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METROLOGIC INSTRUMENTS, INC.

SP5600 Optimus*R*

User's Guide
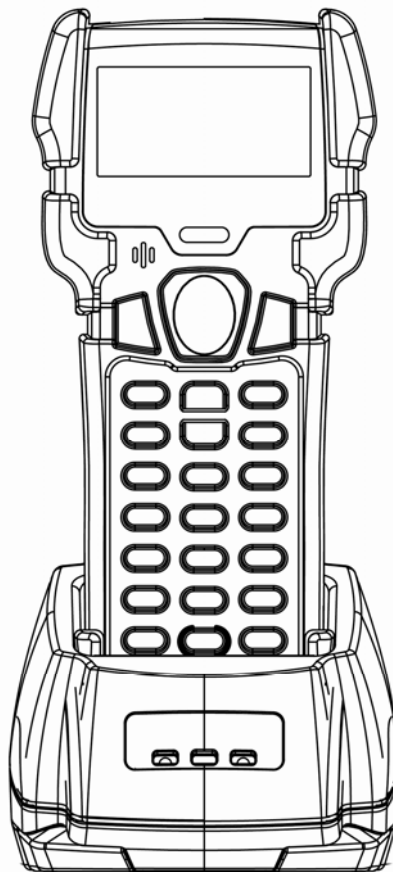
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Table of Contents

Introduction

General Features and Characteristics

Installation

Introduction

Product Overview

The **SP5600** Optimus*R* Portable Data Terminals are robust and versatile scanning devices designed to provide exceptional performance, while enduring the demands of everyday use. The rugged exterior of the Optimus*R* make it the ideal PDT for applications that take place in more rigorous environments. The lithium-ion rechargeable battery provides the Optimus with more than 200 hours of operation. It is supported by a resourceful set of development tools, including a Windows-based program builder, "C" compiler, and "BASIC" compiler. The Optimus*R* has a fully integrated laser for scanning all 1D bar code symbologies, completely enclosed by the protective ergonomic housing. The built-in functionality of the Optimus makes it an excellent choice for numerous applications. In addition, when combined with the optional WiFi module it is the ideal solution for real time applications such as inventory control, shop floor management, warehousing operations, and distribution operations.

Key Product Features

- Up to 8 MB RAM capable of storing over 400,000 records
- Easy to use Optimizer program builder and download software
- Auto-backlit LCD display
- Audible and visual indications
- Built-in laser bar code scan engine capable of scanning all 1D bar code symbologies.
- Powered by rechargeable Lithium-ion battery
- Upload/download data via RS232, USB, and WiFi interfaces

Scanner and Accessories*

METROLOGIC PART NUMBERS.	PART DESCRIPTION
SP5602	Optimus*R* laser batch unit with 2MB RAM
SP5604	Optimus*R* laser batch unit with 4MB RAM
SP5608	Optimus*R* laser batch unit with 8MB RAM
SP5650	Optimus*R* laser WiFi standard unit
SP5652	Optimus*R* laser WiFI unit with 2MB RAM
SP5654	Optimus*R* laser WiFi unit with 4MB RAM
SP5658	Optimus*R* laser WiFi unit with 8MB RAM
MI5600-614	Optimus*R* standard cradle
MI5600-6107	Optimus*R* modem cradle
52-52860A	RS232 Cradle Cable
52-52861A	USB cradle cable

* For information on additional accessories and scanner kits contact your local Metrologic Instruments representative.

General Features and Characteristics

Figure 1 Scanner Features

ITEM NO.	DESCRIPTION
1	Multi-functional Keypad
2	Scan Button
3	LCD display
4	Red Output Window (Laser Aperture)
5	Speaker for audible indicators
6	Protective rubber bumpers
7	Battery Compartment
8	Communication Ports (RS232 and IrDA), Power Adapter Port, and Battery Contacts
9	Comfort Strap
10	Battery Compartment Release

General Features and Characteristics

Figure 2. Cradle Features

ITEM NO.	DESCRIPTION
1	LED Transmission Indicator
2	LED Power indicator
3	Battery Contacts
4	IR communication port
5	Rubber Footpads
6	RS232 Communication Port and Power Adapter Port

