



INTRODUCTION

This user's manual is for the XRA1403/1405 16-bit evaluation board. Table 1 shows the different devices and packages that the evaluation board supports. This user's manual will describe the hardware setup required to operate the different packages.

1.0 QUICK START

To verify communication with the GPIO expander, the following steps are recommended:

- 1.1 Connect external +5V power supply to J8 pin 1**
- 1.2 Connect J12 pin 13 and 14 to ground of external power supply**
- 1.3 Connect to MCU SPI interface for:**

SPI clock (SCK_SCL signal at J5 pin11)

SO (SO_SPI signal at J5 pin17)

SI (SI_SPI signal at J5 pin21)

CS# (CS#_SPI signal at J5 pin19)

- 1.4 From the MCU, write the following registers:**

GCR1 = 0x00

GCR2 = 0x00

If the LEDs turn on, the communication with the GPIO expander is successful.

To disable connection to LEDs, remove jumpers on J28, J29, J30 and J31. Connect to external inputs or outputs at J3 and J4.

2.0 HARDWARE SETUP

2.1 Packages description

The evaluation board supports all 4 packages of the XRA1403 and XRA1405. The ordering part number, package and location on the board is shown below in Table 1. Table 2 lists the evaluation board ordering part numbers.

TABLE 1: PACKAGE LIST

ORDERING PART NUMBER	PACKAGE	LOCATION
XRA1403IL24-F	24-pin QFN	U4
XRA1403IG24-F	24-pin TSSOP	U5
XRA1405IL24-F	24-pin QFN	U4
XRA1405IG24-F	24-pin TSSOP	U5

TABLE 2: EVALUATION BOARD ORDERING PART NUMBERS

PART NUMBER
XRA1403IL24-0B-EB
XRA1403IG24-0B-EB
XRA1405IL24-0B-EB
XRA1405IG24-0B-EB

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2.2 Jumper Settings
2.2.1 Common Jumpers

The following jumpers apply to all the 4 packages of XRA1403 and XRA1405:

TABLE 3: COMMON JUMPER SETTINGS

JUMPERS	FUNCTIONS	COMMENTS
J8	Selects the supply voltage to generate the +1.8V power supply for the board	1&2 selects +5V (default, Pin 1 -- Test point for external +5V) 2&3 selects +P NOTE: Not installed. Trace between 1 & 2
J9	Selects the supply voltage to generate the +2.5V power supply for the board	1&2 selects +5V (default) 2&3 selects +P NOTE: Not installed. Trace between 1 & 2
J13	Selects the supply voltage to generate the +3.3V power supply for the board	1&2 selects +5V (default) 2&3 selects +P NOTE: Not installed. Trace between 1 & 2
J10	Selects the supply voltage for +VDDP	Used only for the XRA1405 Jumper in 1&2 selects +3.3V Jumper in 3&4 selects +2.5V Jumper in 5&6 selects +1.8V
J11	Selects the supply voltage for +VDD	Jumper in 1&2 selects +3.3V (default) Jumper in 3&4 selects +2.5V Jumper in 5&6 selects +1.8V
J12	Not used for XRA140x	Installed but not used
J14	Not used for XRA140x	Installed but not used
J6	Not used	Installed but not used
J27	LEDs	NOTE: Not installed. Pin 2 is connected to GND
J3	Header for testing GPIO[15:8] of both TSSOP and QFN package	Installed. Connect to external input/output.
J4	Header for testing GPIO[7:0] of both TSSOP and QFN package	Installed. Connect to external input/output. Remove jumpers on J28, J29, J30 and J31 after test.
J2	Header for internal test	Not installed
J5	Header for XRA1403 and XRA1405 signals and spare signals	Installed. Connect SPI signals from this header to MCU.
J7	Header for UART signals and spare signals	Not installed. Some GPIO signals and spare signals are accessible at this header

2.2.2 XRA1403IL24-F

The following jumpers apply to the XRA1403IL24-F:

