Apollo2 Blue EVB Board Revision 0.3 Quick Start Guide

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Document Revision 1.0

Sep 2017

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1. Introduction

This document provides guidance in setting up the Apollo2 Blue Evaluation Board (EVB), revision 0.3, to get started executing code examples, measuring power consumption in various configurations, and beginning software development.

2. Document Revision History

Rev #	Date	Description
1.0	Sep 2017	Document initial public release

Table 1: Document Revision History

3. Overview of the Apollo2 Blue EVB

The Apollo2 Blue EVB features Arduino-compatible headers and an integrated J-Link debugger:

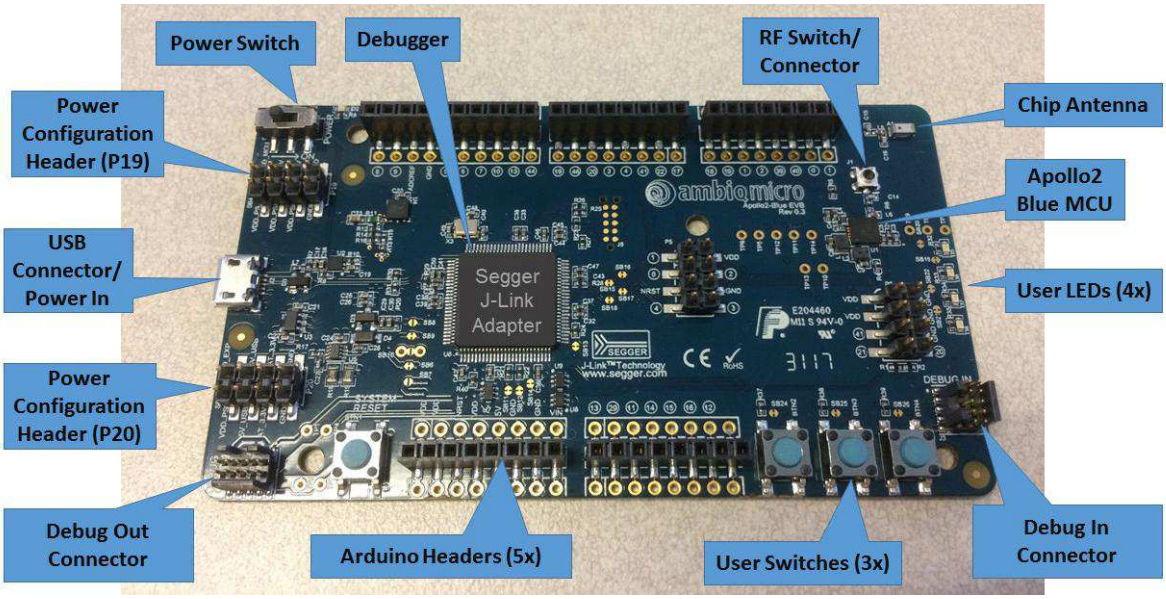

Figure 1. Apollo2 Blue EVB, Revision 0.3

The EVB has these additional features:

- Low power reference design
- Apollo2 Blue MCU in the LGA package (AMA2B1KK-KLR)
- Multiple power/clock options
- Micro USB connector for power/download/debug
- On-board chip antenna (A1)
- RF switch/connector (J1 - Murata MM8430-2610RA1) for BLE PHY testing without removing chip antenna
- Segger J-Link debugger
- Debugger-in / debugger-out ports
- Four user-controlled LEDs
- Three push buttons for application use, plus a reset push button
- Power slide switch with LED power indicator
- Five 8-12 pin Arduino-style headers for pin/power access to shield board(s)
- Multiple test points for power measurements
- CE Mark and RoHS compliant

Figure 2 shows the Apollo2 Blue EVB under RF testing via the RF switch/connector.

