IEI Integration Corp.

MODEL:

Robot-TP-65M

Teach Pendant with 4-wire Resistive Type Touchscreen, Deadman Switch, Emergency Button, IP 64 Protection and RoHS

User Manual

Rev. 1.01 - 7 October, 2013

RoHS Lead Free

Revision

Date	Version	Changes
7 October, 2013	1.01	Added Section 3.3.2: Robot-TP-65M/K Connection
17 June, 2013	1.00	Initial release

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1

Introduction

1.1 Overview

Figure 1-1: Robot-TP-65M Teach Pendant

The Robot-TP-65M is teach pendant with a 6.5” 4-wire resistive touchscreen. The Robot-TP-65M is designed for easy and simplified integration into robot arm applications.

1.2 Model Variation

The Robot-TP-65M series has two models. The model variation is listed below:

- **Robot-TP-65M/K-ML**: one cable with a 37-pin military connector for connection
- **Robot-TP-65M/L**: multiple cables for connection

1.3 Features

The Robot-TP-65M features are listed below:

- High brightness LCD with LED backlight
- 4-wire resistive type touchscreen
- 6-meter long all-in-one cable allows easy installation
- Completely dust and splash proof (IP 64) design
- One meter drop resistance
- 0°C~50°C extended operating temperature
- Allow users to program with 33-key membrane keypad

- Equipped with an emergency stop and a 3-position deadman switch to provide safe operation

1.4 External Overview

1.4.1 Front Panel

The front side of the Robot-TP-65M is a flat bezel panel TFT LCD screen surrounded by a PC/ABS plastic frame. There are buttons and LED indicators located on the front panel. The detailed information is described in the following sections.

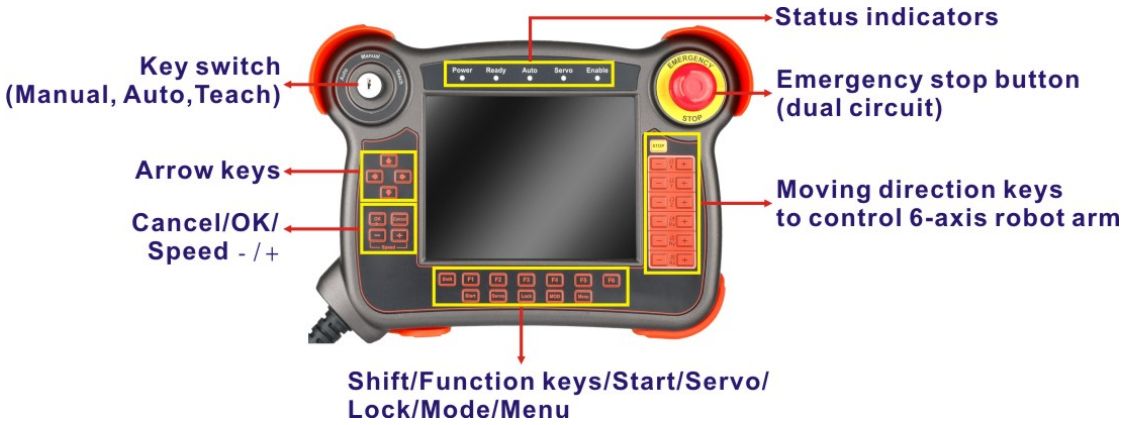


Figure 1-2: Front View

1.4.1.1 LED Indicators

There are several LED indicators located along the top of the LCD screen (**Figure 1-3**).

Figure 1-3: LED Indicators

The descriptions of each LED indicator are listed below.

LED Indicator	Description
Power	**On:** the robot is connected with a +12V power source **Off:** the power cord is not attached or power supply failure

LED Indicator	Description
Ready	**On:** the robot is turned on and ready to be operated
Auto	**On:** the Robot-TP-65M is in Auto mode
Servo	**On:** the servo is enabled **Off:** the servo is disabled.
Enable	**On:** the deadman switch is pressed **Off:** the deadman switch is not pressed

Table 1-1: LED Indicators

1.4.1.2 Function Keys

The function keys are located on the front side of the Robot-TP-65M (**Figure 1-4**).

Figure 1-4: Function Keys

The function keys are described in **Table 1-2**:

Key	Function Key Description
Left	
Arrow Keys	Use the arrow keys to move the cursor on the screen.
OK	Use the OK button to confirm.