TABLE 4: JUMPER SETTINGS FOR XRA1403IL24-F

JUMPERS	FUNCTIONS	COMMENTS
J28	Header for connecting GPIO[7:0] signals of QFN package	Jumper in pin 1 & J29 pin1 connects GPIO0 to LED Jumper in pin 2 & J29 pin 3 connects GPIO1 to LED Jumper in pin 3 & J29 pin 5 connects GPIO2 to LED Jumper in pin 4 & J29 pin 7 connects GPIO3 to LED Jumper in pin 5 & J29 pin 9 connects GPIO4 to LED Jumper in pin 6 & J29 pin 11 connects GPIO5 to LED Jumper in pin 7 & J29 pin 13 connects GPIO6 to LED Jumper in pin 8 & J29 pin 15 connects GPIO7 to LED
J29	Header for connecting GPIO[7:0] signals of TSSOP package to LEDs	1&2 connects GPIO0 to LED - 0 ohm resistor on board 3&4 connects GPIO1 to LED - 0 ohm resistor on board 5&6 connects GPIO2 to LED - 0 ohm resistor on board 7&8 connects GPIO3 to LED - 0 ohm resistor on board 9&10 connects GPIO4 to LED - 0 ohm resistor on board 11&12 connects GPIO5 to LED - 0 ohm resistor on board 13&14 connects GPIO6 to LED - 0 ohm resistor on board 15&16 connects GPIO7 to LED - 0 ohm resistor on board
J30	Header for connecting GPIO[15:8] signals of TSSOP package to LEDs	1&2 connects GPIO8 to LED - 0 ohm resistor on board 3&4 connects GPIO9 to LED - 0 ohm resistor on board 5&6 connects GPIO10 to LED - 0 ohm resistor on board 7&8 connects GPIO11 to LED - 0 ohm resistor on board 9&10 connects GPIO12 to LED - 0 ohm resistor on board 11&12 connects GPIO13 to LED - 0 ohm resistor on board 13&14 connects GPIO14 to LED - 0 ohm resistor on board 15&16 connects GPIO15 to LED - 0 ohm resistor on board
J31	Header for connecting GPIO[15:8] signals of QFN package	Jumper in pin 1 & J30 pin 1 connects GPIO8 to LED Jumper in pin 2 & J30 pin 3 connects GPIO9 to LED Jumper in pin 3 & J30 pin 5 connects GPIO10 to LED Jumper in pin 4 & J30 pin 7 connects GPIO11 to LED Jumper in pin 5 & J30 pin 9 connects GPIO12 to LED Jumper in pin 6 & J30 pin 11 connects GPIO13 to LED Jumper in pin 7 & J30 pin 13 connects GPIO14 to LED Jumper in pin 8 & J30 pin 15 connects GPIO15 to LED
J81	Selects the supply voltage for +VDD for 24-pin QFN packages	Jumper in 2&4 selects +VDD (default) Jumper in 1&3 selects +VDD Jumper in 3&5 selects +VDD
J82	Selects the corresponding signal for pin 18 of 24-pin QFN package	NOTE: Use J87 pin 2 & 3
J83	Selects the corresponding signal for pin 23 of 24-pin QFN package	Jumper in 2&4 selects SI signal (default) Jumper in 1&3 selects A1 signal Jumper in 3&5 selects A1 signal
J84	Selects the corresponding signal for pin 24 of 24-pin QFN package	Jumper in 2&4 selects RESET# signal (default) Jumper in 1&3 selects A2 signal Jumper in 3&5 selects RESET# signal

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TABLE 4: JUMPER SETTINGS FOR XRA1403IL24-F

JUMPERS	FUNCTIONS	COMMENTS
J85	Selects the corresponding signal for pin 20 of 24-pin QFN package	Jumper in 2&4 selects SO signal (default) Jumper in 1&3 selects SDA signal Jumper in 3&5 selects SDA signal
J86	Selects the supply voltage for +VDDP for 24-pin QFN packages	Installed but not used for XRA1403IL24-F Jumper in 1&2 selects +VDDP Jumper in 2&3 selects +VDDP
J87	Selects the corresponding signal for pin 18 of 24-pin QFN package	Jumper in 2&3 selects CS# signal (default) Jumper in 1&2 selects A0 signal
J88	Selects the corresponding signal for pin 23 of 24-pin QFN package	Installed but not used for XRA1403IL24-F Jumper in 1&2 selects +VDD signal Jumper in 2&3 selects +VDD signal
J89	Selects the corresponding signal for pin 24 of 24-pin QFN package	Installed but not used for XRA1403IL24-F Jumper in 1&2 selects RESET# signal Jumper in 2&3 selects SI signal
J90	Selects the corresponding signal for pin 20 of 24-pin QFN package	Installed but not used for XRA1403IL24-F Jumper in 1&2 selects SDA signal Jumper in 2&3 selects SO signal
J71, J72, J73, J74, J75, J76, J77, J78, J79, J80	Not used for XRA1403IL24-F	Not installed.



