Sharp® 128x128 Memory LCD and microSD Card BoosterPack™ Plug-in Module (BOOSTXL-SHARP128)

This user's guide provides an overview of the features and options of the BOOSTXL-SHARP128, including power, header pinouts and connections, and communication interfaces.

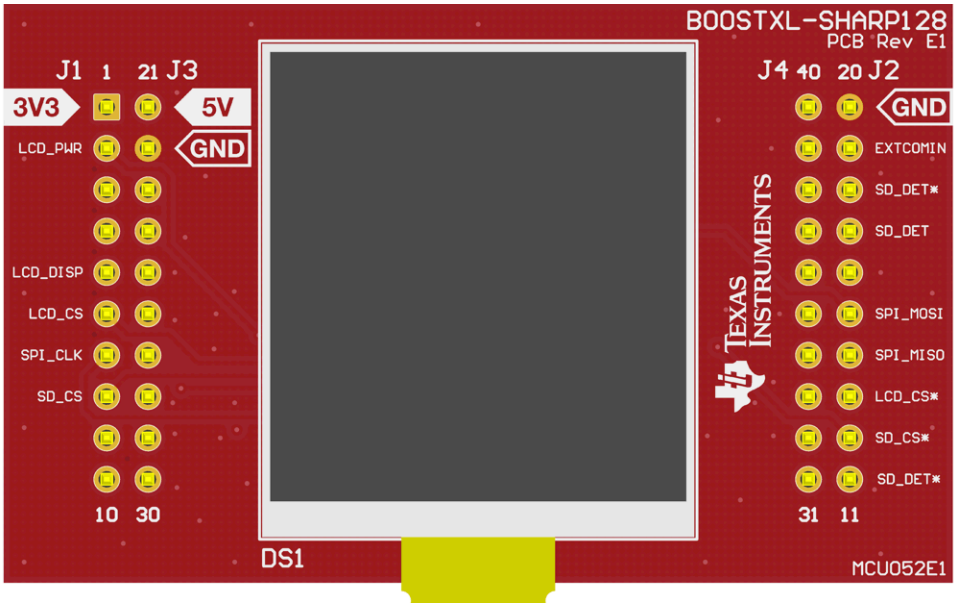

Figure 1. BOOSTXL-SHARP128 BoosterPack™ Plug-In Module

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Trademarks

1 Board Overview

1.1 Introduction

The Sharp® 128x128 Memory LCD and microSD Card TI BoosterPack™ Plug-in Module (BOOSTXL-SHARP128) is based on the LS013B7DH03 super-low-power TFT display panel from Sharp Electronics and also features a microSD card expansion slot. Both the LCD and SD card can be controlled using the serial peripheral interface (SPI).

TI MCU LaunchPad™ development kit developers can use this BoosterPack plug-in module to display sensor readings, time, graphics, or other information using the 128-x128-pixel LCD as well as to expand embedded applications with SD card read/write capabilities.

NOTE: The BOOSTXL-SHARP128 supersedes the obsoleted 430BOOST-SHARP96, which used the discontinued Sharp LS013B4DN04 LCD module. The 128x128 LS013B7DH03 and the 96x96 LS013B4DN04 LCD modules are pin-to-pin compatible with reusable firmware and drivers.

1.2 Key Features

- Sharp LS013B7DH03 memory LCD
  - 1.28-inch screen offering 128x128 monochrome pixels
  - Super-low power consumption TFT panel
  microSD card expansion slot (no SD Card included)
- DCDC 3-V to 5-V converter available to also support 5-V Sharp displays

1.3 What's Included

1.3.1 Kit Contents

- 1x BOOSTXL-SHARP128 BoosterPack plug-in module
- 1x quick start guide

1.3.2 Software Examples

- SimpleLink™ SDK
- MSP430Ware™ software

1.4 First Steps: Example Projects

A good method to get familiar with the EVM is by using available example code online. The examples demonstrate the key features of the BoosterPack plug-in module.

3. Choose a LaunchPad development kit that fits your needs - Visit TI's LaunchPad portal

2. Download example code from the SimpleLink SDKs or MSP430Ware - See Section 3

1. Plug the BoosterPack into the LaunchPad

Launch!

1.5 Next Steps: Looking Into Provided Code and Examples

It is now time to start exploring more features of the EVM!

http://www.ti.com/tool/boostxl-sharp128

To get started, you need an integrated development environment (IDE) to explore and start editing the code examples. Refer to Section 3 for more information on IDEs and where to download them.