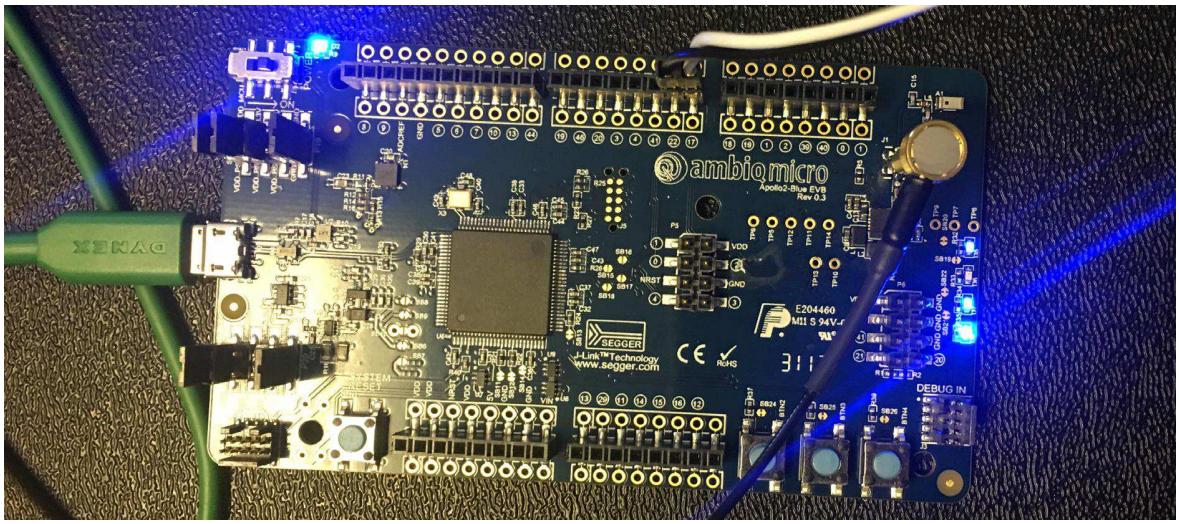

Figure 2. BLE PHY testing through RF switch/connector (J1) on Apollo2 Blue EVB

4. Debug Interface

Figure 3 shows the Apollo2 Blue EVB set up for standard debug using the on-board J-Link debugger and on-board power supply configured for 3.3V.