2.2.3 XRA1403IG24-F

The following jumpers apply to the XR1403IG24-F:

TABLE 5: JUMPER SETTINGS FOR XRA1403IG24-F

JUMPERS	FUNCTIONS	COMMENTS
J28	Header for connecting GPIO[7:0] signals of QFN package	Installed but not used
J29	Header for connecting GPIO[7:0] signals of TSSOP package to LEDs	Jumper in 1&2 connects GPIO0 to LED Jumper in 3&4 connects GPIO1 to LED Jumper in 5&6 connects GPIO2 to LED Jumper in 7&8 connects GPIO3 to LED Jumper in 9&10 connects GPIO4 to LED Jumper in 11&12 connects GPIO5 to LED Jumper in 13&14 connects GPIO6 to LED Jumper in 15&16 connects GPIO7 to LED
J30	Header for connecting GPIO[15:8] signals of TSSOP package to LEDs	Jumper in 1&2 connects GPIO8 to LED Jumper in 3&4 connects GPIO9 to LED Jumper in 5&6 connects GPIO10 to LED Jumper in 7&8 connects GPIO11 to LED Jumper in 9&10 connects GPIO12 to LED Jumper in 11&12 connects GPIO13 to LED Jumper in 13&14 connects GPIO14 to LED Jumper in 15&16 connects GPIO15 to LED
J31	Header for connecting GPIO[15:8] signals of QFN package	Installed but not used
J71	Selects the supply voltage for +VDD for 24-pin TSSOP packages	Jumper in 2&4 selects +VDD (default) Jumper in 1&3 selects +VDD Jumper in 3&5 selects +VDD
J72	Selects the corresponding signal for pin 21 of 24-pin TSSOP package	NOTE: Use J78 pin 2 & 3
J73	Selects the corresponding signal for pin 2 of 24-pin TSSOP package	Jumper in 2&4 selects SI signal (default) Jumper in 1&3 selects A1 signal Jumper in 3&5 selects A1 signal
J74	Selects the corresponding signal for pin 3 of 24-pin TSSOP package	Jumper in 2&4 selects RESET# signal (default) Jumper in 1&3 selects A2 signal Jumper in 3&5 selects RESET# signal
J75	Selects the corresponding signal for pin 23 of 24-pin TSSOP package	Jumper in 2&4 selects SO signal (default) Jumper in 1&3 selects SDA signal Jumper in 3&5 selects SDA signal
J76	Selects the supply voltage for +VDDP for 24-pin TSSOP packages	Installed but not used for XRA1403IG24-F Jumper in 1&2 selects +VDDP Jumper in 2&3 selects +VDDP
J77	Selects the corresponding signal for pin 2 of 24-pin TSSOP package	Installed but not used for XRA1403IG24-F Jumper in 1&2 selects +VDD signal Jumper in 2&3 selects +VDD signal
J78	Selects the corresponding signal for pin 21 of 24-pin TSSOP package	Jumper in 2&3 selects CS# signal (default) Jumper in 1&2 selects A0 signal

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TABLE 5: JUMPER SETTINGS FOR XRA1403IG24-F

JUMPERS	FUNCTIONS	COMMENTS
J79	Selects the corresponding signal for pin 3 of 24-pin TSSOP package	Installed but not used for XRA1403IG24-F Jumper in 1&2 selects RESET# signal Jumper in 2&3 selects SI signal
J80	Selects the corresponding signal for pin 23 of 24-pin TSSOP package	Installed but not used for XRA1403IG24-F Jumper in 1&2 selects SDA signal Jumper in 2&3 selects SO signal
J81, J82, J83, J84, J85, J86, J87, J88, J89, J90	Not used for XRA1403IG24-F	Not installed