General Features and Characteristics

Multifunctional Keypad

Figure 3.Keypad Features

ITEM NO.	KEY NAME	DESCRIPTION
1	**ALPHA(α)**	*The toggle key for Alphabet/Numeral input.* When the system is in alpha-mode, a small icon will be shown in the lower right corner of the display. Each numeric key can be used to generate one of the three capital letters located on that number key. For example, numeral *2* can be used to produce *A*, *B*, or *C*. Pressing the same key twice within one second, will produce the letter *B*. Pressing the same key without halting longer than one second, will allow the user to toggle through the three letters. When the key has been depressed for longer than one second or another key has been pressed, the unit will send the real key code to the application program.
2	**ALPHANUMERIC**	*Alphanumeric* These 10 keys can be used for either alpha characters or numerical input. (See Item 8 for further description of key operation)
3	**ARROW**	*Arrow.*The two arrow keys located below the *Scan* key are used to toggle up and down between menu selections.
4	**ESC**	*Escape.* This key is used to stop and exit current operation
5	**SCAN**	*Scan a bar code.* Pressing this button will trigger the scanner to read a bar code
6	**ENTER**	*Enter.* There are two enter keys on the side of the scan key. Normally the enter keys are used for command execution or input confirmation.
7	**BS**	*Back Space* This key can be used to toggle back one space or if pressed down longer than one second, a *clear* code will be sent
8	**FUNCTION(FN)**	*The function key.* This key cannot be activated alone; it must be pressed with one of the numeric keys at the same time. For example, *FN* + *1* generates function #*1*, *FN* + *2* generates function #*2*, etc (up to 9 functions). Also, this key can be combined with the *UP/DOWN* arrow keys to adjust the contrast of the LCD. And when this key is combined with the *ENTER* key, it will turn ON/OFF the backlight.
9	**POWER**	*Power On/Off.* To prevent an accidental power down, it requires about 1.5 sec of continuous pressing to turn On/Off the power.

General Features and Characteristics

The LCD Screen

The LCD screen of the Optimus*R* Portable Data Terminal displays program settings, operational parameters, data collected, and much more. The display is a graphical LCD with the following characteristics:

- Display area of 64 pixels x 100 pixels
- Resolution:
    - Maximum of 8 lines x 16 characters
    - Minimum of 4 lines x 12 characters
- Displays alpha-characters, numbers, and symbols
- Automated back light

The Lithium-Ion Battery

The OptimusR Portable Data Terminal includes a lithium-ion rechargeable battery pack. The battery is inserted (*See Getting Started* for battery installation) into the battery compartment of the Optimus and recharges with Optimus in the cradle and in charging mode.
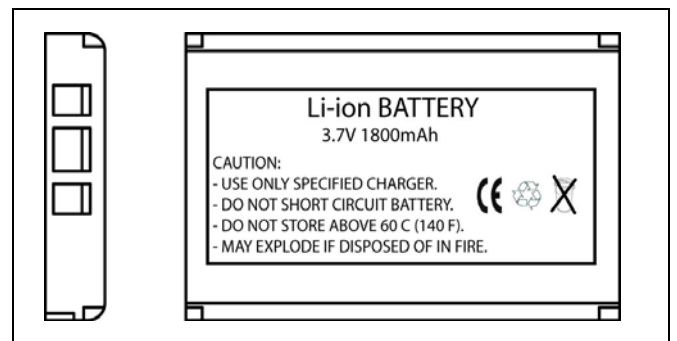
Li-ion BATTERY
3.7V 1800mAh

CAUTION:
- USE ONLY SPECIFIED CHARGER.
- DO NOT SHORT CIRCUIT BATTERY.
- DO NOT STORE ABOVE 60 C (140 F).
- MAY EXPLODE IF DISPOSED OF IN FIRE.

Figure 4 Lithium-Ion Battery

Installation

Getting Started

The Optimus*R* Portable Data Terminal (*PDT*) requires minimal effort to begin functional operation for data collection in any application. In order to get started the unit must have a fresh battery inserted into the battery compartment.

