Application Note: Differences Between the Elo TouchSystems COACh II and COACh IV Controller Chipsets

Part Number E391902
Revision A

1-800-ELOTOUCH (1-800-356-8682)
www.elotouch.com

Disclaimer

The information in this document is subject to change without notice. Tyco Electronics makes no representations or warranties with respect to the contents hereof, and specifically disclaims any implied warranties of merchantability or fitness for a particular purpose. Tyco Electronics reserves the right to revise this publication and to make changes from time to time in the content hereof without obligation of Tyco Electronics to notify any person of such revisions or changes.

Trademark Acknowledgments

COACh, Elo logo, Elo TouchSystems, IntelliTouch, SmartSet, TE logo and Tyco Electronics are trademarks. All other product names mentioned herein may be trademarks or registered trademarks of their respective companies.

Table of Contents

OVERVIEW

The COACh IV is the next generation in the COACh family of resistive touchscreen controller chipset solutions. Some COACh II users will be interested in migrating to the newer, feature enhanced COACh IV. This document discusses the differences between COACh II and COACh IV.

While their functionality is very similar, there are a number of key differences in both features and hardware. These two devices are built on two different chip platforms and are not interchangeable. Transitioning from a COACh II circuit design to a COACh IV circuit requires a complete PCB redesign even though some blocks and most functionality are similar.

MECHANICAL AND ELECTRICAL

The COACh II and COACh IV are built on two different platforms and are not interchangeable even though many pin functions are the same and overall functionality is similar.

Device Pin Out

The majority of pin functions are the same for both devices, however the pin out definitions are completely different. COACh II has additional pins associated with low power mode which is not supported by COACh IV. Consult the User Manual for the specific device for the pin out definition.

Schematics and Reference Circuit

Although the circuits are similar, the devices are not interchangeable and transitioning a design from COACh II to COACh IV should be done by a complete hardware redesign in accordance with the COACh IV User Manual. Attempting to modify a COACh II design to ”fit” the COACh IV is prone to errors and is likely to not be time efficient.

Pin Functions

As previously stated, the majority of pin functions are the same. However, there are some differences as well as functions that have been added or removed,

- The clock input for COACh II is 5.5926 MHz and for COACh IV is 6.000 MHz.
- COACh IV uses a modified touch detection scheme and has a TOUCH input pin.
- COACh IV NVRAM jumper input when connected to ground will reset the NVRAM to default values, while the COACh II function for this pin only bypasses the NVRAM and initializes current operation to default operating parameters.
- COACh II supports a low-power mode and has a power-down enable input pin, a power down state indicator output pin, and a wake up interrupt input pin.

- NVRAM pins on the COACh II are Microwire protocol while COACh IV uses I2C.
- COACh IV has the necessary pins for USB support; tthe COACh II does not support USB.

Electrical Specifications

Electrical specifications for each device are unique and are defined in the associated documents. COACh II electrical specifications are contained in the COACh II Addendum to the COACh User Manual. COACh IV specifications are contained in the COACh IV User Manual. Key electrical characteristic differences are described below:

- COACh II operates over an extended supply voltage range from 3.3 through 5 volts.
- COACh IV operates at only 5 volts and supports self-powered USB operation.
- COACh II supports a low-power mode.

FUNCTIONALITY / FEATURE SET

Although mostly the same, the feature set does differ between COACh II and COACh IV. Some of these differences have already been mentioned in the preceding section.

Touch Measurement

Touchscreen measurement algorithms used in the COACh IV code are essentially the same as the original COACh and COACh II designs except the touch detection method has been modified.

Instead of setting the substrate (glass) side of the touchscreen to high side drive and using a pull-down resistor on the sense (surface) side, the sense side is hard grounded and the Y drive is pulled high through a weak IO pull up. Touch is detected when the Y input is measured below the set threshold level.

Although the threshold polarity has now been inverted this is compensated in firmware and the threshold parameter function is unchanged.

This change reduces sensitivity to high closed circuit resistances however, overall touch performance may still be limited to the combination of closed circuit resistance and capacitive effects.

Jitter Filter

COACh IV adds a jitter filter with controls in the SmartSet filter command and will be described in the SmartSet Compatibility section.

Communication Protocols

COACh IV supports both USB and serial communication and is fully compatible with all Elo drivers as well as the native HID driver.

Low Power Mode

COACh IV does not support low-power mode.

Modified Baud Rate Support

COACh IV drops 300 baud support but adds 14,400 and 38,400 baud.

NVRAM Default Reset

COACh IV adds NVRAM reset to default with SmartSet RESET ‘2’ command or with jumper configuration on power on.

NVRAM

COACh IV uses I2C NVRAM compared to Microwire for COACh II.

Serial Number Support

COACh IV adds serial number support. This is necessary for multiple monitor support in USB.

SMARTSET COMPATIBILITY

The majority of SmartSet command support and function are the same for both devices. However, there are some minor differences which are outlined here.

Acknowledge Command

There may be some differences in error code reporting between COACh II and COACh IV. Both devices will report an error code for a given error condition but the error code returned may not be the same; for example, sending a ’v‘ query request may return “not supported” in one device and “illegal command” in the other. The different possible commands and error returns are not compiled here as the list is extensive.