The available code examples are provided inside the SimpleLink SDKs and MSP430Ware software. All code is licensed under BSD, and TI encourages reuse and modifications to fit specific needs.

2 Hardware

Figure 2 shows an overview of the EVM hardware.

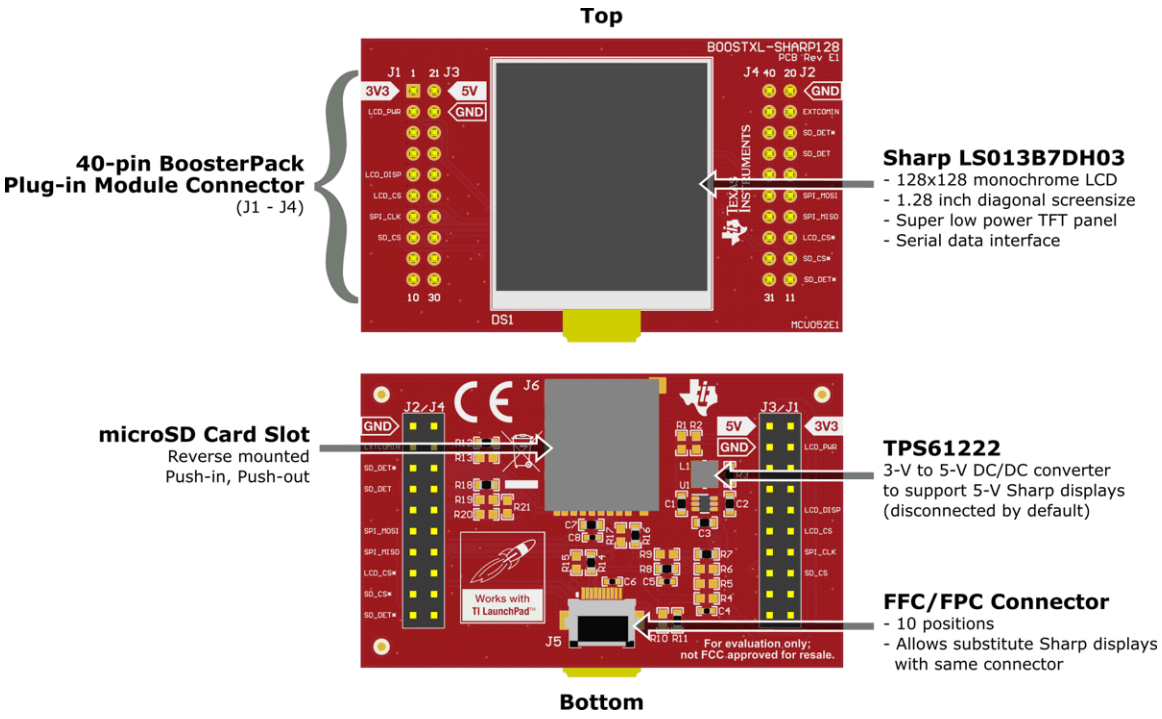

Figure 2. BOOSTXL-SHARP128 Overview

2.1 Block Diagram

Figure 3 shows the block diagram.

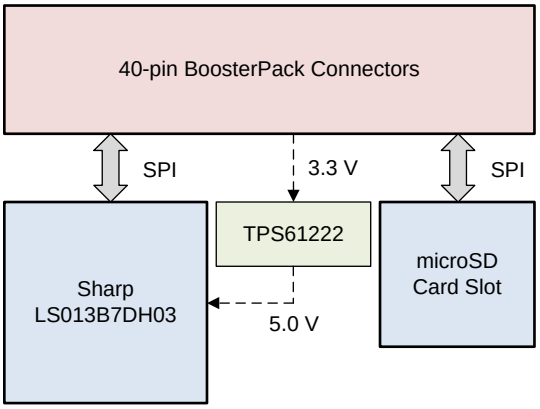

Figure 3. BOOSTXL-SHARP128 Block Diagram

2.2 BoosterPack Plug-In Module Pinout

The BOOSTXL-SHARP128 BoosterPack plug-in module adheres to the 40-pin BoosterPack plug-in module pinout standard. This standard aids compatibility between LaunchPad development kits and BoosterPack plug-in modules across the TI ecosystem.

The 40-pin standard is compatible with the 20-pin standard that is used by other LaunchPad development kits and BoosterPack plug-in modules. This allows some subset of functionality of 40-pin BoosterPack plug-in modules to be used with 20-pin LaunchPad development kits.