Cancel	Use the Cancel button to cancel.
Speed -/+	Use "-" to decrease the speed. Use "+" to increase the speed.
Right	
Stop	Use the Stop button to stop the operation.
Moving Direction Keys	Use these keys to drive the robot arm manually in a designated direction. The user have to hold down the deadman switch at the same time when using these keys. **J1/X** -/+: Motion in X direction **J2/Y** -/+: Motion in Y direction **J3/Z** -/+: Motion in Z direction **J4/Rx** -/+: Rotation around X axis **J5/Ry** -/+: Rotation around Y axis **J6/Rz** -/+: Rotation around Z axis
Bottom	
F1 ~ F6	F1 to F6 are function keys. These function keys can be switched to F7 to F12 by pressing the **Shift** key.
Shift	
Start	Use the Start button to start the motor.
Servo	Use the Servo button to enable or disable servo. If enabled, the Servo LED indicator on the top of the front panel will light up.
Lock	Use the Lock button to place the robot in machine lock
MOD	Use the MOD button to switch between joint, X-Y or tool coordinate mode.
Menu	Use the Menu button to bring up the menu list.

Table 1-2: Function Key Descriptions

NOTE:

Most of the front panel function buttons are active only when using the optional operator HMI (Human Machine Interface).

1.4.2 Rear Panel

The rear panel provides access to the deadman switch. Refer to **Figure 1-5**.

Figure 1-5: Rear View

1.5 Dimensions

The Robot-TP-65M dimensions are shown below.

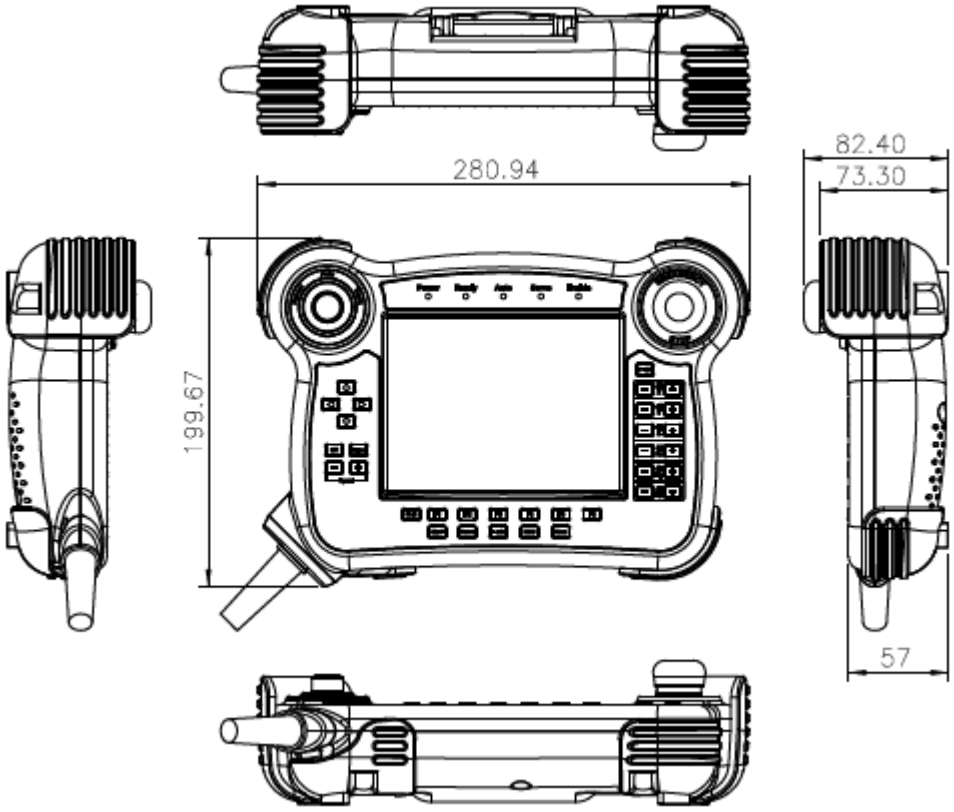


Figure 1-6: Robot-TP-65M Dimensions (mm)

1.6 System Specifications

The technical specifications for the Robot-TP-65M systems are listed in **Table 1-4.**