1. Access the battery compartment by removing the battery cover. To remove the cover, pull the cover release up on each side of the compartment and slide the cover away form the unit.
2. Insert the Li-ion battery into the battery compartment, battery information side up and battery contacts to the bottom, at an angle with the battery contacts inserted first.
3. Push the Li-ion battery the remainder of the way into the compartment. The battery will fit snuggly into place.
4. Close the battery compartment by sliding the battery cover toward the scan head until the cover locks into place.
5. Turn the unit over, so the keypad is visible and hold down the power button ⏻.
6. The LCD graphical display will display a menu and an audible indicator will sound to signify that the Optimus has been powered up properly.
7. Using the arrow keys select the *Run Program* option.
8. Scan a bar code.

Note: The Optimus*R* comes with a default program loaded that allows users to scan items and enter their quantity. For information on how to create these programs, please refer to the Optimizer manual.

Installation

Basic Operation

In order for the Optimus to operate properly, an application program must be loaded onto the PDT. It is possible for the Optimus to power up without at active application. On power up if the Optimus has no application program loaded, then the following Program Manager menu options will appear on the display:

MENU OPTIONS.	DESCRIPTION
Download	This option allows the user to download application programs (*.SHX), BASIC run-time (bas.ops.shx), BASIC programs (*.SYN) or font files to the terminal. There are 6 resident locations and one Active Memory. A maximum of 7 programs can be downloaded to the terminal. The application program downloaded to the Active Memory will be the only activate program running. In order to activate one of the other programs. Immediately after downloading, input a name for the program desired or just press the enter key to keep its current name if one is applicable. This will enable the user to download the program. The application file's type, name, and size will be shown on the list of programs when entering the Download or Activate menu of the Program Manager. The file type is a small letter that follows the program number (01~06), it can be either 'b', 'c' or 'f' which represents BASIC program, C program or font file respectively. The program name is up to 12 characters and the program size is in units of K bytes. NOTE: In order to delete a program, select the program designated for deletion. From the program information screen, press the Alpha/Function key, then zero.
Activate	This option will enable the use to activate one of the resident programs. In order to accomplish this, the user must copy one of the 6 resident programs to the Active Memory. Upon activation of the new program the original program in the Active Memory will be replaced. *Note:* A font file cannot be activated, and a BASIC program cannot be activated if the BASIC run-time does not exist.
Upload	The *Upload* option gives the user additional method for retrieving an application program. It allows a user to transmit the application programs to a host PC or another terminal. This function also allows a terminal to be cloned without going through a PC.

Selecting and successfully completing one of these three menu options will enable the OptimusR to begin functional operation.

Communication and Data Collection Setup

The OptimusR Series has various ways of communicating with a host device. Depending on the model of Optimus, it can communicate via RS232, USB, or via a WiFi connection. The OptimusR can store data in the unit or send data real time via a WiFi connection. The OptimusR has the ability to utilize a RS232 or USB connection to communicate to a host device for both application program downloads and data uploads. The OptimusR includes either a USB or RS232 cable. In order to begin an application download or data transfer the following steps would need to be followed.

1. Remove the Optimus cradle, the power supply, and either the USB or RS232 cable from the box.
2. Plug the power supply into a power outlet and insert the other end into the cradle. The red LED on the cradle will illuminate if the power supply is connected correctly.

Installation

3. Follow steps a, b, or c
   a. For the RS232 cable plug the 9 pin serial connector into a serial port on the host device. Plug the opposite end into the communication port of the cradle.
   b. For the USB cable plug the USB end of the cable into an appropriate communication port on the host device and the opposite end of the cable into the communication port of the cradle*.
   c. For the WiFi connection to communicate with the host device the settings on OptimusR and the host device must be configured correctly.
4. Power up the Optimus and select the *Utilities* option.
5. This will open additional menu options. Select the *Transfer File*s option.
6. Select *Get Program* on the next menu. The unit is now ready to download an application program.
7. Place unit in cradle and download the appropriate application program.
8. Once the Optimus has received the application program the unit is ready for scanning and collecting data.

> Note: There are Optimus*R* models available that do not include the cradle. Models that do not include a cradle as an accessory can have the power supply and the communication cable connected directly to the unit.

A software driver is required for proper installation. The driver is included with the installation CD provided with each Optimus. In addition the driver can be downloaded from http://www.metrologic.com.

Installation

Data Upload

1. To transfer the data collected select the *Utilities* option.
2. Select the *Download Method* option on the next menu and then select the appropriate method for downloading files to the host device.
3. The WiFi can send data in real time, however, if cradle options (Cradle-IR or IrDA) are selected re-insert the Optimus unit into the cradle and upload the data to the host device.