The BOOSTXL-SHARP128 BoosterPack plug-in module is compatible with all 20-pin and 40-pin LaunchPad development kits that are compliant with the standard. For more information about compatibility between LaunchPad development kits and BoosterPack plug-in modules, visit http://www.ti.com/launchpad.

Figure 4 shows the 40-pin pinout of the BOOSTXL-SHARP128 BoosterPack plug-in module.

NOTE: Some pins are not connected by default, and some functionality can be switched to a different pin on the BoosterPack plug-in module using 0-Ω selection resistors on the bottom of the board.

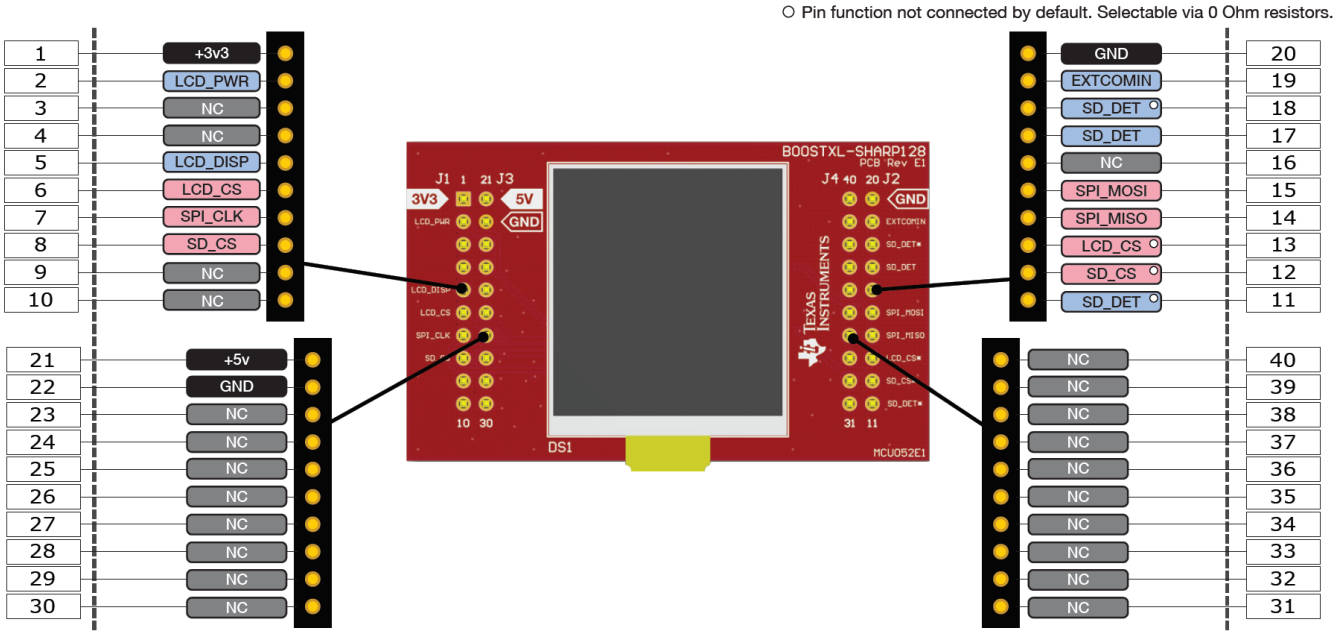

Figure 4. Connector Pinout for LaunchPad Development Kit and BoosterPack Plug-in Module

2.3 Hardware Features

2.3.1 Ultra-Low-Power LCD

The Sharp Microelectronics LS013B7DH03 is a 1.28-inch 128- x 128-pixel monochrome HR-TFT transflective LCD panel. This thin, light, and compact module has 18% reflectivity, 0.2% transmissivity, and super-low-power consumption.

2.3.2 microSD Card Slot

The BOOSTXL-SHARP128 BoosterPack plug-in module features an onboard microSD card slot. This provides another form of data storage for users.

The microSD card slot can detect if a card is present by generating an active-low interrupt signal on the SD card detect pin. The SD_DETECT signal can be selected between three different pins of the BoosterPack plug-in module using 0-Ω resistors (see Table 1).