2.2.4 XRA1405IL24-F

The following jumpers apply to the XRA1405IL24-F:

TABLE 6: JUMPER SETTINGS FOR XRA1405IL24-F

JUMPERS	FUNCTIONS	COMMENTS
J28	Header for connecting GPIO[7:0] signals of QFN package	Jumper in pin 1 & J29 pin 1 connects GPIO0 to LED Jumper in pin 2 & J29 pin 3 connects GPIO1 to LED Jumper in pin 3 & J29 pin 5 connects GPIO2 to LED Jumper in pin 4 & J29 pin 7 connects GPIO3 to LED Jumper in pin 5 & J29 pin 9 connects GPIO4 to LED Jumper in pin 6 & J29 pin 11 connects GPIO5 to LED Jumper in pin 7 & J29 pin 13 connects GPIO6 to LED Jumper in pin 8 & J29 pin 15 connects GPIO7 to LED
J29	Header for connecting GPIO[7:0] signals of TSSOP package to LEDs	1&2 connects GPIO0 to LED - 0 ohm resistor on board 3&4 connects GPIO1 to LED - 0 ohm resistor on board 5&6 connects GPIO2 to LED - 0 ohm resistor on board 7&8 connects GPIO3 to LED - 0 ohm resistor on board 9&10 connects GPIO4 to LED - 0 ohm resistor on board 11&12 connects GPIO5 to LED - 0 ohm resistor on board 13&14 connects GPIO6 to LED - 0 ohm resistor on board 15&16 connects GPIO7 to LED - 0 ohm resistor on board
J30	Header for connecting GPIO[15:8] signals of TSSOP package to LEDs	1&2 connects GPIO8 to LED - 0 ohm resistor on board 3&4 connects GPIO9 to LED - 0 ohm resistor on board 5&6 connects GPIO10 to LED - 0 ohm resistor on board 7&8 connects GPIO11 to LED - 0 ohm resistor on board 9&10 connects GPIO12 to LED - 0 ohm resistor on board 11&12 connects GPIO13 to LED - 0 ohm resistor on board 13&14 connects GPIO14 to LED - 0 ohm resistor on board 15&16 connects GPIO15 to LED - 0 ohm resistor on board
J31	Header for connecting GPIO[15:8] signals of QFN package	Jumper in pin 1 & J30 pin 1 connects GPIO8 to LED Jumper in pin 2 & J30 pin 3 connects GPIO9 to LED Jumper in pin 3 & J30 pin 5 connects GPIO10 to LED Jumper in pin 4 & J30 pin 7 connects GPIO11 to LED Jumper in pin 5 & J30 pin 9 connects GPIO12 to LED Jumper in pin 6 & J30 pin 11 connects GPIO13 to LED Jumper in pin 7 & J30 pin 13 connects GPIO14 to LED Jumper in pin 8 & J30 pin 15 connects GPIO15 to LED
J81	Selects the supply voltage for +VDD for 24-pin QFN packages	Installed but not used for XRA1405IL24-F Jumper in 1&3 selects +VDD Jumper in 3&5 selects +VDD Jumper in 2&4 selects +VDD
J82	Selects the corresponding signal for pin 18 of 24-pin QFN package	Installed but not used for XRA1405IL24-F Jumper in 1&3 selects A0 signal Jumper in 3&5 selects A0 signal Jumper in 2&4 selects CS# signal

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TABLE 6: JUMPER SETTINGS FOR XRA1405IL24-F