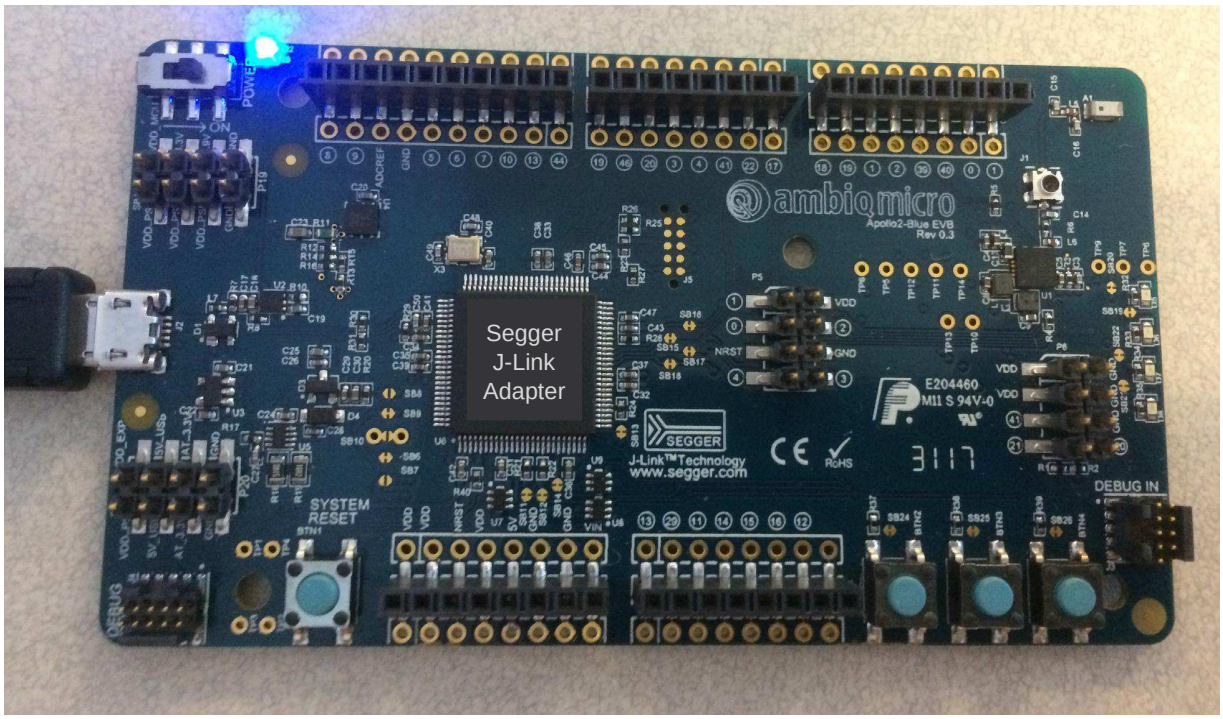

Figure 3. Apollo2 Blue EVB using On-board J-Link Debugger

The debug interface is supported by standard J-Link drivers from Segger. Please refer to “Software Development Tools for the Apollo2 Blue EVB” on page 11 for more details on J-Link debug support.

This EVB also supports the use of an external Cortex SWD debug interface through a standard 10-pin debug header (DEBUG IN - J3) as shown in Figure 4.

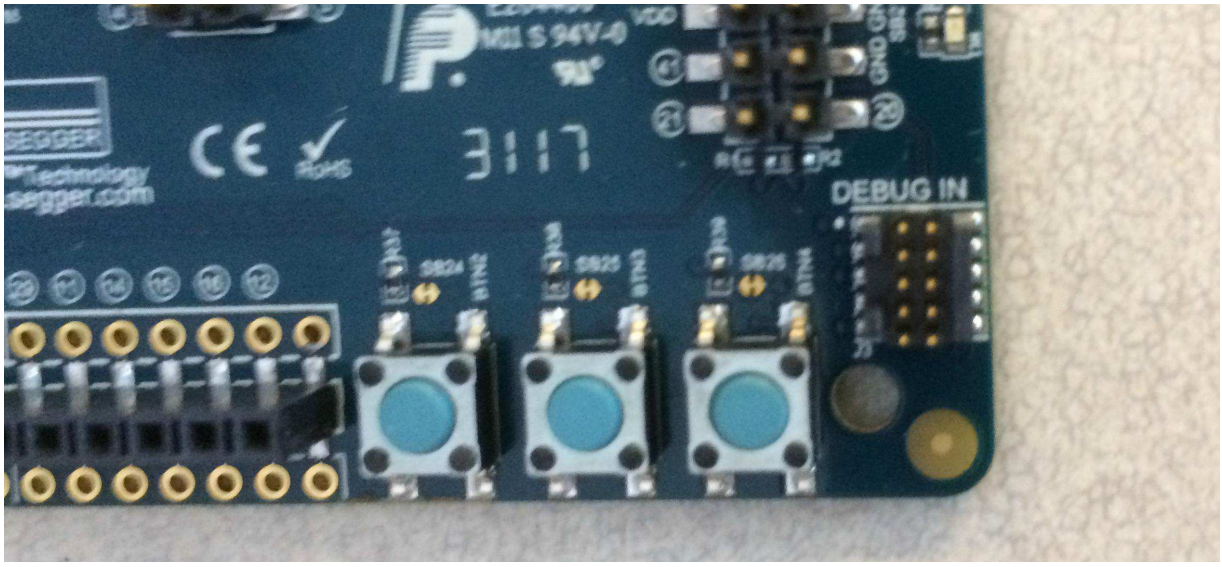

Figure 4. Apollo2 Blue EVB's Cortex DEBUG IN Header (J3)

No jumper changes are required to use an external debug adapter. Simply connect the external debug adapter with a 10-pin ribbon cable connector to the "DEBUG IN" header.

The EVB also offers the ability to be used as a J-Link debug adapter for any target board that has an Apollo family MCU (Apollo1 or Apollo2).