Table 1. SD Card Detection Configuration

Selectable Pin Function	Selection Resistor	BoosterPack Plug-in Module Pin
SD_DETECT	R18 (default)	BP Pin 17
	R19	BP Pin 18
	R20	BP Pin 11

2.3.3 Customizable LCD Power

The default setting uses a GPIO pin (BP2) to power the BoosterPack plug-in module at the GPIO voltage of the LaunchPad development kit. This allows removing power from the BoosterPack plug-in module entirely through software on the LaunchPad development kit. It is often beneficial to control the power of the LCD directly, and although the LCD is ultra-low power, completely powering it down can extend battery life.

By modifying the 0-Ω resistors, the setup can be changed to connect to V_{CC} all the time. This frees up one pin on the header of the BoosterPack plug-in module.

Additionally, there is a 3-V to 5-V DC/DC converter on board. In the default configuration this DC/DC converter is completely disconnected. Using 0-Ω resistors or solder bridges the converter can be enabled and the output used to power the display. Resistor R1 or R2 can be populated to supply the input voltage to the DC/DC converter. This can be useful to interface other displays that come with the same connector but require 5 V.

Table 2 lists the possible LCD power sources selectable with 0-Ω resistors on the back of the board.

Table 2. LCD Power Configuration

Selectable Pin Function	Selection Resistor	LCD Power Source
LCD_VCC	R7 (default)	GPIO - BP Pin 2
	R1, R6	DC/DC 5V - Onboard (3V3 as DC/DC Vin)
	R2, R6	DC/DC 5V - Onboard (GPIO as DC/DC Vin)
	R5	3V3 - BP Pin 1
	R4	5V - BP Pin 21

2.3.4 Configurable Chip Select Pins

By default, the LCD Chip Select and SDCard Chip Select pins are connected on the J1 BoosterPack header to maintain backwards compatibility with existing software that was developed on the old 430BOOST-SHARP96 and the Card Reader SDCard BoosterPack plug-in module.

However, to provide compatibility with the BoosterPack plug-in module pinout standard, 0-Ω resistors R14 and R16 can be removed, while R15 and R17 can be shorted, to switch the chip select pins from J1 to J2 to conform to the BoosterPack plug-in module standard.

Table 3. Chip Select Pin Configurations

Selectable Pin Function	Selection Resistor	BoosterPack Plug-in Module Pin
LCD_SPI_CS	R14 (default)	BP Pin 6
	R15	BP Pin 13
SD_SPI_CS	R16 (default)	BP Pin 8
	R17	BP Pin 12

2.4 Design Files

2.4.1 Hardware Design Files

Schematics can be found in Section 4. All design files including schematics, layout, bill of materials (BOM), Gerber files, and documentation are available for download in the BOOSTXL-SHARP128 Design Files.

2.5 Hardware Change Log

Table 4 lists the revision history of the BOOSTXL-SHARP128 BoosterPack plug-in module.

Table 4. Hardware Change Log

PCB Revision	Date	Description
Rev A	August 2018	Production Release

3 Software and Additional Resources

3.1 Website for LaunchPad Development Kits

More information about LaunchPad development kits, supported BoosterPack plug-in modules, and available resources can be found at TI's LaunchPad portal.

3.2 TI Resource Explorer

TI Resource Explorer is a cloud-enabled repository that consolidates everything you need to start your development. Using TI Resource Explorer, you will find code examples, documentation, hardware design files, training, and more. TI Resource Explorer is context-aware, delivering relevant material as you navigate the folder structure to the left.

It is easy to find all of the relevant material associated to your development kit, device, or SDK. Use the search bars above to look for your specific LaunchPad development kit. The content in TI Resource Explorer filters appropriately. The content is in three main sections: Device, Development Tools, and Software.

3.3 SimpleLink SDKs

The SimpleLink SDK is designed for simplified development within one environment using industry standard APIs, TI Drivers, and TI RTOS to provide a robust foundation for application development. Within the SDK, you will find code examples, drivers, middleware, documentation, migration guides, and more.

For more information, visit www.ti.com/simplelinksdk.

3.4 MSP430Ware Software

MSPWare software is a collection of code examples, software libraries, data sheets, and other design resources for all MSP devices delivered in a convenient package – essentially everything developers need to become MSP experts. In addition to providing a complete collection of existing MSP design resources, MSPWare also includes a high-level API called MSP Driver Library. This library makes it easy to program MSP hardware.

For more information, see www.ti.com/tool/mspware.

3.5 Tool Options

The source code installation includes directories containing projects, makefiles, and binaries for the following tool-chains:

- Arm® Keil® RealView® Microcontroller Development System
- IAR Embedded Workbench® for Arm
- TI Code Composer Studio™ IDE for Arm and GCC compilers
- Energia open-source electronics prototyping platform

For detailed information on using the tools, see the documentation included in the tool chain installation or visit the website of the tools supplier.