To change the download method select the *Utilities* option from the main menu and then select the *download method* from the list of available options. This allows the user to alter the method by which data is transferred to the host device.

> Note: Plugging the Optimus into a serial port or USB port on the host device does not guarantee communication with the Optimus. Ensure that the communication port on the host device is not populated by another device. Confirm that the communication settings on both the host device and the Optimus correspond prior to a program download or data upload.

The Optimus*RW* is similarly connected to the host device and programmed however, there is a key difference in the data collection process. The OptimusRW supports transmission of data wirelessly and as such has the capability of communicating that data in real time. The unit needs to be setup to communicate with the network as follows:

1. With the Optimus powered off press and hold the 7, 9, and power keys. The System Module menu will appear on screen.
2. Using the arrow keys select the *802.11b Menu* option.
3. The list of settings that appears are the settings that require configuration in order for the WiFi to function effectively.
4. Select *Information* option to view the current configuration settings on the Optimus.
5. Select the *Network Set* option to configure the network settings. This is similar to enabling the network settings on a PC.
6. Select *WLAN Setting* to select and configure the Optimus for the appropriate network available to connect to the host device.
7. Select *Security* to setup any security/authentication settings that match the host device.
8. Select the *Echo test* to test the settings and verify that the network settings on the Optimus are configured correctly and that the Optimus is communicating with the host device.
9. Power off the Optimus.

Upon completion of the configuration process, and depending on the active application program, the user will be able to begin data transmission via WiFi communication.

> Note: Contact a Metrologic Instruments representative if assistance is required when integrating a Metrologic device into a network.

Installation

The System Menu

The system menu on the Optimus is another useful tool included with the Optimus. It provides information about the Optimus and access to the system menu for configuring the Optimus. In order to access the system module, follow the instructions below:

1. With the Optimus powered off press down and hold the 7, 9, and power button.
2. An audible indicator will sound to indicate that the Optimus is powered on.
3. The Optimus will display the system menu.

The system menu will list a number of options:

- **Information**
- **Settings**
- **Tests**
- **Memory**
- **Power**
- **Load Program**
- **802.11 Menu**

System Menu Options

Depending on the application program that is active on the Optimus, there are number of settings and options that may be selected for both setup and testing. The tables show a number of those settings and their descriptions.

Information

The *Information* option provides information about the Optimus including:

- Hardware Version
- Serial Number
- Manufacturing Date
- Application Program Version

Installation

Settings

SETTING	DESCRIPTION	DEFAULT
Clock	Set date and time for the system.	N/A
Backlight ON Period	Set the duration for the keyboard/LCD backlight	*the light goes off after 20 seconds*
CPU Speed	Set CPU running speed. There are five speeds available: Full speed, half speed, quarter speed, eighth speed and sixteenth speed.	*Full speed*
Auto Off	Set time threshold for automatically power off when no operation is taking place during that specified period. If this value is set to zero, this function will be disabled.	*10 minutes*
Power On Options	There are two possible selections: **Program Resume**, which starts from the program being used during the last session before the last power-off; and **Program Restart**, which starts with a new program.	*Program Resume*
Key Click	Select a tone for the beeper or disable the beeper when the user presses a key button.	*Enable*
System Password	Set a password to protect the user from entering the system menu.	*no password is set*
Font	Current font displayed on the Optimus display	*System Font*
Reset to Default	Resets the system settings to the default settings	*N/A*

Tests

The OptimusR has numerous tests available to the user for both operation and diagnostics. Depending on the application program that is in the active memory will determine which tests can be performed and are available to the user. The following table provides a description of the available tests.

