Infrared Remote Control for Mobile Devices

Low power reconfigurable fabric-based implementation for all popular televisions, including Samsung, LG, Vizio, and others

Introduction

As smartphone and tablet Original Equipment Manufacturers (OEMs) continue to innovate and strive to provide hardware-differentiated products, they continue to look at ways to integrate commonly-used consumer devices into a single mobile-based platform.

One solution that has been identified is the integration of home audio/video remote control functions into smartphones. However, while many devices have existing infrared LEDs required for transmission, today's application processors lack the logic space and control software necessary for the implementation of a remote control function.

QuickLogic's programmable fabric-based Infrared Data Association (IrDA) Controller provides mobile device makers with a low-cost, proven method of implementing remote control features on their devices.

Features

The IrDA Proven System Block (PSB) provides a number of features, including:
- I²C Slave Interface
  - Primary interface from the host application processor to the IrDA PSB
- Register Module
  - Contains all of the control and configuration registers for properly configuring the modules of the infrared hub
  - Provides a set of general purpose I/O registers for monitoring and/or controlling external devices
- Carrier Generator
  - Generates a carrier based on a programmable cycle time and duty cycle
- Modulator
  - Receives the carrier signal and produces an envelope signal that enables the output signal
  - Generates interrupts at the end of each output signal sequence as defined by the data in the Modulator Memory
- Modulator Memory
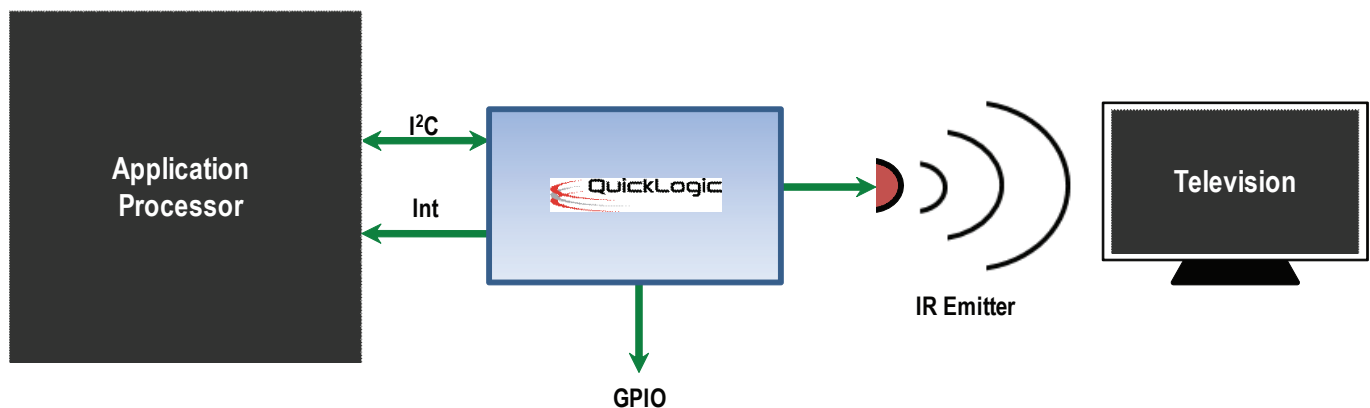 - Holds data that controls the length of each on/off (i.e., logic "1" and logic "0") period of the output signal

Figure 1: Infrared Remote Control Block Diagram

Specifications

Slave Interface	The initial slave interface conforms to the I^{2}C slave device protocol. This includes: • 100 kHz operation • 7-bit slave address • START/STOP/acknowledge signaling • Single and burst data transfers The slave interface can be configured to SPI by QuickLogic during the design phase.
Infrared Remote Carrier Signal Frequency Range	Ability to generate a carrier frequency in excess of the range of 30 kHz to 60 kHz used by infrared remote controls.
Programmable Duty Cycle	The duty cycle of the carrier signal can be altered between 10% and 90% of the carrier signal cycle time. As a result, infrared power consumption can be balanced with infrared range.
Multi-Format Infrared Remote Support	The Modulator Module uses the contents of the Modulator Memory to generate virtually any infrared remote control protocol.
Modulator Memory	The Modulator Memory consists of up to 8K bytes. The data stored in this memory determines the on/off (i.e., logic "1" and logic "0") periods for the Modulator Module envelope output signal.
Modulator Memory Access	The host application processor can access the Modulator Memory through a 128-byte memory aperture. Each byte can be stored individually or as part of an I^{2}C burst of up to 128 bytes. The Modulator Module can access all of the Modulator Memory as a single continuous block.
Infrared Remote Control Output	Modulated infrared remote compatible signal (i.e., the output consists of varying length bursts of a carrier signal).
Interrupt Generation	The Modulator Module can be enabled, by software, to generate an interrupt upon completing the execution of a modulator envelope sequence stored in the Modulator Memory.
General Purpose I/O	There are eight signals available for use as input or output ports. Each bit is individually selectable and controllable.

Availability

The IrDA PSB is available on QuickLogic's PolarPro 3 and ArcticLink 3 S1 family of Customer Specific Standard Products (CSSPs).

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