



LH7A400-10 to LH7A404-10 Card Engine Migration

Application Note 179

Kurt Larson

Logic Product Development

Published: December 2003

Abstract

This application note is for developers who are presently using the LH7A400-10 card engine with the intention of migrating to the LH7A404-10 card engine. This document covers such topics as similarities and differences between the two card engines, as well as resistor jumper settings that allow selectable configurations. The goal of this document is to provide a guide for base board design so that the transition from the LH7A400-10 to the LH7A404-10 may be as smooth as possible.

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REVISION HISTORY

REV	EDITOR	DESCRIPTION	APPROVAL	DATE
A	Kurt Larson	Release	HAR	12/01/2003
B	James Wicks	Minimum Purchase Note Inserted	JAW	07/14/04

1 Introduction

The Sharp LH7A400 and LH7A404 processors are very similar. The main difference between the two is that the LH7A404 has more peripheral options than the LH7A400: the LH7A400 processor peripherals are a subset of the LH7A404 peripheral set. Logic Product Development (LPD) has created Card Engines for both of these processors with the intent to allow them to be interchangeable from a customer-specific base board development standpoint.

2 Crossing Over to the LH7A404-10

2.1 Similarities Between the LH7A400-10 and the LH7A404-10 Card Engines

2.1.1 Card Engine Pin Out

All of LPD's Card Engine designs are based on a standard 'Card Engine Pin Out.' This ensures hardware compatibility between different Card Engines and individual baseboards. To account for different processor feature sets, a section of the Card Engine expansion connectors have Multi-Function Pins (MFP's). MFP's are used to support a wide variety of multiple manufacturers' peripherals unrelated to the memory bus and other standard Card Engine peripherals.

2.1.2 Memory Density Configuration

From a system perspective, the LH7A400-10 and LH7A404-10 have the same memory density configuration options. Both devices can be specified with 16MB, 32MB, or 64MB of onboard RAM. Non-volatile storage can be specified with 8MB, 16MB, or 32MB of NOR flash on each device. Production volume boards may have the option to populate a 256KB boot EPROM in lieu of NOR flash for additional cost savings.

2.1.3 Asynchronous and Synchronous Memory

The LH7A400-10 and LH7A404-10 both have the same asynchronous and synchronous memory interface from the Card Engine standard pin out.

2.1.4 Audio CODEC

Both the LH7A400-10 and LH7A404-10 use the same AC97 Audio CODEC.

2.1.5 PCMCIA Interface

The LH7A400-10 and LH7A404-10 both support dual PCMCIA card engines. The Card Engine standard interface has designated pins for the PCMCIA interface. For a complete dual PCMCIA design example, please consult the Integrated Development Kit (IDK) documentation or contact Logic for further assistance.

2.1.6 USB Function

Both the LH7A400-10 and LH7A404-10 support a USB Function peripheral. The USB Function interface is identical on the LH7A400-10 and LH7A404-10 Card Engines. The peripheral is attached to the Card Engine interface at the USB1 signal set. These signals include: uP_USB1_P, uP_USB1_M, uP_USB1_PWR_EN, uP_USB1_OVR_CRNT.

2.2 Differences Between the LH7A400-10 and the LH7A404-10 Card Engines

2.2.1 Analog to Digital Converter/Touch Screen

The LH7A404 processor has an internal Analog to Digital Converter that allows for 4 wire or 5 wire resistive touch screens. The LH7A400 processor does not have an internal Analog to Digital Converter, so an ADS7843 Touch Screen Controller is used to implement a touch interface on the LH7A400-10 Card Engine.

The Card Engine touch interface pin-out is standardized to support a 4 wire interface. To implement a 5 wire touch interface on the LH7A404-10 card engine, the 5th touch signal can be made available through the MFP configuration resistors. Refer to section 2.3 'Resistor and Jumper Settings' (below) for more information about connecting to the 5th touch signal on the LH7A404-10 Card Engine. Contact Logic Product Development if assistance is needed with designing a 4 or 5 wire touch interface. LPD's supported operating systems, including LogicLoader, Linux, and WinCE take into account differences in the touch interfaces to provide a seamless cross over between the LH7A400-10 and LH7A404-10 to the end user.

The LH7A404 processor has additional Analog to Digital signals that the LH7A400 does not. These signals can be made available on the MFP interface. Please reference section 2.3 'Resistor and Jumper Settings' for more information on how to gain access to the additional ADC signals.

2.2.2 PS2/AT Keyboard and Mouse Input

The LH7A400-10 does not directly support a PS2 keyboard or mouse interface. The LH7A404-10 supports a PS2 or AT compatible interface that is available through the MFP interface. Refer to section 2.3 'Resistor and Jumper Settings' for more information on enabling the PS2/AT keyboard or mouse interface.

2.2.3 The 'nWAIT' Signal

The LH7A404 has an external 'nWAIT' signal on the asynchronous memory bus. This can be used to add external wait states to devices on the asynchronous bus. The LH7A400 does not have this signal, so the wait states must be specified in software for each device.

2.2.4 LCD Interface

The LH7A400-10 and LH7A404-10 have LCD interfaces that pin out similarly on the Card Engine expansion connectors. However, the LH7A404-10 Card Engine implements additional LCD control signals unavailable on the LH7A400-10.