JUMPERS	FUNCTIONS	COMMENTS
J83	Selects the corresponding signal for pin 23 of 24-pin QFN package	Installed but not used for XRA1405IL24-F Jumper in 1&3 selects A1 signal Jumper in 3&5 selects A1 signal Jumper in 2&4 selects SI signal
J84	Selects the corresponding signal for pin 24 of 24-pin QFN package	Installed but not used for XRA1405IL24-F Jumper in 1&3 selects A2 signal Jumper in 3&5 selects RESET# signal Jumper in 2&4 selects RESET# signal
J85	Selects the corresponding signal for pin 20 of 24-pin QFN package	Installed but not used for XRA1405IL24-F Jumper in 1&3 selects SDA signal Jumper in 3&5 selects SDA signal Jumper in 2&4 selects SO signal
J86	Selects the supply voltage for +VDDP for 24-pin QFN packages	Jumper in 2&3 selects +VDDP (default) Jumper in 1&2 selects +VDDP
J87	Selects the corresponding signal for pin 18 of 24-pin QFN package	Jumper in 2&3 selects CS# signal (default) Jumper in 1&2 selects A0 signal
J88	Selects the corresponding signal for pin 23 of 24-pin QFN package	Jumper in 2&3 selects +VDD signal (default) Jumper in 1&2 selects +VDD signal
J89	Selects the corresponding signal for pin 24 of 24-pin QFN package	Jumper in 2&3 selects SI signal (default) Jumper in 1&2 selects RESET# signal
J90	Selects the corresponding signal for pin 20 of 24-pin QFN package	Jumper in 2&3 selects SO signal (default) Jumper in 1&2 selects SDA signal
J71, J72, J73, J74, J75, J76, J77, J78, J79, J80	Not used for XRA1405IL24-F	Not installed.

2.2.5 XRA1405IG24-F

The following jumpers apply to the XR1405IG24-F:

TABLE 7: JUMPER SETTINGS FOR XRA1405IG24-F

JUMPERS	FUNCTIONS	COMMENTS
J28	Header for connecting GPIO[7:0] signals of QFN package	Installed but not used
J29	Header for connecting GPIO[7:0] signals of TSSOP package to LEDs	Jumper in 1&2 connects GPIO0 to LED Jumper in 3&4 connects GPIO1 to LED Jumper in 5&6 connects GPIO2 to LED Jumper in 7&8 connects GPIO3 to LED Jumper in 9&10 connects GPIO4 to LED Jumper in 11&12 connects GPIO5 to LED Jumper in 13&14 connects GPIO6 to LED Jumper in 15&16 connects GPIO7 to LED
J30	Header for connecting GPIO[15:8] signals of TSSOP package to LEDs	Jumper in 1&2 connects GPIO8 to LED Jumper in 3&4 connects GPIO9 to LED Jumper in 5&6 connects GPIO10 to LED Jumper in 7&8 connects GPIO11 to LED Jumper in 9&10 connects GPIO12 to LED Jumper in 11&12 connects GPIO13 to LED Jumper in 13&14 connects GPIO14 to LED Jumper in 15&16 connects GPIO15 to LED
J31	Header for connecting GPIO[15:8] signals of QFN package	Installed but not used
J71	Selects the supply voltage for +VDD for 24-pin TSSOP packages	Installed but not used for XRA1405IG24-F Jumper in 1&3 selects +VDD Jumper in 3&5 selects +VDD Jumper in 2&4 selects +VDD
J72	Selects the corresponding signal for pin 21 of 24-pin TSSOP package	Installed but not used for XRA1405IG24-F Jumper in 1&3 selects A0 signal Jumper in 3&5 selects A0 signal Jumper in 2&4 selects CS# signal
J73	Selects the corresponding signal for pin 2 of 24-pin TSSOP package	Installed but not used for XRA1405IG24-F Jumper in 1&3 selects A1 signal Jumper in 3&5 selects A1 signal Jumper in 2&4 selects SI signal
J74	Selects the corresponding signal for pin 3 of 24-pin TSSOP package	Installed but not used for XRA1405IG24-F Jumper in 1&3 selects A2 signal Jumper in 3&5 selects RESET# signal Jumper in 2&4 selects RESET# signal
J75	Selects the corresponding signal for pin 23 of 24-pin TSSOP package	Installed but not used for XRA1405IG24-F Jumper in 1&3 selects SDA signal Jumper in 3&5 selects SDA signal Jumper in 2&4 selects SO signal
J76	Selects the supply voltage for +VDDP for 24-pin TSSOP packages	Jumper in 2&3 selects +VDDP (default) Jumper in 1&2 selects +VDDP