Filter Command

COACh IV adds a jitter fuzzy filter and in the Filter command there are two new parameters, SCORE and FILTER. See the COACh IV User Manual for details.

Configuration Command

The COACh IV configuration command response is three packets fewer than for COACh II. It does not report packets for ‘H’, ‘K’, or ‘Q’.

ID Command

The ID command differs in most of the parameter bytes.

Because COACh IV supports USB, it will report ‘4’ in the IO field if operating in USB; COACh II only reports ‘0’ as it is serial only.

Firmware revision of COACh II is 1.0 and COACh IV is 1.3. These revision values may change at any time in the future with firmware updates.

The P parameter specifies the configuration command packet count which at this time is 10h for COACh II and 0Eh for COACh IV.

The class parameter for COACh II is 00h and 50h for COACh IV.

Jumper Command

As with the ID command, COACh IV may report either '0' or '4' in the IO byte depending on the current communication channel which is active.

Key Command

COACh IV does not support the Key command.

Low Power Command

COACh IV does not support low-power mode.

Owner Command

COACh IV responds "TYCOELC"; COACh II responds "EloInc.".

Parameters Command

COACh IV drops 300 baud and adds 14,400 and 38,400 baud.

Reset Command

COACh IV adds TYPE 2, NVRAM reset to defaults.

Upload Command / Serial Number

COACh IV adds serial number support through the upload 'W' and 'N' commands as specified in the COACh IV User Manual.

SmartSet Touch Packet Format

The status byte in the SmartSet touch packet format is modified if operating in USB mode. The bit position for initial and stream indicators are swapped to maintain HID compatibility with bit mapped mouse buttons. See the COACh IV User Manual for details.

COMPARISON TABLE: COACh II v1.0 VERSUS COACh IV v1.3

Feature	COACh II v1.0	COACh IV v1.3
Mechanical		
Chip Packaging	Same	
Pin Out	NOT pin compatible; see individual data sheets	
Electrical		
Pin Functions	See individual data sheets	
AC/DC Specification	See individual data sheets	

Feature	COACh II v1.0	COACh IV v1.3
Schematic / Reference Circuit	Different, see User Manuals	
Clock speed (MHz)	5.5926	6.0000
Functional		
Low-Power Mode	supported	N/A
TTL serial	Yes	Yes
USB	No	Yes, self-powered
Power Supply (V, +/-5%)	3.3 - 5	5
Touch Algorithm: measurement method same for both, touch detect differs	Touch detect – substrate at high drive, sense pulled low	Touch detect – substrate high via GPIO weak pull up, sense grounded
Touch Filter	Averaging	Averaging plus additional filter for enhanced jitter performance
Modified Baud Rate Support	Standard set	Remove 300; Add 14400, 38400
NVRAM Default Reset	No	SmartSet or power on jumper
NVRAM type	Microwire	I2C
Serial Number Support	No	Yes
SmartSet Compatibility		
Acknowledge	Error codes may differ for a given error condition	
Filter command	Standard	Added Jitter filter, parameters
Configuration command	Standard	Standard less ‘H’, ‘K’, ‘Q’ packets
ID command	IO always ‘0’; revision 1.0; P=10h; class 00h	IO is ‘4’ if in USB; revision 1.3; P=0Eh; class 50h
Jumper command	IO always ‘0’	IO is ‘4’ if in USB
Key command	Supported	Not supported
Low Power command	Supported	Not supported
Owner command	“EloInc.”	“TYCOELC”
Parameters command	Standard set	Remove 300; Add 14400, 38400
Reset command	Standard	Add RESET ‘2’ – NVRAM defaults

Feature	COACh II v1.0	COACh IV v1.3
Upload command / Serial Number	Not supported	Serial number support
SmartSet Touch Packet Format	Standard (USB not supported)	Modified Status byte in USB

Check out Elo's Website!

www.elotouch.com

Get the latest…

- Product information
- Specifications
- News on upcoming events
- Press release
- Software drivers
- TouchMonitor Newsletter

Getting in Touch with Elo

To find out more about Elo's extensive range of touch solutions, visit our website at www.elotouch.com or simply call the office nearest you:

North America

Elo TouchSystems
301 Constitution Drive
Menlo Park, CA 94025
USA

(800) ELO-TOUCH
(800) 356-8682
Tel 650-361-4800
Fax 650-361-4722
customerservice@elotouch.com

Germany

Tyco Electronics Raychem GmbH
(Elo TouchSystems Division)
Finsinger Feld 1
D85521 Ottobrunn
Germany

Tel +49 (0)(89) 60822-0
Fax +49(0)(89) 60822-180
elosales@elotouch.com

Belgium

Tyco Electronics Raychem N.V.
(Elo TouchSystems Division)
Diestsesteenweg 692
B-3010 Kessel-Lo
Belgium

Tel +32(0)(16)35 21 00
Fax +32(0)(16)35 21 01
elosales@elotouch.com

Asia-Pacific

Sun Hamada Bldg. 2F
1-19-20 Shin Yokohama
Kanagawa 222-0033
Japan

Tel +81(45)478-2161
Fax +81(45)478-2180
www.tps.co.jp

Tyco Electronics

elo TOUCHSYSTEMS