

UG0903
User Guide
Pin-Outs of Hello FPGA Expansion Connectors



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1 Pin-Outs of Expansion Connectors

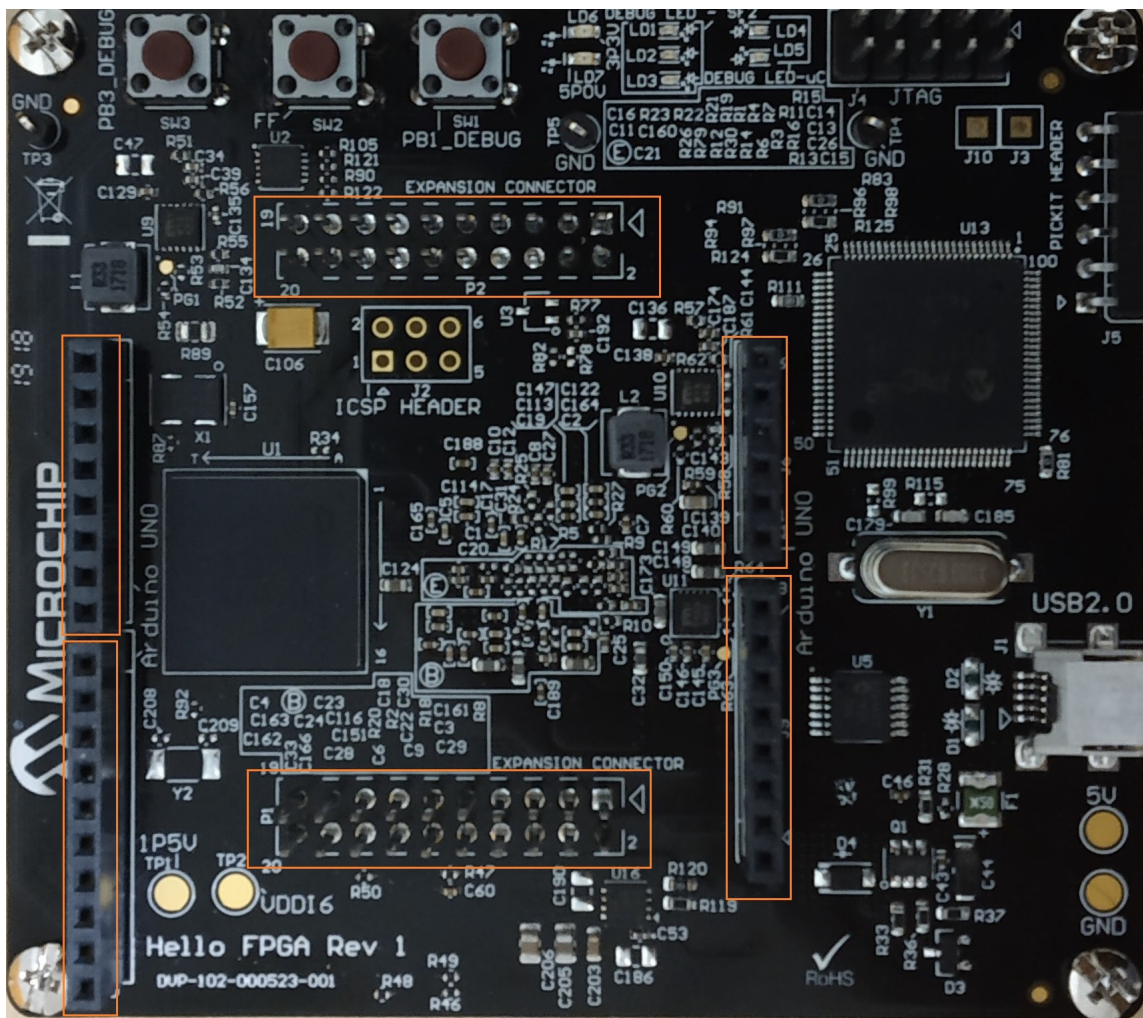
Microchip's Hello FPGA kit is developed to introduce field-programmable gate array (FPGA). The kit features Microchip's SmartFusion2 SoC FPGA and 32-bit MCU.

Three applications—Video, Digit Recognition (AI), and DSP FIR Filter—are developed to demonstrate the capabilities of the SmartFusion2 SoC FPGA. A video application typically requires a camera sensor module and a Digit Recognition (AI) application requires an LCD display module. The Hello FPGA kit includes a camera sensor board and an LCD board. For more information, see [QS0876: Hello FPGA Kit Quick Start Guide](#).