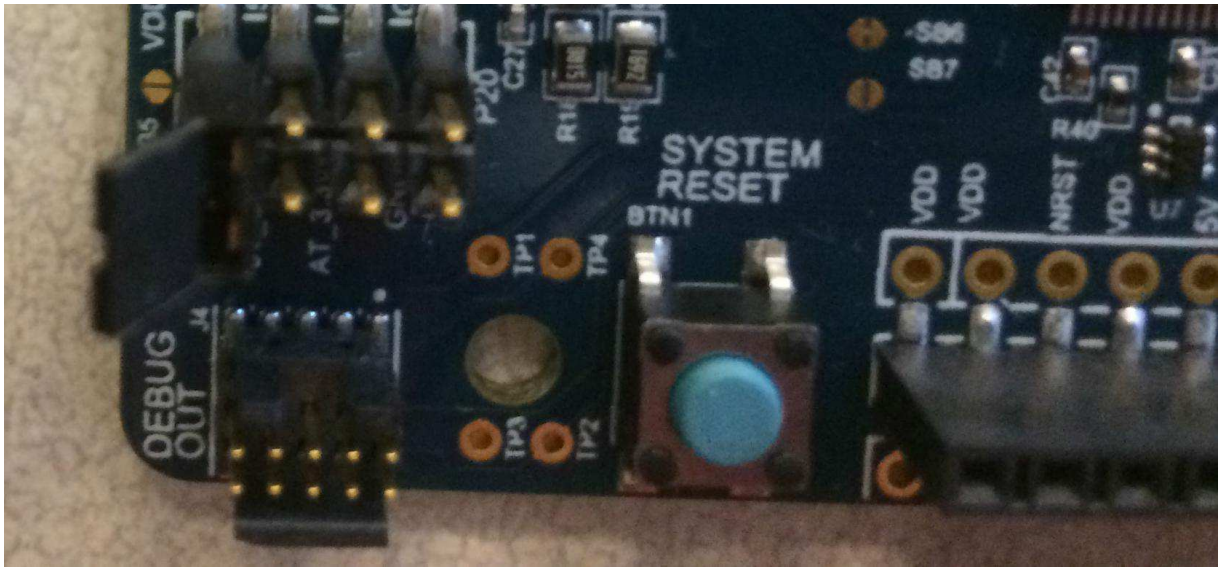

Figure 5. Apollo2 Blue EVB's DEBUG OUT Header (J4)

To utilize this functionality, use a 10-pin low-pitch standard debug connector to connect the "DEBUG OUT" header (J4) on the EVB to the debug header on the target board. The EVB will automatically detect when the "DEBUG OUT" header is connected to another target board and reconfigure the integrated J-Link to connect to this external board rather than the on-board Apollo2 Blue.

Note: A voltage on pin 1 of the J4 header is required for the above mentioned automatic switch to occur. Also, if the target VDD doesn't match the on-board voltage (either 3.3V or 1.9V), and to avoid possible voltage level conflicts on the debug I/O port, VDDIO of the J-Link processor may need to be changed to the target voltage by cutting SB9 and shorting SB10.

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5. Software Development Tools for the Apollo2 Blue EVB

The standard Segger J-Link debug interface is used on the Apollo2 Blue EVB. Please install the latest Beta Segger J-Link software, and configure your preferred development IDE (Keil, IAR, or Eclipse) to use J-Link debug interface.

Links to development tools that support Apollo2 Blue:

- SEGGER J-Link Software (6.14 or newer): https://www.segger.com/downloads/jlink
- KEIL uVision (MDK523 or newer): https://www.keil.com/demo/eval/arm.htm
- New Keil Pack (Also used by Eclipse): http://www.keil.com/dd2/pack/#/third-party-download-dialog
- IAR Version 7.80.4 (8.10.1 or newer): https://www.iar.com/iar-embedded-workbench/tools-for-arm/arm-cortex-m-edition/
- Atollic TrueSTUDIO (7.1.2 or newer): https://www.atollic.com/truestudio/
- GCC 5.3.1: https://gcc.gnu.org

Regardless of preferred IDE, please install the Segger J-Link software. All of the above development environments support J-Link, but you must have the latest J-Link software installed. Most alternate development environments also are supported by J-Link.

Please refer to the AmbiqSuite Getting Started Guide (AMSDKGS) at http://ambiqmicro.com/apollo-ultra-low-power-mcu/ for more details on setting up development IDEs to use J-Link.

