	A	Note 1
4.6 Reversed voltage	Refer clause 3.2	Room temperature	C	Note 4
4.7.1 Single line interruption	Refer clause 3.2	Room temperature	C	Note 5
4.7.2 Multiple line interruption	Refer clause 3.2	Room temperature	C	Note 5
4.8.3 Multiple voltage system	Refer clause 3.2	Room temperature	A	Note 1

Note 1: The monitor program of com1-PuTTY operates normally during the test.

Note 2: During the test, when the supply voltage decreases to 6.08V, DUT stops working, and when the supply voltage increases to 6.98V, DUT resumes to work.

Note 3: During the test, when the supply voltage decreases to 18.2V, The monitor program of com1-PuTTY paused; when the supply voltage decreases to 6.98V, DUT stops working; when the supply voltage increases to 30.0V, DUT resumes to work .

Note 4: The power supply of DUT connects normally, DUT works normally after the test.

Note 5: During the test, pull out the wires, then connects the DUT, DUT works normally after the test.

Test Site	TR14	Test Time	2016.03.30
DUT	MT-40 series	Test Voltage	DC 42V
Temperature	23°C	Humidity	42%RH
Barometer pressure	101kPa	Tested By	Amy
Test Mode	Normal Operation(2#)		

Test items	Test voltage	Temperature	Test Result	Observation
4.1 Direct current supply voltage	Refer clause 3.2	Room temperature	A	Note 1
4.2 Overvoltage	Refer clause 3.2	Room temperature	A	Note 1
4.3 Superimposed alternating voltage	Refer clause 3.2	Room temperature	A	Note 1
4.4 Slow decrease and increase of supply voltage	Refer clause 3.2	Room temperature	C	Note 2
4.5.1 Voltage dips and interruptions	Refer clause 3.2	Room temperature	A	Note 1
4.5.2 Reset voltage	Refer clause 3.2	Room temperature	C	Note 3
4.5.3 Start pulse	Refer clause 3.2	Room temperature	A	Note 1
4.6 Reversed voltage	Refer clause 3.2	Room temperature	C	Note 4
4.7.1 Single line interruption	Refer clause 3.2	Room temperature	C	Note 5
4.7.2 Multiple line interruption	Refer clause 3.2	Room temperature	C	Note 5
4.8.3 Multiple voltage system	Refer clause 3.2	Room temperature	A	Note 1

Note 1: The monitor program of com1-PuTTY operates normally during the test.

Note 2: During the test, when the supply voltage decreases to 6.50V, DUT stops working, and when the supply voltage increases to 10.38V, DUT resumes to work.

Note 3: During the test, when the supply voltage decreases to 24.5V, The monitor program of com1-PuTTY paused; when the supply voltage decreases to 9.0V, The monitor program of com1-PuTTY occurs error; when the supply voltage decreases to 6.30V, DUT stops working; when the supply voltage increases to 30.0V, DUT resumes to work .

Note 4: The power supply of DUT connects normally, DUT works normally after the test.

Note 5: During the test, pull out the wires, then connects the DUT, DUT works normally after the test.

Test Site	TR14	Test Time	2016.04.11
DUT	MT-40 series	Test Voltage	DC 42V
Temperature	23°C	Humidity	42%RH
Barometer pressure	101kPa	Tested By	Amy
Test Mode	Normal Operation(3#)		

Test items	Test voltage	Temperature	Test Result	Observation
4.8 Short circuit protection	Uhigh=48V	Room temperature	C	Note 1
4.10 Insulation resistance	No power	Room temperature	A	Note 2

Note 1: The LED of DUT flashes normally, the monitor program of com1-PuTTY operates normally after the test. (The supply voltage lines are under the test.)

Note 2: DUT works normally during and after the test, the impedance of DUT exceed 9999MΩ .

### 3.5 Test Photograph

Test Mode: Normal Operation

Description: Voltage dips and interruptions



Test Mode: Normal Operation

Description: Slow decrease and increase of supply voltage



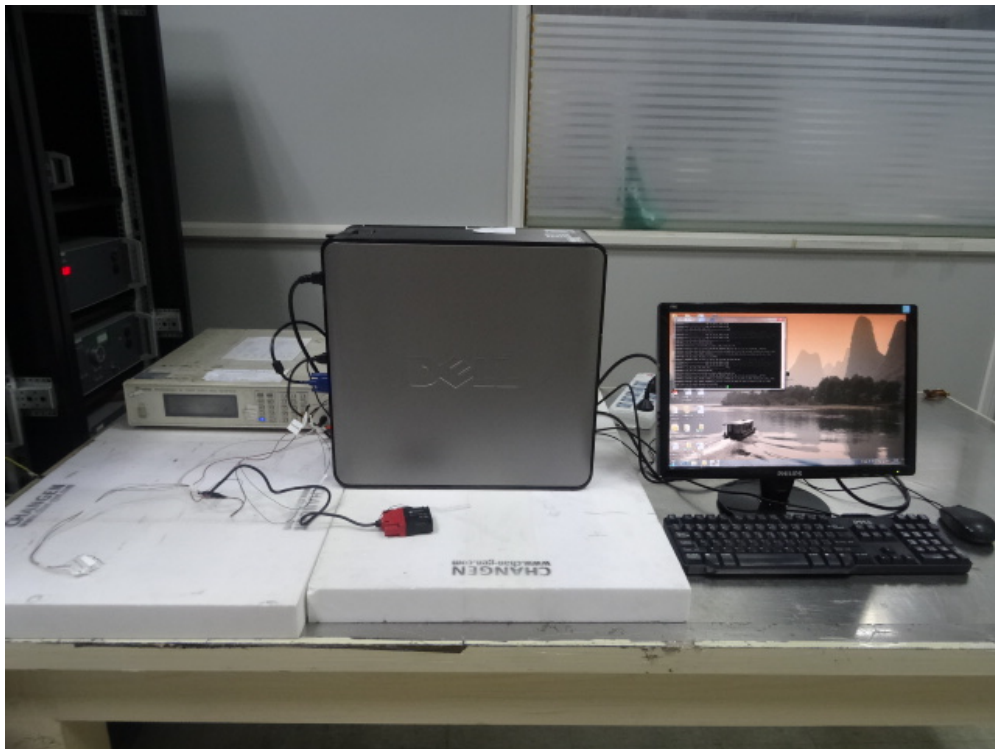
Test Mode: Normal Operation

Description: others



Test Mode: Normal Operation

Description: short circuit protection



Test Mode: Normal Operation

Description: insulation resistance





4. DUT Photo



1#&2#



3#