Specification		Robot-TP-65M
LCD Size		6.5"
Max. Resolution		640 (W) x 480 (H)
Brightness (cd/m^2)		800
Contrast Ratio		600:1
LCD Color		262K
Pixel Pitch (H x V) (mm)		0.207(H) x 0.207 (V)
Viewing Angle (H-V)		160° / 140°
Backlight MTBF (hr)		50,000 (LED backlight)
Touchscreen		4-wire resistive type touch screen Touch controller: Penmount DMC6000
LED Indicators		Five LEDs: Power, Ready, Auto, Servo, Enable
Keys		Moving direction, OK, Cancel, Speed (-/+), Shift, Function Keys (F1 ~ F6), Start, Servo, Lock, MOD, Menu, Stop, Cursor Keys
Switches	Emergency Stop Button	For B contacts, four circuit outputs (forced disjunction type)
	Deadman Switch	3-position switch (off-on-off), two circuit outputs
	Mode Selector Switch	3-position (Auto, Manual, Teach) keylock switch
I/O	Video Input	VGA
	Touch Interface	RS-232
	Power Source	12 V DC input
	Keypad Control Interface	PS/2
OSD Control		Software OSD
Construction Material		PC + ABS plastic front frame
Front Panel Color		Gray Pantone 8405C
Weight (N)		3.32 kg
Dimensions (W x H x D) (mm)		281 x 200 x 83
Operating Temperature		0ºC ~ 50ºC
Storage Temperature		-25ºC ~ 65ºC
Humidity		<90% (no-condensing)
IP level		IP 64 compliant (6-side)

Vibration	MIL-STD-810F
Drop Survival	1 m (38 inches), four corners, two sides
Power Requirement	12V DC
Power Consumption	6.6 W
Cable Length	6 m

Table 1-3: System Specifications

Chapter

2

Unpacking

2.1 Unpacking

To unpack the Robot-TP-65M, follow the steps below:

WARNING!

The front side LCD screen has a protective plastic cover stuck to the screen. Only remove the plastic cover after the Robot-TP-65M has been properly installed. This ensures the screen is protected during the installation process.

Step 1: Use box cutters, a knife or a sharp pair of scissors that seals the top side of the external (second) box.

Step 2: Open the external (second) box.

Step 3: Use box cutters, a knife or a sharp pair of scissors that seals the top side of the internal (first) box.

Step 4: Lift the monitor out of the boxes.

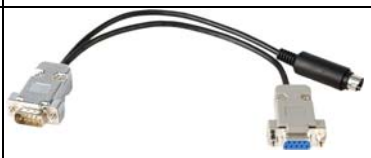
Step 5: Remove both polystyrene ends, one from each side.

Step 6: Pull the plastic cover off the Robot-TP-65M.

Step 7: Make sure all the components listed in the packing list are present.

2.1.1 Packing List

The Robot-TP-65M teach pendant is shipped with the following components:

Quantity	Item	Image
Standard		
1	Robot-TP-65M teach pendant	
1	Transfer cable	
1	Belt	
1	Utility CD	

If any of these items are missing or damaged, contact the distributor or sales representative immediately.

Chapter

3

Installation

3.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the maintenance of the Robot-TP-65M may result in permanent damage to the Robot-TP-65M and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the Robot-TP-65M. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the Robot-TP-65M is accessed internally, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: - Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding***: - Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: - When configuring the Robot-TP-65M, place it on an antic-static pad. This reduces the possibility of ESD damaging the Robot-TP-65M.
- ***Only handle the edges of the PCB***: - When handling the PCB, hold the PCB by the edges.

3.2 Installation Precautions

When installing the Robot-TP-65M, please follow the precautions listed below:

- **Power turned off**: When installing the Robot-TP-65M, make sure the power is off. Failing to turn off the power may cause severe injury to the body and/or damage to the system.
- **Certified Engineers**: Only certified engineers should install and modify onboard functionalities.

- **Anti-static Discharge**: If a user open the rear panel of the Robot-TP-65M, to configure the jumpers or plug in added peripheral devices, ground themselves first and wear and anti-static wristband.