To support these expansion boards, the Hello FPGA kit supports dual-mounted Arduino compatible interfaces and 20-pin expansion headers. This document describes the pin-outs of these headers (or connectors). This pin-out information lets the designer know the pin-to-pin connectivity of the camera sensor/LCD board and the SmartFusion2 SoC FPGA. This information is required for proper assignment of FPGA I/Os during the development of application prototypes and probing the required signals.

The dual-mounted connectors of the Hello FPGA kit are highlighted in [Figure 1](#).

Figure 1 • Connectors on Hello-FPGA Kit



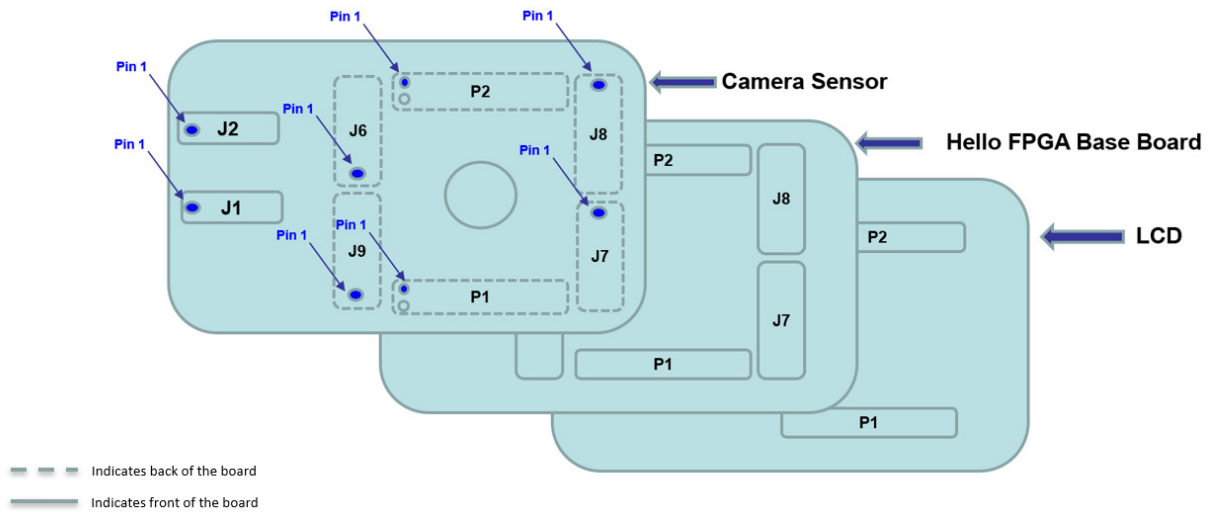
To run the three application demos, the camera sensor board, the Hello FPGA board (also called as the base board), and the LCD board must be connected as shown in [Figure 2](#).

Figure 2 • Hello FPGA and Expansion Boards Connection



Figure 3 shows the two-dimensional representation of the connectivity of the camera sensor, Hello FPGA base, and LCD boards.

Figure 3 • Hello FPGA Expansion Headers



1.1 Camera Sensor and Base Board Pin-Outs

As shown in Figure 1, P1 is a 20 pin expansion connector. Table 1 lists the pin-outs of P1 expansion connector between the camera sensor board and Hello FPGA board.

Table 1 • Pin-Outs of P1 (Camera Sensor and Base Board)

P1	Camera Sensor	Hello FPGA Base Board
1	D0	MSIO18PB2_H14 ¹ _P1
2	GND	GND
3	D1	MSIO19PB2_H15 ¹ _P1
4	NC (Not Connected)	MSIO18NB2_G14 ¹ _P1
5	D2	MSIO11NB2_N15 ¹ _P1
6	NC	MSIO6PB2_K14 ¹ _P1
7	D3	MSIO75NB7_F5 ¹ _P1
8	NC	MSIO6NB2_K15 ¹ _P1
9	D4	MSIO4NB2_L15 ¹ _P1
10	NC	MSIO4PB2_K16 ¹ _P1
11	D5	MSIO2NB2_M13 ¹ _P1
12	NC	MSIO75PB7_G5 ¹ _P1
13	D6	MSIO2PB2_N14 ¹ _P1
14	NC	MSIO78PB7_F4 ¹ _P1
15	D7	MSIO11PB2_N16 ¹ _P1
16	NC	MSIO79NB7_F2 ¹ _P1
17	SCL	MSIO79PB7_G1 ¹ _P1
18	NC	MSIO80NB7_G2 ¹ _P1

Table 1 • Pin-Outs of P1 (Camera Sensor and Base Board) (continued)

P1	Camera Sensor	Hello FPGA Base Board
19	SDA	MSIO19PN2_G16 ¹ _P1
20	NC	MSIO81NB7_H4 ¹ _P1

1. Pin name of the SmartFusion2 SoC FPGA.

As shown in [Figure 1](#), P2 is a 20 pin expansion connector. [Table 2](#) lists the pin-outs of P2 expansion connector between the camera sensor board and Hello FPGA board.