SETTING	DESCRIPTION	DEFAULTS
Reader	To test the reading performance of the scanner. The following symbologies are enabled for the Reader test. All other symbologies will need to be enabled via programming. *Default Bar codes: Code 39, Industrial 25, Interleave 25,Codabar, Code 93, Code 128, UPCE, UPCE with ADDON 2, UPCE with ADDON 5, EAN8, EAN8 with ADDON 2 EAN8 with ADDON 5, EAN13, EAN13 with ADDON 2, EAN13 with ADDON 5*	
Buzzer	To test the buzzer with different Frequency/Duration. Press **ENTER** key to start and then press any key to stop the test.	
LCD & LED	To test LCD display and LED indicator. Press **ENTER** key to start and then press any key to stop the test.	
Keyboard	To test the rubber keys. Press a key and the result will be shown on the LCD display. Note that the **FN** key should be used in conjunction with numeral keys.	
Memory	To test the data memory (SRAM). Note after the test, the contents of the memory space will be wiped out. ⚠ **Warning: This test erases any data stored in the terminal**.	
Echo Test	Echo Test is used to test the communication between the cradle and the PC. Perform Echo test from the host device that the cradle is connected.	

Installation

Memory

The menu option provides the user with ability to gather information on the amount of memory available on the Optimus, as well as the ability to initialize the memory. This is accomplished by choosing one of the two available selections.

1. Size Info.
2. Initialize

Size Info.

The Optimus contains two types of memory, SRAM and Flash memory. These two types of memory allow the Optimus to perform operational tasks at an optimal level.

Base RAM: The Base RAM is the primary memory in the Optimus and is the location where application is stored and accessed.

Memory Card: The Memory Card is basically SRAM and is memory that retains data as long as power is being supplied. SRAM does not have to be periodically refreshed and provides quick access to data. This is the location that the data collected will be stored.

Flash memory: Flash memory is a type of constantly-powered nonvolatile memory that can be erased and reprogrammed easily. This allows users to program the Optimus effortlessly.

Initialize

This selection enables the user of the Optimus to initialize the memory (SRAM).

⚠ **Warning: Initializing the memory will erase the current data in memory.**

Power

Selecting the power option allows the user to view the actual voltages of the main battery and the backup battery.

Load Program

The selection of *Load Program* enables the user to download an application program to the Optimus. *Note: For further information on application program downloads see the Optimizer User's guide.*

Installation

802.11b Menu

The 802.11b Menu settings will configure the Optimus*R* with the appropriate network and security settings for WiFi communication.

1. Information
2. Network Set
3. WLAN Setting
4. Security
5. Echo Test

> **!** Modifying TCP/IP settings can affect the performance of certain devices. Contact an IT professional to ensure that modifying these settings is done correctly.

Information

The information setting list the current network settings of the OptimusR.

Network Set

These are the network settings for the OptimusR.
1. DHCP
2. SubNet Mask
3. Local IP
4. Gateway
5. DNS Server
6. Domain Name

WLAN Setting

These are the Wireless Local Area Network settings.
1. Local Name
2. SS ID
3. System Scale
4. Power Saving
5. Preamble
6. Ad-Hoc

Security

The security settings provide network authentication configuration settings to provide secure data transfer.
1. Authentications
2. WEP (Wired Equivalent Privacy) Menu
3. EAP (Extensible Authentication Protocol) Menu

Echo Test

Test to verify that the network settings are correct and communication from Optimus to host device is functioning.

Installation

Application

The Application module runs on top of the System module. The OptimusR Series Portable Data Terminals are preloaded with the Optimizer's run-time program and the following menu will be shown upon powering the unit up:

Models ():

1. **Run Program**
2. **Utilities**

Utilizing the arrow keys select the menu option and execute it by pressing the ENTER key. For certain models of the OptimusR Series the Data Optimizer program may need to be used in order to handle the in-coming and out-going data to and from a host device. For detailed information, please refer to "Optimizer User's Guide" and "DataOptimizer User's Guide".
Note: If the Application Generator is used to create the application program, it will be necessary to download it to the terminal.

Programming the terminal

There are three software tools available for developing application programs for the terminal.

- The Optimizer Program Builder
- The "BASIC" Compiler
- The "C" Compiler

For detailed information, please consult the appropriate manual or contact Metrologic Instruments, Inc..

Programming the communication cradle

The communication cradle of the OptimusR Portable Data Terminal supports serial IR interface only. If a customized PC application has been developed for communication with the terminal via the cradle, it will be necessary to first configure the cradle through programming. There is a DLL available for this purpose.

For more information, please contact Metrologic Instruments, Inc..