3.6 Community Resources

3.6.1 TI E2E™ Community

Search the TI E2E community forums at e2e.ti.com. If you cannot find your answer, post your question to the community!

3.6.2 Community at Large

Many online communities focus on the LaunchPad development kit – for example, http://www.43oh.com. You can find additional tools, resources, and support from these communities.

4 Schematics

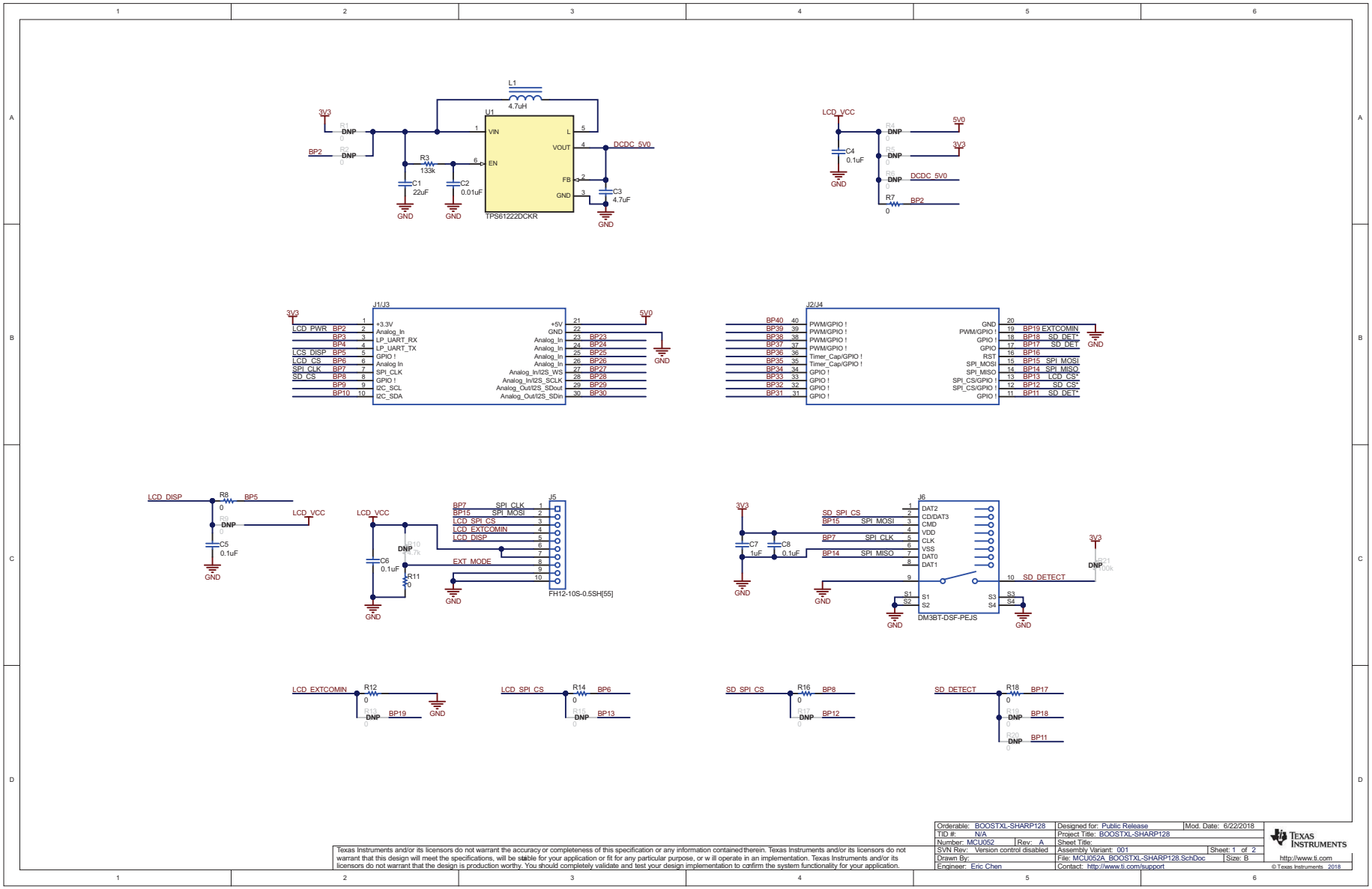

Figure 5. Schematics

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- *Reorient 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.*

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