6. Power Supply Options and Measuring Current

There are three power supply options for the Apollo2 Blue EVB:

- Operate at 3.3V as provided by the on-board power supply
- Operate at 1.9V as provided by the on-board power supply
- Provide externally supplied power

Figure 6 shows header P19 which is used to select a power configuration through jumper installations, as well as the option to measure the supply current to the MCU with an ammeter. Solder bridge SB4 can be filled instead of jumpering from pin 1 to pin 2 if current measuring is of no interest.

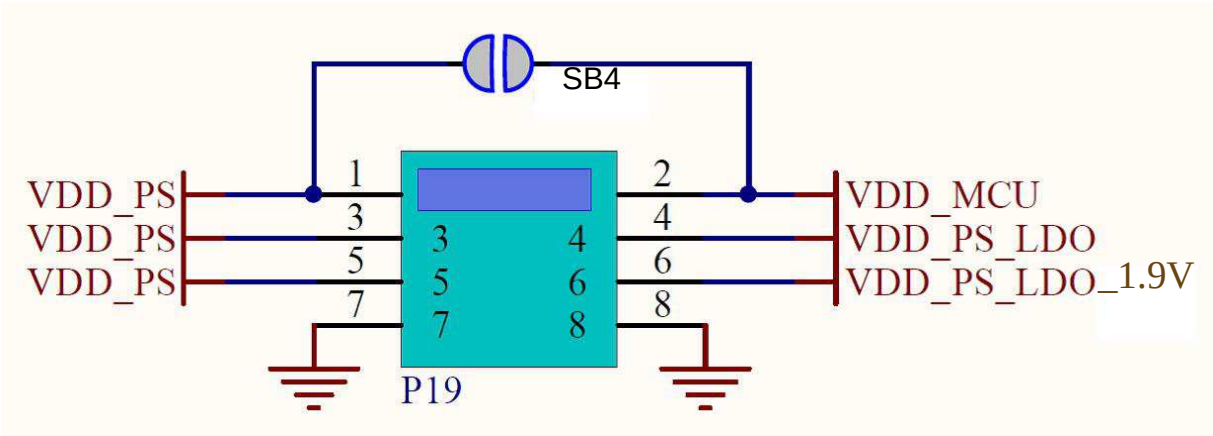

Figure 6. Voltage Selection on Header P19

Table 2 shows valid jumper configurations for P19. All other configurations are invalid. Note that a jumper across pins 7 and 8 is not necessary and does not do anything - the pins are available only for easy access to ground.

Table 2: Jumper Configuration for Power Selections

Jumper 1-2	Jumper 3-4	Jumper 5-6	Power Source
In	In	In	1.9V operation from internal regulator
Out	In	Out	Intended for current measuring across pins 1 and 2 during 3.3V operation from internal regulator
Out	In	In	Intended for current measuring across pins 1 and 2 during 1.9V operation from internal regulator
In	Out	Out	Externally-provided supply voltage within the allowable range (1.9-3.6V)[a] on pin 3 or 5
Out	Out	Out	Intended for current measuring across pins 1 and 2 during externally-provided supply voltage within the allowable range (1.9-3.6V) on pin 3 or 5

a. Note that the Apollo2 Blue EVB supports only Step Down operation for the BLE, and therefore does not sup-port the full voltage range of the device.

As an example for setting the jumpers on P19, Figure 7 shows the EVB configured for 3.3V operation with jumper across VDD_PS and VDD_MCU for no current measurement.