Troubleshooting

SYMPTOM	DESCRIPTION
Does not power up after pressing POWER key.	Make sure the battery is inserted and charged.
	Charge the battery and check the charging status. If no charging information shown on the display, reload the battery and check if the battery is properly installed then try again.
	Call for service if problem persists.
Cannot transmit data or programs to/from the terminal	Check if the cable is plugged tightly into host device and cradle.
	Perform Echo test to confirm communication.
	Check if host communication parameters (COM port, baud rate, data bits, parity, and stop bit) match with the Terminal's. Verify that the communication port on the host device is not in use by another device.
Keypad does not work properly	Turn off the power then enter the system menu. From the system menu, select the *Test* and then its sub-item *KBD.* Perform the key-in test.
	Call for service if problem persists.
Scanner does not scan	Check if the bar codes used are enabled
	Check if battery-low indicator is shown on the LCD display. If yes, charge the battery
	Call for service if problem persists.
Abnormal responses	Open the battery cap and re-load the battery.
	Enter system menu. Run diagnostic test.
	Call for service if problem persists.

Specifications

	OPTIMUSR SERIES	
OPERATIONAL		
Light Source:	**V**isible **L**aser **D**iode (VLD) @ 650 nm	
Normal Depth of Field:	51 mm - 381 mm (2"- 15")	0.33 mm (13 mil) bar code
Width of Scan Field:	305mm (12") @ 381 mm (15")	
Single-Line		
Scan Speed:	42 scan lines per second	
No. of Scan Lines:	1	
Min Bar Width:	0.127 mm (5.0 mil)	
Decode Capability:	All standard 1-D bar codes including RSS-14, RSS-Expanded, and RSS-14 Limited	
Print Contrast:	35% minimum reflectance difference	
No. Characters Read:	Up to 80 data characters Maximum number will vary based on symbology and density.	
Beeper Operation:	7 tones or no beep	
CPU:	16-bit CMOS, low power consumption	
Program Memory:	2 MB Flash ROM	
Data Memory:	2 MB SRAM, expandable to 8 MB	
Display:	LCD 128 x 64 pixels, back-lit	
Display Resolution:	8 lines x 20 Characters (max), 4 Lines x 15 characters (min)	
Communication (Unit):	RS232, USB, IrDA, CradleIR or WiFi	
Communication (Cradle):	RS232 or USB	
Application Development:	Windows-based Optmizer; optional C & BASIC compilers	

Specifications

|	OPTIMUSR SERIES
MECHANICAL	
Width (Unit):	81 mm (3.2")
Depth (Unit):	46 mm (1.8")
Height (Unit):	172 mm (6.77")
Weight (Unit):	10.6 oz (300 g) – including battery
Width (Cradle):	96 mm (3.8")
Depth (Cradle):	106 mm (4.17")
Height (Cradle):	80 mm (3.15")
ELECTRICAL	
Battery Operation:	Li-ion
Battery Backup:	3.7V, 7.0mA hours, rechargeable lithium battery
Operation:	Over 200 hours, Over 16 hours (WiFi)
Laser Class:	CDHR and IEC Class 2 in accordance with IEC 60825 – 1:1993 + A1:1997 + A2:2001
EMC:	FCC Class B
ENVIRONMENTAL	
Operating Temperature:	0°C to 50°C (32°F to 122°F)
Storage Temperature:	-20°C to 60°C (-4°F to 140°F)
Humidity:	5% to 95% relative humidity, non-condensing
Shock Resistance:	1.2 m (4') drop onto concrete
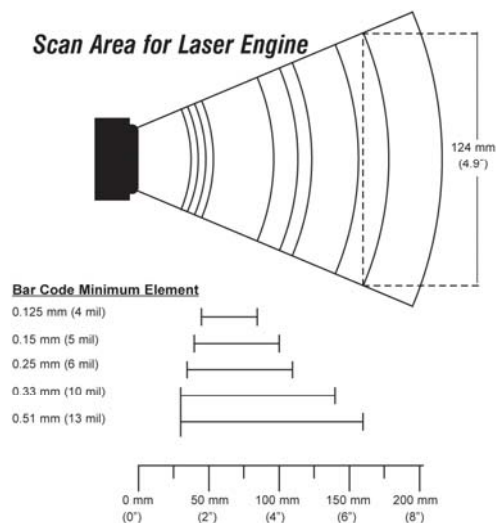
Figure 5 Scan Areas

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Safety Notices

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reposition or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.