3.3 System Connection

The Robot-TP-65M series has two models: Robot-TP-65M/K-ML and Robot-TP-65M/K. The only difference of these two models is that the Robot-TP-65M/K-ML has a 37-pin military connector while the Robot-TP-65M/K has multiple cables and connectors for connection. The following sections describe the system connection and connector pinouts of these two models.

3.3.1 Robot-TP-65M/K-ML Connection

The Robot-TP-65M/K-ML has a 6-meter cable with a 37-pin military connector to be connected to a robot controller.

Figure 3-1: Robot-TP-65M/K-ML with Cable

The pinout locations and pinouts of the 37-pin connector are described below.

Figure 3-2: 37-pin Military Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Key SW. - Manual	20	RS-232 – SOUT
2	EMG2	21	--
3	EMG1	22	RS-232 – RTS
4	PS/2 - KBDATA	23	PS/2 - GND
5	RS-232 - GND	24	LED - Servo
6	PS/2 - chassis	25	LED – Auto
7	RS-232 - chassis	26	GND
8	PS/2 - KBCLK	27	DDC – DAT
9	-(N)	28	DDC CLOCK
10	LED - Enable	A	R (Red+)
11	LED - Ready	B	GND (Red-)
12	+(P)	C	G (Green+)
13	3 SW.2	D	GND (Green-)
14	3 SW.1	E	B (Blue+)
15	Key SW. - Teach	F	GND (Blue-)
16	+12V	G	VSYNC
17	GND	H	HSYNC

18	RS/2 +5V	J	Copper Shielding Mesh
19	RS-232 – SIN		

Table 3-1: 37-pin Military Connector Pinouts

3.3.2 Robot-TP-65M/K Connection

The Robot-TP-65M/K has following cables and connectors for connecting to a robot controller:

- OSD keypad connector (PS/2)
- Touch connector (DB-9 male)
- VGA connector (DB-15 male)
- Cables:
  - Monitor power
  - EMG
  - Key switch
  - 3-way switch
  - LED

Figure 3-3: Robot-TP-65M/K with Cables

The pinout locations and pinouts of these connectors are described in the following sections.

3.3.2.1 OSD Keypad Connector

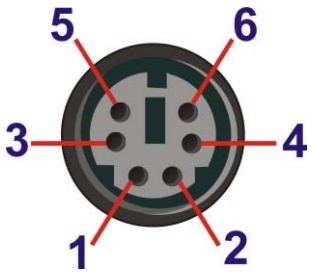


Figure 3-4: OSD Keypad Connector Pinout Locations

PIN NO.	DESCRIPTION
1	KB_DATA
2	--
3	GND
4	PS/2 VCC_IN 5V
5	KB_CLK
6	--

Table 3-2: OSD Keypad Connector Pinouts

3.3.2.2 Touch Connector

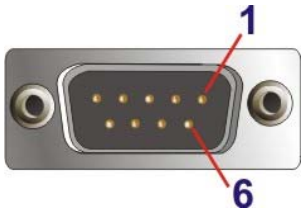


Figure 3-5: Touch Connector Pinout Locations

PIN NO.	DESCRIPTION
1	--
2	RS-232_RX
3	RS-232_TX
4	--
5	GND

6	--
7	RS-232_RTS
8	--
9	--

Table 3-3: Touch Connector Pinouts

3.3.2.3 VGA Connector

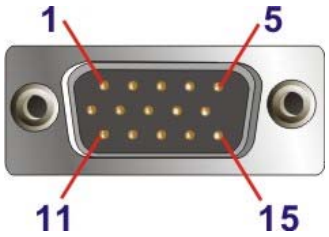


Figure 3-6: VGA Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	RED	9	--
2	GREEN	10	--
3	BLUE	11	--
4	--	12	DDC_DATA
5	GND	13	HSYNC
6	(Shield) RED	14	VSYNC
7	(Shield) GREEN	15	DDC_CLOCK
8	--		

Table 3-4: VGA Connector Pinouts

3.3.2.4 Cable Pinouts

	NO.	COLOR		DESCRIPTION
Monitor Power	1	White		Vin-in (12V only)
	2	Black		GND

EMG	1	Red		EMG 1
	2	Yellow		EMG 2
Key Switch	1	Black		3 SW.2
	2	Brown		KEY SW-Teach
	3	Orange		KEY SW-Manual
3-Way Switch	1	Green		3 SW.2
	2	Blue		3 SW.1
LED	1	Purple		LED_Power (VCC 12~24V)
	2	Gray		LED_Ready
	3	White		LED_Auto
	4	Pink		LED_Servo
	5	Light green		LED_Enable
	6	White/Black		LED_GND

Table 3-5: Cable Pinouts

3.4 Carrying the System

The package comes with a belt for the user to carry the Robot-TP-65M. To use the belt, follow the steps below.