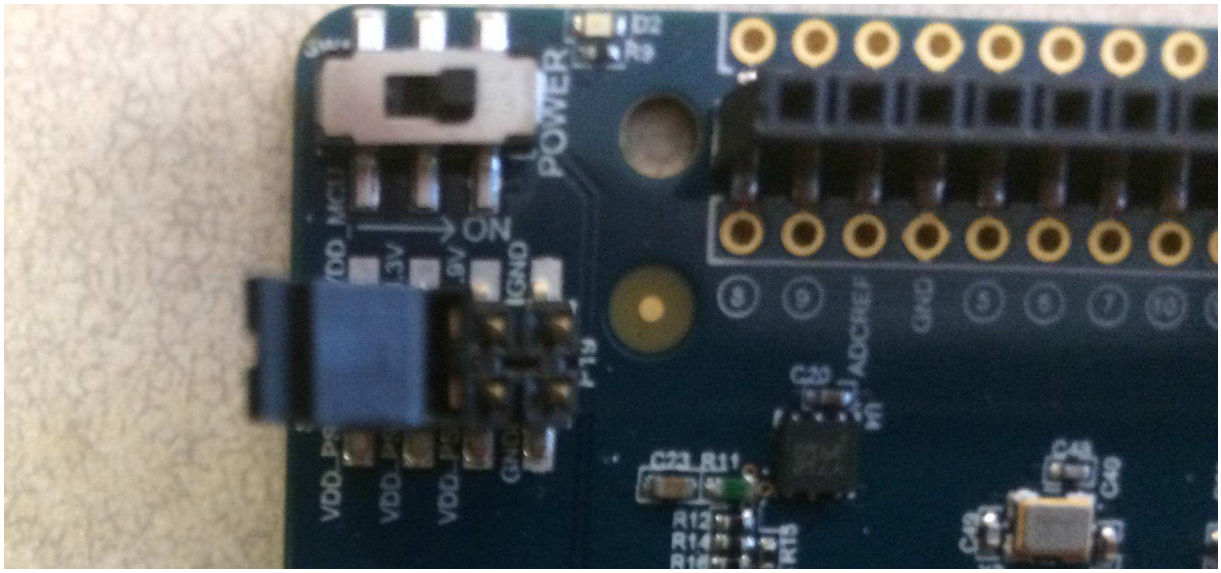

Figure 7. Header P19 Configured for 3.3V Operation - No Current Measurement

Figure 8 shows the EVB configured for 3.3V operation with current measuring leads across VDD_PS and VDD_MCU for current measurement.

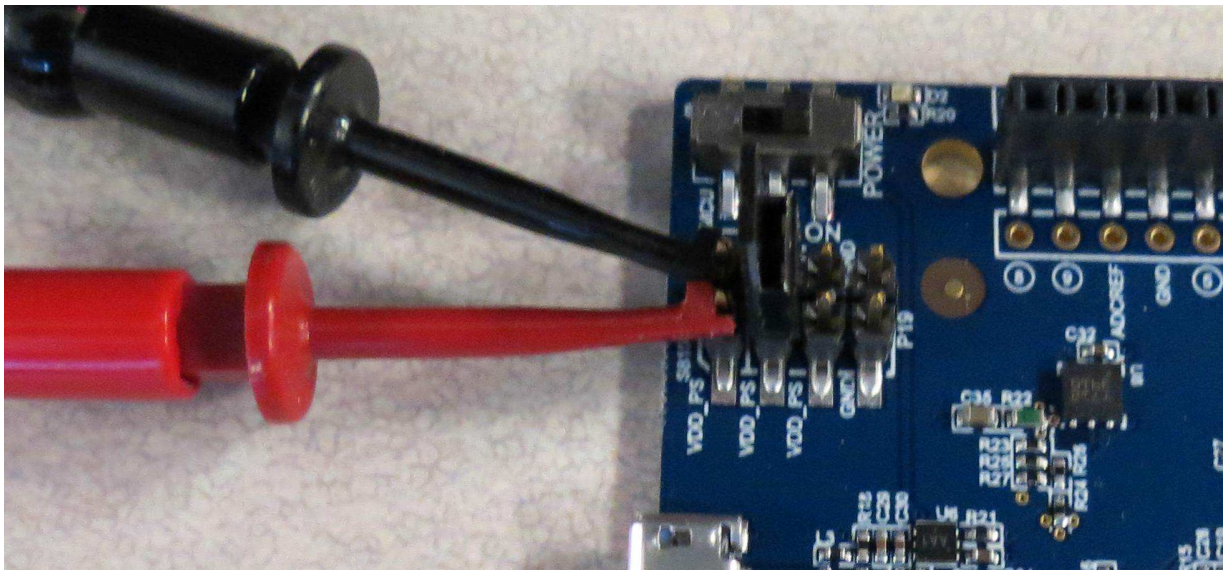

Figure 8. Header P19 Configured for 3.3V Operation - With Current Measurement

FCC Warring Statement

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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 or more of the following measures:
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– 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.
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