Table 2 • Pin-Outs of P2 (Camera Sensor and Base Board)

P2	Camera Sensor	Hello FPGA Base Board
1	3.3V	3.3V
2	5V	5V
3	NC	MSIO3PB2_L11 ¹ _P2
4	GND	GND
5	NC	MSIO117NB4_P13 ¹ _P2
6	NC	P220ADC_AN3 ¹ _P2
7	NC	MSIO81PB7_H3 ¹ _P2
8	NC	P24_ADC_AN1 ¹ _P2
9	NC	MSIO5NB2_L13 ¹ _P2
10	NC	P34_ADC_AN10_AN5_P2
11	XCLK	MSIO5PB2_L14 ¹ _P2
12	NC	P35_ADC_AN11_AN21_P2
13	PCLK	MSIO106PB4_T9_P2
14	NC	P41_ADC_AN12_AN7_P2
15	HREF	MSIO103NB4_P7 ¹ _P2
16	NC	P42_ADC_AN13_AN48_P2
17	VSYNC	MSIO_PB2_M15 ¹ _P2
18	NC	P43_ADC_AN14_AN9_P2
19	PWDN	MSIO1NB2_M16 ¹ _P2
20	NC	P77_ADC_AN25_AN8_P2

1. Pin name of the SmartFusion2 SoC FPGA.

[Table 3](#) lists the pin-outs of J6 expansion connector between the camera sensor board and Hello FPGA board.

Table 3 • Pin-Outs of J6

J6	Camera Sensor	Hello FPGA Base Board
1 ¹	AN	ARD_AN0_RB10_uC
2	AN1	ARD_AN1_RB11_uC
3	AN2	ARD_AN2_RB12_uC
4	AN3	ARD_AN3_RB13_uC

Table 3 • Pin-Outs of J6 (continued)

J6	Camera Sensor	Hello FPGA Base Board
5	AN4	RD_AN4_RB14_uC
6	AN5	RD_AN5_RB15_uC

1. Connects to Mikrobus J1/J2 Connectors on the camera sensor board.

Table 4 lists the pin-outs of J6 expansion connector between the camera sensor board and Hello FPGA board.

Table 4 • Pin-Outs of J7

J7	Camera Sensor	Hello FPGA Base Board
1	IO_8	MSIO113NB4_R10 ¹ _ARD_IO
2	IO_9	MSIO113PB4_P9 ¹ _ARD_PWM_IO
3 ²	CS	MSIO114NB4_M10 ¹ _ARD_PWM_SS_IO
4 ²	MOSI	MSIO115NB4_R11 ¹ _ARD_PWM_MOSI/IO11
5 ²	MISO	MSIO115PB4_T11 ¹ _ARD_MISO/IO12
6 ²	SCK	MSIO118NB4_R13 ¹ _ARD_SCK/IO13
7	GND	GND
8	AREF	NC
9 ²	SDA	MSIO112NB4_P8 ¹ _ARD_SDA_IO14
10 ²	SCL	MSIO112PB4_R8 ¹ _ARD_SCL_IO15

1. Pin name of the SmartFusion2 SoC FPGA.
2. Connects to Mikrobus J1/J2 Connectors on the camera sensor board.

Table 5 lists the pin-outs of J6 expansion connector between the camera sensor board and Hello FPGA board.

Table 5 • Pin-Outs of J8

J8	Camera Sensor	Hello FPGA Base Board
1 ¹	RX	MSIO78NB7_F3 ² _ARD_Rx_IO0
2 ¹	TX	MSIO80PB7_G3 ² _ARD_Tx_IO1
3 ¹	INT	MSIO103PB4_P6 ² _ARD_INT0_IO2
4 ¹	PWM	MSIO104NB4_N7 ² _ARD_INT1_PWM_IO3
5	IO_4	MSIO106NB4_R9 ² _ARD_IO4
6	IO_5	MSIO109PB4_P10 ² _ARD_PWM_IO5
7	IO_6	MSIO110NB4_T8 ² _ARD_PWM_IO6
8	IO_7	MSIO110PB4_T7 ² _ARD_IO7

1. Connects to Mikrobus J1/J2 Connectors on the camera sensor board.
2. Pin name of the SmartFusion2 SoC FPGA.

Table 6 lists the pin-outs of J6 expansion connector between the camera sensor board and Hello FPGA board.