Step 1: Locate the hooks on the four corners of the Robot-TP-65M (**Figure 3-7**).

Figure 3-7: Hook Locations

Step 2: Choose either two hooks to install the belt.

Step 3: Carry the Robot-TP-65M as shown in **Figure 3-8**.

Figure 3-8: Carrying the Robot-TP-65M

3.5 Emergency Buttons

The Robot-TP-65M teach pendant has a deadman switch and an emergency button, which are provided to stop the robot automatically and safely when the operator can no longer operate the robot correctly with the teach pendant in the manual mode.

3.5.1 Deadman Switch

Figure 3-9: Deadman Switch

The deadman switch is located on the rear panel. It is a 3-position switch which is able to react to the following three operating statuses:

(1) **OFF:** When the switch is not being pressed or is being pressed lightly

(2) **ON:** When the switch is being pressed with correct pressure

(3) **OFF:** When the switch is being pressed too strongly

3.5.2 Emergency Stop Button

Figure 3-10: Emergency Stop Button

The emergency stop button is located on the front panel. Push the button can stop the robot operation immediately.

- **STOP:** Push the emergency stop button to stop operation.
- **RESET:**
  - Pull the emergency stop button to reset or
  - Turn the emergency stop button to rest

Appendix

A

Safety Precautions

WARNING:

The precautions outlined in this chapter should be strictly followed. Failure to follow these precautions may result in permanent damage to the Robot-TP-65M.

A.1 Safety Precautions

Please follow the safety precautions outlined in the sections that follow:

A.1.1 General Safety Precautions

Please ensure the following safety precautions are adhered to at all times.

- ***Follow the electrostatic precautions*** outlined below whenever the Robot-TP-65M is opened.
- ***Make sure the power is turned off and the power cord is disconnected*** whenever the Robot-TP-65M is being installed, moved or modified.
- ***Do not apply voltage levels that exceed the specified voltage range***. Doing so may cause fire and/or an electrical shock.
- ***Electric shocks can occur*** if the Robot-TP-65M chassis is opened when the Robot-TP-65M is running.
- ***Do not drop or insert any objects*** into the ventilation openings of the Robot-TP-65M.
- ***If considerable amounts of dust, water, or fluids enter the Robot-TP-65M***, turn off the power supply immediately, unplug the power cord, and contact the Robot-TP-65M vendor.
- **DO NOT**:
  - Drop the Robot-TP-65M against a hard surface.
  - Strike or exert excessive force onto the LCD panel.
  - Touch any of the LCD panels with a sharp object
  - In a site where the ambient temperature exceeds the rated temperature

A.1.2 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the Robot-TP-65M may result in permanent damage to the Robot-TP-65M and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the Robot-TP-65M. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the Robot-TP-65M is opened and any of the electrical components are handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: Wearing a simple anti-static wristband can help to prevent ESD from damaging any electrical component.
- ***Self-grounding***: Before handling any electrical component, touch any grounded conducting material. During the time the electrical component is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: When configuring or working with an electrical component, place it on an antic-static pad. This reduces the possibility of ESD damage.
- ***Only handle the edges of the electrical component***: When handling the electrical component, hold the electrical component by its edges.

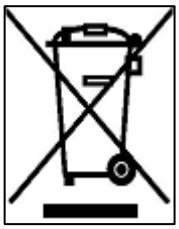
A.1.3 Product Disposal

CAUTION:

Risk of explosion if battery is replaced by and incorrect type. Only certified engineers should replace the on-board battery.

Dispose of used batteries according to instructions and local regulations.

- Outside the European Union - If you wish to dispose of used electrical and electronic products outside the European Union, please contact your local authority so as to comply with the correct disposal method.
- Within the European Union:



EU-wide legislation, as implemented in each Member State, requires that waste electrical and electronic products carrying the mark (left) must be disposed of separately from normal household waste. This includes monitors and electrical accessories, such as signal cables or power cords. When you need to dispose of your display products, please follow the guidance of your local authority, or ask the shop where you purchased the product. The mark on electrical and electronic products only applies to the current European Union Member States.