The additional signals on the LH7A404-10 Card Engine can be used to natively implement a wider variety of LCD displays. These additional signals include: LCD_SPR, LCD_CLK_RETURN, and LCD_DON. Please note that if LCD_SPR is required, it must be selected through a configuration resistor jumper to replace LCD_SPL.

2.2.5 USB Host Controller

The LH7A400-10 Card Engine does not support an onboard USB Host controller. The LH7A404-10 Card Engine supports dual USB Host connections.

The Card Engine template uses the USB2 signals as the primary host port interface: uP_USB2_P, uP_USB2_M, uP_USB2_PWR_EN, uP_USB2_OVR_CRNT. The LH7A404-10 card engine brings one of the two host ports to the USB2 interface. The second host connection on the LH7A404-10 is available through the Card Engine MFP interface. Please refer to section 2.3 'Resistor and Jumper Settings' for more information regarding the second USB Host interface.

2.3 Resistor and Jumper Settings

The Card Engine interface contains 38 signals designated as Multi Function Pins (MFP's). MFP's allow the Card Engine platform to remain flexible and able to support many different types of processors. MFP implementation on a customer base board is the number one area of concern when creating a base board to support multiple card engines.

The MFP's are located on expansion connector J1B and are pins B33-B40, B48-B54, B56-B65, and B67-B80. The LH7A400-10 Card Engine uses all MFP's to support LH7A400 peripherals that are not part of the standard Card Engine peripherals. The LH7A404 processor has a superset of the LH7A400 peripherals, which allows for more user peripheral options. In order to support all the LH7A404 peripheral configuration options, Logic designed the LH7A404-10 Card Engine with 22 configurable resistor jumpers. Each jumper can be specified as a + or – population at the time of board manufacture.

The peripheral signal set is designed so that if all the configuration resistors are populated in the + position, the LH7A404-10 external MFP signal interface is exactly identical to the LH7A400-10 external MFP signal interface.

The LH7A404-10 standard resistor configuration is designated as + for each jumper. The LH7A404-10 SDK kit comes with all the resistor jumpers in the + configuration. If a user needs to develop with a peripheral the LH7A400 processor does not support, the LH7A404-10 card engine can be modified to allow access to the desired feature.

If a user is migrating from an LH7A400-10 to a LH7A404-10 Card Engine and is only using the LH7A400-10 peripheral set, the user can purchase the LH7A404-10 standard Card Engine configuration.

All non-standard configuration settings must be ordered directly from Logic Product Development. To obtain a desired resistor jumper configuration that is non-standard, please contact Logic Product Development sales team at: sales@logicpd.com. Note: minimum purchase required for custom configuration.

The table on the following page displays the available configuration options along with trade-offs for each chosen signal.

MFP Signal	Reference Designator	+ Option	- Option
MFP1	JP1	uP_KEY_COL0	uP_BATCNTL
MFP2	JP2	uP_KEY_COL1	uP_USBHN1
MFP3	JP3	uP_KEY_COL2	uP_USBHP1
MFP4	JP4	uP_KEY_COL3	uP_USB_DCP
MFP5	JP5	uP_KEY_COL4	uP_MMC_DATA3
MFP6	JP6	uP_KEY_COL5	uP_MMC_DATA2
MFP7	JP7	uP_KEY_COL6	uP_MMC_DATA1
MFP8	JP8	uP_KEY_COL7	uP_PWMSYNC
MFP9	JP9	uP_MMC_CMD - SPIDI	uP_CFA8 - CFA24 - CFRESETB - PH1
MFP10	JP10	uP_MMC_nSELECT - nCS3	uP_nCFSTATEN - PH7
MFP11	JP11	uP_MMC_DATA0 - SPIDO	uP_KMICKL
MFP12	JP12	uP_MMC_CLK - SPICKL	uP_KMIDAT
MFP13	JP13	uP_SCI_CLK	uP_INTBOOT
MFP14	JP14	uP_SCI_IO	LCD_LBR
MFP15	JP15	uP_SCI_MEDCHG	LCD_UBL
MFP16	JP16	uP_SCI_DETECT - PF5	uP_DEOT0
MFP17	JP17	uP_SCI_VCCEN	uP_A/D5
MFP18	JP18	uP_SCI_RESET	uP_A/D6
MFP19	JP19	uP_PWMEN0	uP_CTCLKIN
MFP20	JP20	uP_PCC_nCE1A	uP_PE5
MFP21	JP21	uP_PWM0	UARTB_DCD - PB4
MFP22	JP22	uP_PCC_nCE2A	uP_UARTA_DCD

Table 1: Configuration Options with Trade-offs for each Chosen Signal

MFP signals 23 through 38 are identical to the LH7A400-10 Card Engine signal pin out.

3 Summary

The Sharp LH7A400 and LH7A404 processors are very similar with exception to the number of peripherals. Logic Product Development utilized their similarities to make the LH7A400-10 and LH7A404-10 Card Engine products, which can be used almost interchangeably depending on the user's application. However, due to the larger number of peripherals on the LH7A404 processor, the LH7A404-10 Card Engine has additional peripheral features which are not available on the LH7A400-10 Card Engine. These additional peripheral features may be used through the setting of the configuration resistors for MFP1 through MFP22.

If you need to access the additional peripheral set the LH7A404-10 Card Engine provides, please contact Logic Product Development sales team at sales@logicpd.com for details on obtaining an alternate Card Engine configuration. Note that a minimum purchase is required for custom configuration.