Table 6 • Pin-Outs of J9

J9	Camera Sensor	Hello FPGA Base Board
1	NC	NC
2	3.3V	3.3V (through 0 ohm)
3 ¹	RST	MSIO116NB4_R12 ² _ARD_RESET
4	3.3V	3.3V
5	5V	5V
6	GND	GND
7	GND	GND
8	12V	NC

1. Connects to Mikrobis J1/J2 Connectors on the camera sensor board.
2. Pin name of the SmartFusion2 SoC FPGA.

1.2 Base Board and LCD Board Pin-Outs

As shown in Figure 1, P1 is a 20 pin expansion connector. Table 7 lists the pin-outs of P1 expansion connector between the Hello FPGA board and LCD board.

Note: The LCD board includes P1 and P2 connectors only, as shown in Figure 3.

Table 7 • Pin-Outs of P1 (Base Board and LCD Board)

P1	Camera Sensor	Hello FPGA Base Board	LCD Module
1	D0	MSIO18PB2_H14 ¹ _P1	NC
2	GND	GND	GND
3	D1	MSIO19PB2_H15 ¹ _P1	NC
4	NC	MSIO18NB2_G14 ¹ _P1	LCD_D0
5	D2	MSIO11NB2_N15 ¹ _P1	NC
6	NC	MSIO6PB2_K14 ¹ _P1	LCD_D1
7	D3	MSIO75NB7_F5 ¹ _P1	NC
8	NC	MSIO6NB2_K15 ¹ _P1	LCD_D2
9	D4	MSIO4NB2_L15 ¹ _P1	NC
10	NC	MSIO4PB2_K16 ¹ _P1	LCD_D3
11	D5	MSIO2NB2_M13 ¹ _P1	NC
12	NC	MSIO75PB7_G5 ¹ _P1	LCD_D4
13	D6	MSIO2PB2_N14 ¹ _P1	NC
14	NC	MSIO78PB7_F4 ¹ _P1	LCD_D5
15	D7	MSIO11PB2_N16 ¹ _P1	NC
16	NC	MSIO79NB7_F2 ¹ _P1	LCD_D6
17	SCL	MSIO79PB7_G1 ¹ _P1	NC
18	NC	MSIO80NB7_G2 ¹ _P1	LCD_D7
19	SDA	MSIO19PN2_G16 ¹ _P1	NC

Table 7 • Pin-Outs of P1 (Base Board and LCD Board) (continued)

P1	Camera Sensor	Hello FPGA Base Board	LCD Module
20	NC	MSIO81NB7_H4 ¹ _P1	LCD_CS

1. Pin name of the SmartFusion2 SoC FPGA.

As shown in [Figure 1](#), P1 is a 20 pin expansion connector. [Table 8](#) lists the pin-outs of P1 expansion connector between the Hello FPGA board and LCD board.

Table 8 • Pin-Outs of P2 (Base Board and LCD Board)

P2	Camera Sensor	Hello FPGA Base Board	LCD Module
1	3.3V	3.3V	3.3V
2	5V	5V	5V
3	NC	MSIO3PB2_L11 ¹ _P2	LCD_RS
4	GND	GND	GND
5	NC	MSIO117NB4_P13 ¹ _P2	LCD_WR
6	NC	P220ADC_AN3 ¹ _P2	NC
7	NC	MSIO81PB7_H3 ¹ _P2	LCD_RD
8	NC	P24_ADC_AN1 ¹ _P2	NC
9	NC	MSIO5NB2_L13 ¹ _P2	LCD_RST
10	NC	P34_ADC_AN10_AN5_P2	NC
11	XCLK	MSIO5PB2_L14 ¹ _P2	NC
12	NC	P35_ADC_AN11_AN21_P2	NC
13	PCLK	MSIO106PB4_T9 ¹ _P2	NC
14	NC	P41_ADC_AN12_AN7_P2	NC
15	HREF	MSIO103NB4_P7 ¹ _P2	NC
16	NC	P42_ADC_AN13_AN48_P2	NC
17	VSYNC	MSIO_PB2_M15 ¹ _P2	NC
18	NC	P43_ADC_AN14_AN9_P2	NC
19	PWDN	MSIO1NB2_M16 ¹ _P2	NC
20	NC	P77_ADC_AN25_AN8_P2	NC

1. Pin name of the SmartFusion2 SoC FPGA.

2 Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

2.1 Revision 1.0

The first publication of this document.