Please follow the national guidelines for electrical and electronic product disposal.

A.2 Maintenance and Cleaning Precautions

When maintaining or cleaning the Robot-TP-65M, please follow the guidelines below.

A.2.1 Maintenance and Cleaning

Prior to cleaning any part or component of the Robot-TP-65M, please read the details below.

- Except for the LCD panel, never spray or squirt liquids directly onto any other components. To clean the LCD panel, gently wipe it with a piece of soft dry cloth or a slightly moistened cloth.
- Never use alcohol to clean the external chassis.
- The interior of the Robot-TP-65M does not require cleaning. Keep fluids away from the Robot-TP-65M interior.
- Be cautious of all small removable components when vacuuming the Robot-TP-65M.
- Turn the Robot-TP-65M off before cleaning the Robot-TP-65M.
- Never drop any objects or liquids through the openings of the Robot-TP-65M.
- Be cautious of any possible allergic reactions to solvents or chemicals used when cleaning the Robot-TP-65M.
- Avoid eating, drinking and smoking within vicinity of the Robot-TP-65M.

A.2.2 Cleaning Tools

Some components in the Robot-TP-65M may only be cleaned using a product specifically designed for the purpose. In such case, the product will be explicitly mentioned in the cleaning tips. Below is a list of items to use when cleaning the Robot-TP-65M.

- ***Cloth*** – Although paper towels or tissues can be used, a soft, clean piece of cloth is recommended when cleaning the Robot-TP-65M.
- ***Water*** – A cloth moistened with water can be used to clean the Robot-TP-65M.
- ***Using solvents*** – The use of solvents is not recommended when cleaning the Robot-TP-65M as they may damage the plastic parts.
- ***Vacuum cleaner*** – Using a vacuum specifically designed for computers is one of the best methods of cleaning the Robot-TP-65M. Dust and dirt can restrict the airflow in the Robot-TP-65M and cause its circuitry to corrode.
- ***Cotton swabs*** - Cotton swaps moistened with water are excellent tools for wiping hard to reach areas.
- Foam swabs - Whenever possible, it is best to use lint free swabs such as foam swabs for cleaning.

Appendix

B

Hazardous Materials Disclosure

B.1 Hazardous Material Disclosure Table for IPB Products Certified as RoHS Compliant Under 2002/95/EC Without Mercury

The details provided in this appendix are to ensure that the product is compliant with the Peoples Republic of China (China) RoHS standards. The table below acknowledges the presences of small quantities of certain materials in the product, and is applicable to China RoHS only.

A label will be placed on each product to indicate the estimated “Environmentally Friendly Use Period” (EFUP). This is an estimate of the number of years that these substances would “not leak out or undergo abrupt change.” This product may contain replaceable sub-assemblies/components which have a shorter EFUP such as batteries and lamps. These components will be separately marked.

Please refer to the table on the next page.

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	X	O	O	O	O	X
Display	X	O	O	O	O	X
Printed Circuit Board	X	O	O	O	O	X
Metal Fasteners	X	O	O	O	O	O
Cable Assembly	X	O	O	O	O	X
Fan Assembly	X	O	O	O	O	X
Power Supply Assemblies	X	O	O	O	O	X
Battery	O	O	O	O	O	O

O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006

X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in SJ/T11363-2006

此附件旨在确保本产品符合中国 RoHS 标准。以下表格标示此产品中某有毒物质的含量符合中国 RoHS 标准规定的限量要求。

本产品上会附有"环境友好使用期限"的标签，此期限是估算这些物质"不会有泄漏或突变"的年限。本产品可能包含有较短的环境友好使用期限的可替换元件，像是电池或灯管，这些元件将会单独标示出来。

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
壳体	X	O	O	O	O	X
显示	X	O	O	O	O	X
印刷电路板	X	O	O	O	O	X
金属螺帽	X	O	O	O	O	O
电缆组装	X	O	O	O	O	X
风扇组装	X	O	O	O	O	X
电力供应组装	X	O	O	O	O	X
电池	O	O	O	O	O	O

O: 表示该有毒有害物质在该部件所有物质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。